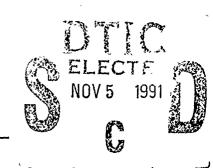
AD-A242 718



CRREL Technical Publications

Supplement 1976 to 1990





THE STATE TO A STATE THE S



#4.5 Army Corps #4:Engineers Cold-Regional Research

DISTRIBUTION STATEMENT A

Approved for public release; Distribution Unlimited

CRREL Technical Publications

Supplement 1976 to 1990

	S Sport II - St. Sales St. St.	/
·	ssion For	7
	TARRO	N1
pric		ñ
	.െ ഗദേർ	ō
Juse	Floation_	
37		
Distr	ibution/	
Avai	lability C	odes
	Avail and	
Dist	Special	1
01	1	4
17-1	.	AL NOW
ł		-372
-		



91 1104 143

91-15043



U.S. Army Corps of Engineers Cold Regions Research & Engineering Laboratory

CONTENTS

CRREL Scientific and Technical Reports	iii
NTIS Order Form	٧
CRREL Bibliography Order Form	vii
CRREL Reports (CR)	
Special Reports (SR)	
Monographs (M)	78
Technical Digests	81
Miscellaneous Publications	82
Author Index	222
Subject Index	269

CRREL Scientific and Technical Reports

Effective scientific and technical research depends on the transfer of information throughout the scientific community as well as the general dissemination of information to the public. CRREL has maintained an active publication program since its inception. This publications list is the supplement to the CRREL Publications List dated December 1975. The following descriptions are meant to clarify the CRREL report series.

CRREL Reports The results of all major research efforts at CRREL are published in the CRREL Report series.

Special Reports

The Special Report series contains a wide variety of reports that do not fall within the CRREL Report category, e.g. literature reviews, data compilations, interim reports.

Monographs

The Cold Regions Science and Engineering Monograph series comprises comprehensive reviews of a field of scientific or technical knowledge with analysis and evaluation. This series is not published on a regular basis and the numbers and frequency vary from year to year. This series would be considered classics in the field of cold regions science and engineering.

Miscellaneous Publications This series includes papers by CRREL authors that are published outside the laboratory but under CRREL funding. This series would include conference proceedings, contract reports, and journal articles.

Internal Reports and Technical Notes This series is not listed in our publications list but frequently is referred to in literature cited by CRREL authors. These documents have not been published for reasons such as proprietary information, excessive expense, limited interest, or awkwardness of format. Copies are available for review in the CRREL Library or with the author's explicit release. Technical Notes are informal, preliminary, unedited, and frequently superceded by a more formal CRREL publication. These are also not available for external distribution without prior permission from the author.

Stibliography on Cold Regions Science and Technology The Bibliography on Cold Regions Science and Technology has been sponsored at the Library of Congress by CRREL since 1951. This most important CRREL product has been published in volumes 1–15 as the Bibliography on Snow, Ice and Permafrost, SIPRE Report 12. Beginning with volume 16 the title was changed to Bibliography on

Snow, Ice, and Frozen Ground, with Abstracts, and with volume 23 the current title was adopted. This publication differs from the CRREL Publications List because it includes all the world's cold regions research in addition to the CRREL in-house work.

Almost all the literature cited in the Bibliographyon Cold Regions Science and Technology has been microfiched and is available in full text from the Library of Congress. If your requests number fewer than 10 you may borrow documents from the CRREL Library, 72 Lyme Road, Hanover, New Hampshire 03755-1290. Those interested in purchasing a photocopy of a document cited should write to the Library.

The *Bibliography* is available for purchase in three formats:

- Online searching is offered as FILE COLD through Orbit Search Service, 8000 Westpark Drive, MacLean, Virginia 22102 (phone 703-442-0900 or 800-445-7248).
- A CD-ROM version, Arctic and Antarctic Regions, is available from NISC, Suite 6, Wyman Towers, 3100 St. Paul St., Baltimore, Maryland 21218 (phone 301-243-0797 or FAX 301-243-0982).
- The paper version currently in 44 volumes is available for purchase from the National Technical Information Service (NTIS), Springfield, Virginia 22161 (phone 703-487-4650). The annual volume appears in two parts: author/subject index and the numerical listing. Every five years a five-year author/subject index has been published to simplify the search process.

Current Literature is a monthly listing of items added the previous month to the Bibliography on Cold Regions Science and Technology. This list is produced by the Library of Congress monthly. The monthly Current Literature comprises the annual volume of the Bibliography on Cold Regions Science and Technology. Only the annual volumes contain indexes. To receive the Current Literature, write to U.S. Army CRREL, Technical Communications Branch, 72 Lyme Road, Hanover, New Hampshire 03755-1290.

The CRREL Reports, Special Reports and Monographs are all available for purchase from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The telephone number is 703-487-4650. Please refer to the next page for ordering information, or copy the form.

Current Literature— Cold Regions Science and Technology

Availability of CRREL Publications

U.S. DEPARTMENT OF COMMERCE National Technical Information Service SPRINGFIELD, VA 22161

NTIS ORDER FORM



TELEPHONE ORDERS

Call (703) 487-4650

FAX Your Order (703) 321-8547 TELEX 89-9405 Subscriptions: (703) 487-4630

(See reverse side for RUSH and EXPRESS ordering options)

- HANDLING FEE: A handling fee is required for each order except Express, Rush, Subscription, Quir SERVICE, or Pickup orders.
- SHIPPING: U.S.: Printed reports and microfiche copies are shipped First Class Mail or equivalent. FOREIGN: Regular service: Printed reports and microfiche copies are shipped surface mail.

Air Mail service: Printed reports and microriche copies are shipped surface mail.

Air Mail service to Canada and Mexico: add \$3.50 per printed report; 75¢ per microfiche copy.

Air Mail service to all other addresses: add \$7.50 per printed report; \$1 per microfiche copy. Subscriptions and standing orders are sent surface mail; contact NTIS for Air Mail rates.

		DTIC Users Code: Contract No. Cast six digits - SHIP TO (Enter ONLY if different from purchaser):							
Last Name	First Initial	Last Name				First Init	ial		
Title	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Tide			-				
Company/Organization		Company/Organiza	ition						
Address		Address							
City/State/ZIP		City/State/ZIP	<u> </u>	·			-		
tention Atte Method of Payment Charge my NTIS Deposit Account		Attention							
Telephone number Telephone number			Der						
3 Order Selection (For com		rse) Customer††	QUA Printed	NTITY Micro-	UNIT	Foreign	TOTAL		
(Ordering by title only will delay your order)		Routing (up to 8 digits)	Сору	fiche	PRICE	Air Mail	PRICE		
1.	/CBM		ļ		ļ <u>.</u>				
2.	/CBM				 				
3	/CBM		-						
4.	/CBM		ļ		<u> </u>	 			
5.	/CBM	<u> </u>	<u> </u>			ļ			
6.	/CBM	<u> </u>	 						
<u>7.</u>	/CBM	<u></u>	<u>L</u>			L			
OVER—Order continued on rever		_			From O				
† Billing Service: This service is restricted to cus Canada, and Mexico for an additional \$7.50 per will be applied to all billings more than 30 days of	order. A late payment char	s, ge			and Mexico				
†† Customer Routing Code: NTIS can label each				Billing		red (\$7.50)			
organization. If you want this service, put your ro	outing code in this box.	UI			GRANI	TOTAL			

Rev. 6/31/89 PR-OFA

NTIS ORDER FORM—Side 2

3 Order Selection (Cont.) Enter the NTIS order number(s) Customer (Ordering by title only will delay your order) Customer Routing		QUANTITY					
		Customer Routing	Printed Copy	Micro- fiche	UNIT PRICE	Foreign Air Mail	TOTAL PRICE
8.	/CBM						
9.	/CBM						·
10.	/CBM						
11.	/CBM					<u> -</u>	
12.	/CBM						
13.	/CBM						
14.	/CBM				 		
15.	/CBM						
16.	/CBM						
17.	/CBM						
18.	/CBM						
19.	/CBM		<u></u>				
					8	Subtotal	

ENTER this amount on the other side of this form.



4 Computer Products

If you have questions about a particular computer product, please call our Federal Computer Products Center at (703) 487-4763.

TAPE DENSITY (9 track)

			(9 1	ack)	
Enter the NTIS order number(s) (Ordering by title only will delay your order)		Customer Routing	1600 bpi	6250 bpi	TOTAL PRICE
20.	/CBM				
21.	/CBM				
22.	/CBM				
23.	/CBM_				·
All magnetic tapes are sent air mail or equivalent				Subtotal	

All magnetic tapes are sent air mail or equivalent service to both U.S. and foreign addresses.

ENTER this amount on the other side of this form.



SPECIAL RUSH and EXPRESS ORDERING OPTIONS

Telephone: (800) 336-4700

in Virginia call: (703) 487-4700

RUSH SERVICE—Orders are processed within 24 hours and sent First Class or equivalent. U.S., Canada, and Mexico, add \$12 per item, other countries add \$14.50 per item (Air Mail postage additional, see other side).

EXPRESS SERVICE—Orders are processed within 24 hours AND delivered by overnight courier. Available to U.S. addresses only, add \$22 per item.

ORDER FORM for	SHIP TO:
Bibliography on Cold Regions Science	NAME
and Technology	ORGANIZATION -
MAIL ORDER TO:	
National Technical Information Service	STREET
Springfield, Virginia 22161	CITY, STATE, ZIP
Or call	☐ Check enclosed for
NTIS Sales Desk (703) 557-4650 (Telex 89-9405)	payable to "F&AO
, , , , , , , , , , , , , , , , , , ,	II C aumanu fram

STREET.

CITY, STATE, ZIP.

Check enclosed for _____ Checks must be made payable to "F&AO, USA NRDC," and must be in U.S. currency from a U.S. bank

Publication	•	_	NTIS order	Paper	Micro-		Unit*	
date	Coverage	Volume	number	сору	fiche	Quantity	price	Total
	077.4 504		10.405005			ļ .	30.00	
Sept 1951	SIP 1-781		AD 495995				30.00 30.00	
luly 1952 lan 1953	SIP 781-2400 SIP 2401-4000	2 3	AD 11941				30.00	
luly 1953	SIP 4001-5500	4	AD 23334				30.00	
Jan 1954	SIP 5501-7000	5	AD 29227				30.00	
ulv 1954	SIP 7001-8500	6	AD 42727				30.00	
Jan 1955	SIP 8501-10,000	7	AD 57394				30.00	
July 1955	SIP 10,001-11,500	8	AD 99684				30.00	
Jan 1956	SIP 11,501-13,000	9	AD 99685				30.00	
July 1956	SIP 13,001-14,000	10	AD 115158				30.00	
Jan 1957	SIP 14,001-15,000	11	AD 139463				30.00	
Jan 1958	SIP 15,001-16,000	12	AD 158195				30.00	
Jan 1959	SIP 16,001-17,000	13	AD 217715				30.00	
Jan 1960	SIP 17,001-18,000	14	AD 255775		<u> </u>		30.00	<u> </u>
Jan 1961	SIP 18,001-19,000	15	AD 277537		ļ		30.00	
Jan 1962	SIP 19,001-20,000	16	AD 278593			<u></u>	30.00	
June 1963	SIP 20,001-21,000	17	AD 432809				30.00	
June 1964	SIP 21,001-22,000	18	AD 447121				30.00	
June 1965	SIP 22,001-23,000	19	AD 621041		ļ		30,00	
June 1966	SIP 23,001-24,200	20	AD 641116		ļ		30.00 30.00	
June 1967	SIP 24,201-25,200	21	AD 658229			 	30.00	
June 1968	SIP 25,201-26,000	Com Subi A Austra	AD 672756 ADA 147763		 	 	30.00	
Dec 1983	SIP 1-26,000	Cum. Subj. & Author Index Vol. 1-22	ADA 147/03		1		30.00	
July 1969	23-1 to 23-5949	23	AD 696404			 	30.00	
July 1970	24-2 to 24-4014	24	AD 715769		···		30.00	
July 1971	25-1 to 25-4385	25	AD 740201				30.00	†
Sept 1972	26-1 to 26-4025	26	AD 752083				30.00	
July 1973	27-1 to 27-3104	27	AD 768099				30.00	
Dec 1973		Cum. Subj. & Author	AD A022642				30.00	1
		Index Vol. 23-27						
July 1974	28-1 to 28-4320	28	AD A 007092				30,00	
Oct 1975	29-1 to 29-4032	29	AD A 022640		L		30.00	<u> </u>
Dec 1976	30-1 to 30-4635	30	AD A 083016				30.00	L
Dec 1977	31-1 to 31-4544	31	AD A 063686				30.00	
Dec 1978	32-1 to 32-4772	32	AD A 083017		<u> </u>		30.00	
Dec 1978		Cum. Subj. & Author	AD A 083015		1		30.00	1
		Index Vol. 28-32			ļ	 		
Dec 1979	33-1 to 33-4770	33	AD A 097639		 	<u> </u>	30.00	-
Dec 1980	34-1 to 34-4255	34	AD A 102357		 	 	30.00	
Dec 1981	35-1 to 35-4342	35	AD A 115954		 	 	30.00	
Dec 1 982	36-1 to 36-4268	36	ADA 134620		 	 	30.00	
Dec 1983	37-1 to 37-4389	Cum Subi & Author	ADA 149148	 -	 	 	30.00 30.00	
Dec 1983		Cum. Subj. & Author	ADA 149147				50.00	1
Dec 1004	38-1 to 38-4596	Index Vol. 33-37	ADA 154638		 	+	30.00	
Dec 1984 Dec 1985	38-1 to 38-4590 39-1 to 39-4069	38 & Index	ADA 173543		 	 	J	1
DCC 1703	לטווייקנ טי וייקנ	39 Index	ADA 173474				30.00	
 	 	39 Index	ADA 185048		†	1	20.00	1
Dec 1986	40-1 to 40-4788	40 Index	ADA 185049		1		30.00	1
Dec 1987	41-1 to	41	ADA 190161		T	1	30.00	T
	41-4639	41 Index	ADA 190162					<u></u>
Dec 1988	42-1 to	42	ADA 207649			1	30.00	T
	42-4328						L	
Dec 1988		Cumulative Subj.	ADA 207651		T		30.00	
		Index Vol. 38-42			1			
Dec 1988		Cumulative Author Index	ADA 207650				30.00	
	<u> </u>	Index Vol. 38-42			<u> </u>	1		
Dec 1989	43-1 to	43	ADA 220985	,			30.00	
	43-4649	43 Index	ADA 220986		1	1	30.00	1

CRREL REPORTS

CR 76-01 ARCTIC ENVIRONMENT AND THE ARCTIC SURFACE EFFECT VEHICLE.

Sterrett, K.F., Jan. 1976, 28p., ADA-024 849, Bibliog.

raphy p.25-28.
31-4161
AIR CUSHION VEHICLES, SEA ICE, GRAPHIC FEATURES, ARCTIC LANDSCAPES. GRAPHIC FEATURES, ARCTIC LANDSCAPES. This report summarizes the advances in understanding of the Arctic which have come about since the inception of the ARPA Arctic Surface Effect Velucie Program in 1970, primarily as the result of CRREL's participation. Major efforts to increase knowledge of sea ice, terrestrial, and coastal topographic features are described. Special emphasis is placed upon the quantitative understanding of pressure ridging. Other areas of major interest are atmospheric cheracteristics and ecological effects. A list of publications generated is included.

CR 76-02 PROTECTED MEMBRANE ROOFS IN COLD

REGIONS. Aamot, H.W.C., et al, Mar. 1976, 27p., ADA-025 226, 32 refs

31-4167

WATERPROOFING, INSULATION. ROOFS. COST ANALYSIS.

COST ANALYSIS.
Protected membrane roofs have the prerequisites for better performance and the experience to date is encouraging. The results of performance measurements of three roofs built by the Corps of Engineers verify that the mambrane remains at nearly constant temperature, independent of the weather, and that the insulation retains its integrity despite periodic wetting. Moisture absorption is slow and appears to stabilize in time due to the self-drying nature of the roof. Heat losses are increased due to rain, and extra insulation should be added to compensate for these losses. The resistance of protected membrane roofs to fire, traffic, impact, and other adverse forces is superior. So far, the initial cost of protected membrane roofs is at a premium, primarily due to the cost of concrete pavers. The initial cost premium can be justified, however, by the reduced repair and maintenance costs as indicated to date, and by the longer life expectancy of the protected membrane. The high probability of superior performance and cost effectiveness is a compelling reason to incorporate protected membrane roofs increasingly in Government construction.

CR 76-03 CR 76-63 SURVEY OF DESIGN CRITERIA FOR HAR-BORS AND CHANNELS IN COLD REGIONS— AN ANNOTATED BIBLIOGRAPHY. Haynes, F.D., Mar. 1976, 32p., ADA-025 226.

31-4163 BIBLIOGRAPHIES, PORTS, CHANNELS (WA-TERWAYS), ICE LOADS, DESIGN CRITERIA

A world-wide review of the literature applicable to the design of harbors and channels in cold regions was conducted Forces due to ice movement present the domicant factor in the design of marine structures in cold regions. Expressions for calculating the ice force are presented. Other factors relating to design criteria such as construction materials, structure geometry, and methods of ice suppression are discussed.

ISLANDS OF GROUNDED SEA ICE Kovacs, A., et al, Apr. 1976, 24p., ADA-025 257, 26

Gow, A.J., Dehn, W.F.

31-4164 SEA ICE, ICE ISLANDS, SPACEBORNE PHO-TOGRAPHY.

TOGRAPHY.

Large areas of grounded sea ice have been reported by early arctic explorers and more recently by the U.S. Coast Guard. The ESSA, ERTS, NOAA and DMSP satellites now provide multispectral imagery with sufficiently high resolution to allow detailed sequential observations to be made of the monement and spatial extent of arctic sea ice. This report discusses the location, formation and decay of five large (>30 sq km) islands of grounded sea ice in the southern Chukchi Sea as observed for an extended period of time using satellite imagery. Measurements of the bathymetry around one grounded sea ice feature are presented along with observations made and photos taken from the cosurface. The potential use of these sea ice islands as research stations. be potential use of these sea are islands as research stations also discussed.

CR 76-05 INTERPRETATION OF THE TENSILE STRENGTH OF ICE UNDER TRIAXIAL INTERPRETATION TENSILE Nevel, D.E., et al, Apr. 1976, 9p., ADA-027 042, 12

refe

Hayn s, F.D.

31-4165 ICE STRENGTH, TENSILE STRENGTH, THEO-RIES, STRESSES.

RIES, STRESSES.

Griffith, and later Babel, have previously developed a tensile fracture criterion for a two-dimensional state of stress. This theory is extended to the compression-compression region. From this theory the angle of fracture is developed. The tentory is extended conceptually to three dimensions. al test data by Haynes for snow-ice are shown in this three-dimensional fracture theory. The test data are slightly less than those predicted when the void in the snow-ice is spherical.

CR 76-96 WATER PLOW THROUGH VEINS IN ICE. ADA-026 631, 8 eck, S.C., Apr. 1976, 5p., ADA-026 631. 8 refs. 31-4166

GLACIERS, WATER FLOW, WATER PRESSURE, POROUS MATERIALS.

Water flow through the vein structure of temperate ice is described as Durcian flow in which the pressure gradient is determined from vein size and overburden pressure. A solution method for the resulting equation is given and two special cases are considered.

For steady flow the equilibrate. vein size is a function of depth and, by neglecting the effects of diffusion, it is shown that flow perturbations introduced at the surface propagate downward at a constant speed. These perturbations propagate so slowly that even annual surface fluctuations of fluw may be channated by diffusion before reaching the bottom of the glacier.

CR 76-07
CANTILEVER BEAM TESTS ON REINFORCED

Ohstrom, E.G., et al. Apr. 1976, 12p., ADA-025 380, 6 refs

DenHartog, S.L.

31-4167

ICE STRENGTH, ICE ROADS, FLOATING ICE, REINFORCEMENT (STRUCTURES).

REINFORCEMENT (STRUCTURES).

To determine the effectiveness of reinforcement in ice roads or other uses of a floating ice sheet a series of in-situ cantilever beam tests were run in both seawater ice and frenhwater ice. Tests were run using 1-in-diameter tree branches, 3/16-in-diameter wire rope and 9/16-in, half-round wood dowels. The tests demonstrated clearly that properly placed reinforcement increases the bending strength of the ice and showed further that reinforcement reduces the chance of equipment loss. The question of whether to reinforce or simply grow a thicker ice sheet has not been addressed as this is more a problem of local economics.

TENTS IN FROZEN SOILS FROM LIQUID DETERMINATIONS. PREDICTION OF UNFROZEN WATER CON-

Tice, A.R., et al, Apr. 1976, 9p., ADA-026 632, 30 refe

Anderson, D.M., Banin, A.

31-4168

SOIL WATER, UNFROZEN WATER CONTENT. SOIL WATER, UNFROZEN WATER CONTENT. During the past decade a number of methods for measuring the amount of unfrozen water in partially frozen ground have emerged.

Means of quickly and simply predicting unfrozen water contents in elay have become increasingly important with the growth of interest in encapsulating elay soils compacted at low water contents to serve as baccourses for roads. Unfortunately the measurements require sophisticated equipment and, in most instances, specially trained operators. In an effort to simplify the task of obtaining water-ice phase composition data, methods of calulating observements on curves from other, sumbler measurements. obtaining water-ice phase composition tast, memorals or car-culating phase composition curves from other, simpler measure-ments on soils have been sought. In this paper we present a method of deriving the measurement of unfrozen water contents at various temperatures from liquid l-mit determina-tions. Previous studies have indicated that phase composi-tion curves can be well represented by a simple power equation, W sub u = alpha x theta sup beta, where W sub u is the unfrozen water content in g HZ/0g soil, theta is the temperature in degrees below freezing and alpha and beta are empirical constants characteristic of a given soil. When the liquid limits of a large group of soils encompassing a wide range of textures were regressed against values of alpha, the correlation was found to be remarkably good. This has permitted the development of a recustion equation of sufficient accuracy for general engineering use. sition curves from other, simpler measure-

CR 75.00 SITE ACCESS FOR A SUBARCTIC RESEARCH EFFORT.

Slaughter, C.W., Apr. 1976, 13p., ADA-026 624, 9

31-4169

RESEARCH PROJECTS, REMOTE SENSING. SITE ACCESSIBILITY.

Access to study areas may be an important factor in low term field-oriented research, particularly in regions with well-developed road and communications systems. In term field-oriented research, particularly in regions without well-developed road and communications systems. In a wildhand hydrometeorology research project in subarctic Alaska, access to and within a 40-square-mile research watershed has been developed both in accordance with a general plan prepared at project inception and in response to developing research requirements. Foot trails, trails for "off-read" low-ground-pressure tracked vehicles, belicopper transport, long-term data recorders, and radio telemetry of data have all been incorporated in an access and communications system. Cost estimates indicate that incorporation of gravit roads into the system would be economically advantageous, given adequate funding for initial road construction.

CR 76-10 DE-ICING USING LASERS.

Lane, J.W., et al, Apr. 1976, 25p., ADA-026 637. 27 eole

Marshall, S.J.

31-4170

ICE REMOVAL, LASERS, STRUCTURES, DAM-AGE.

AGE. The feasibility of employing a laser to de-ice remote surfaces was investigated. A Nd-Glass laser, wavelength 1.06 micrometers, and a Ruby laser, wavelength 6943Å, were used to irraducte ice grown upon six types of substrates—suphalt, brass, converte, alumnamm, steel, and stame. It was found that a single pulse, delivered to the interface between the ice and its substrate at a power density of 100 malion to 1 billion watts/ent2, produced fractures 0.1 to 2 cm in diameter for all substrates. If the initial fracture could be propagated by suitables examing of the optical beam over the interface, the ice could be disrupted and thus removed from the substrate. The stechnique could also be a useful adjunct to de-icing method that depend upon the enistence of an initial crack. The process of producing the initial fracture was found to be limited by that hickness of the ice, the bubble content of the ice, and the focusing system. focusing system

CR 76-11 CR 70-11 EFFECTS OF RADIATION PENETRATION ON SNOWMELT RUNOFF HYDROGRAPHS. Colbeck, S.C., Apr. 1976, 9p., ADA-025 763, 10 mfs. For this report from snowher source see 31-4211.

31-4171

SNOW HYDROLOGY, RUNCFF, RADIATION ARSORPTION

ABSORPTION. Water flow through the unsaturated portion of a surespeck is calculated using various assumptions about the interestion into the snew. The results show that for the purposes of hydrologic forecasting, it is sufficiently accurate to assume that all of the radiation absorption occurs at the surface. The error in the calculation of flow is largest for very shellow snowspecks, but this error is reduced by radiation absorption at the base of the snew and by the resting of richtwater through the saturated based inyer.

CR 76-12 TRANSPER CHARACTERISTICS MELTING AND REFREEZING A DRILL HOLE THROUGH AN ICE SHELF IN A TARCTICA. Yen, Y.-C., et al, Apr. 1976, 15p. ADA-026 365, 3

Tien. C 31-4172

refs.

HEATTRANSFER, BOREHOLES, ICE SHELVES, ICE MELTING, REGELATION.

ICE MELLTING, REGILLATION.

The heat transfer processes associated with melting and refreeing a drill hale 500 m in depth and (\$150 m in initial
radius through an ice shelf were approximately analyzed.

The results were expressed in graphical from thomag the
time available for experimentation under the incle as a function
of heating duration and heating strength. It was found
that the refluency of she drill hole had a much slower
rate than the angling of the hole. (Auth)

WINTER THERMAL STRUCTURE AND ICE CONDITIONS ON LAKE CHAMPLAIN, VER-MONT.

Bates, R.E., June 1976, 22p., ADA-027 146, 9 refs.

LAKE ICE, THERMAL REGIME. ICE CONDI-TIONS, MEASURING INSTRUMENTS, UNITED STATES-VERMONT-LAKE CHAMPLAIN

The thermal structure and ice conditions of Lake Champlain, a mid-lotitude large lake, near Steburne Point, Verment, were studied during the winter of 1974-75. The lake was instrumented to a depth of 8.5 m with a string of highly calibrated thermisters, connected to a data logger on shore which recorded water temperatures every four lower. An ice mounting system was developed to anchor the thermister string so that ice and water temperatures could be obtained at known levels. This temperature recording system measured vertical and horizontal variations in ice and water temperature regimes during ice formation, growth and decay. Metamardiancial data were measured during the winder seried highly calibrated therm temperature regimes during ice formation, growth and decay. Metacrological data were measured during the winter period November 1974 through March 1975 at the site. Ice stratigraphy was determined for the ice at the site at its maximum sensonal growth for comparison with ice from St. Allans Bay (at the northern end of Lake Champlain) which had formed earlier. Correlations were determined between ice growth and accumulate i ergree days of freezing. The operation of a bother system installed near the measurement site around a service dock was observed.

CR 76-14 THERMAL POLLUTION STUDIES OF PRENCH CREEK, EIELSON AFB, ALASKA. McFadden, T., June 1976, 5p., ADA-027 405, 7 refs.

THERMAL POLLUTION, WATER POLLUTION,

THERMAL POLLUTION, WATER POLLUTION, UNITED STATES—ALASKA—EIELSON AFB. At the height of warm weather in Alaska in 1975, temperature measurements were made to determine the extent of the thermal impact on French Creek due to a condenser cooling water impact from the Eichson AFB Power plant. Water temperature measurements during a two-day period failed to show any significant thermal impact on the water in French Creek. It was concluded that no thermal pollution exists due to this warm water input at the volumes and conditions that presently exist.

CR 76-15 REVEGETATION IN ARCTIC AND SUBARCTIC NORTH AMERICA—A LITERATURE REVIEW. Johnson, L.A., et al. June 1976, 32p., ADA-027 406, Bibliography p.22-28. Van Cleve, K.

31-4175 PLANTS (BOTANY), ARCTIC LANDSCAPES, SUBARCTIC LANDSCAPES, REVEGETATION.

SUBARCHE LANDSCAPES, REVEGETATION.

A literature review of revegetation and biological aspects of restoration research was completed for arctic and subarctic North America. Although there is a great dead of climatic variation in this region it is generally characterized by extreme andictions, such as a short growing season and permitrost. Most of the revegetation research has been undertaken in the last nX years so a result of increased natural resource development. The princing goal has been enosion control, with aesthetics, minimization of thermokarst, and production development. The princip goal has been erosion control, with aesthetics, minimization of thermolarst, and production of broate as other rejectives. Revegetation and long-term restoration methods depend upon such variables as the size conditions, notrent regime (especially as this is influenced by the elimatic conditions in the Arctic and Subarctic), plant adaptations, and the selection of native or introduced spicies. Technologies where have been developed to meet these evolutions primarily include seeding methods. Most of such mines, and ferthization and seeding methods. Most of such mines, and ferthization and seeding methods. Most of such sizes, and regimes. There are selected on the basis of a number of factor, such as cold hardinens and growth form prior to evaluation in the laboratory and the field. The most successful species to dete have been Arctared fescue and Nugget bluegrass in the Arctic, while these two as well as creeping red fescue, sender wheatgrass, and Icelandic on distribution and Subarctic. Similar methods have been attempted to a more limited extent with evaluation of native herbaceus and woody species which seem promising on the basis of uniteral, succession studies. There are a number of continuing research needs for arctic and subsectic respectation. These include fertilization strategies, development of specialized techniques (such as springing) for native species, and longer term studies. It is pericularly important on mingrate short-term revegetation methods with long-term restoration gasks. t CHOTALION BANKS.

MECHANICS OF CUITING AND BORING. PART II: KINEMATICS OF AXIAL ROTATION MACHINES.

Mellor, M., June 1976, 45p. ADA-027 279, 11 refs. 31-4177

ROCK DRILLING, ROTARY DRILLING, AU-GLES, TUNNELING (EXCAVATION), ME-CHANICAL PROPERTIES, EXCAVATION, CUT-

TING FOOLS.

TING TOOLS.

This report, which is one of a series on the mechanics of cutting and boring in rock, d als with the kinematics of seachines such as rotary drills, zugers, tunnel boring machines, correst, and rase bores, it, which the rotary cutting unit revolves arout an axis that is parallel to the machine's direction of adsance. The discussion and analysis covers the geometry and motion of various components of the cutting system, including such topics as tool trajectories, tool speeds, motions of the mote complicated mechanisms, chopping depth, pencitation rates, production and clearance of cuttings, trool angles, and spatial distribution of cutters. Worked examples are given to illustrate the application of various equations to practical problems.

CR 76-17

MECHANICS OF CUTTING AND BORING. PART III: KINEMATICS OF CONTINUOUS BELT MACHINES.

Mellor, M., June 1976, 24p., ADA-027 \$33, 2 refs. 31-4178

ROCK DRILLING, EXCAVATION, CUTTING TOOLS, CONTINUOUS BELT MACHINES.

TOOLS, CONTINUOUS BELT MACHINES. This report, which is one of a series on the mechanics of cutting and boring in rock, deals with the kinematics of mechanes which utilize a continuous belt as the cutting unit (e.g. coal saws, shale saws, diagner-chain trenchers). The discussion and analysis covers the geometry and motion of various components of the cutting system, including such topics as chipping depth, production and conveyance of cutings, tool trajectorics, tool speeds, tool angles, and arrangement of cutting tools on the belt. Worked examples are included to libustrate the application of various equations to practical realisms.

THICKNESS AND ROUGHNESS VARIATIONS
OF ARCTIC MULTIYEAR SEA ICE.

Ackley, S.F., et al, June 1976, 25p., ADA-028 066, 11

Hibler, W.D., III, Kugzruk, F.K., Kovacs, A., Weeks, 31-4170

SEA ICE, ICE COVER THICKNESS, SURFACE ROUGHNESS, MODELS.

Three surface elevation and ice thickness profiles obtained during the 1972 Arctic Ice Dynamics Joint Experiment Pilot Study on a multiprar ice flow were gestlyzed to obtain relationships between the surface elevation, thickness and physical properties of the ice. It was found that for ice freeboards Study on a musicycar ice flow were entity and to obtain relationships between the surface cleviation, thickness and physical properties of the ice. It was found that for ice freeboards from 0.10 m to 1.05 m above sea level a linear relationship between the ice density and the freeboard could be postulated in a statistical relationship consistent with the observed physical properties, which indicate that as the ice freeboard increases, the ice salinity decreases and the higher freeboard or thicker ice therefore decreases in density. Using this variable density with freeboard relationship, a madel was constructed to predict the ice thickness, given the ice freeboard and anow depth alone. The model was compared with two other models, one assuming constant ice density (independent of freeboard) and the other using smoothing fifters for predicting the ice thickness. It was found that the variable density prediction madel gave the best approximation to the observed ice thickness, with a standard error between the measured and predicted value of about 0.6 m, compared with errors from 50 to 1007; higher for the other two models. The model was also compared with dota on multiyear ice from two other investigations in different regions and was found to give error estimates similar to the error of the data set on which the model can be useful to estimate multiyear ice thicknesses from surface elevation information obtained either by ground-based techniques or by aerial methods such as laner profitometry or stereo aerial photogrammetry. The effect of the variable density on estimates of the stress induced in the ice sheet by instante imbalance loading was examined and the results are presented in an appendix. Consideration of this property led to the conclusion that stresses from sources other than isostitic imbalance must account for 75% or more of the bending stresses necessary to induce cracking in multi-year ice.

CR 76-19 WASTEWATER RENOVATION BY A PROTO-TYPE SLOW INFILTRATION LAND TREAT-MENT SYSTEM.

Iskandar, I.K., et al. June 1976, 44p., ADA-029 744, Bibliography p.33-35. Sletten, R.S., Leggett, D.C., Jenkins, T.F.

32-1066

WASTE TREATMENT, WATER TREATMENT, SOIL CHEMISTRY, SEEPAGE.

The feasibility of a slow-infiltration land treatment system as an alternative to advanced waste treatment of wastewater was studied using six outdoor test cells. Wastewater was was studied using six outdoor test cells. Wastewater was applied to forage grasses by spray irrigation. Farameters studied were wastewater application rate, effect of pretreatment and soil type and seasonal effects on the treatment system. Activated sludge pretreatment of the applied wastewater did not improve the overall quality of the product water from this slow-infiltration system. The upsake of nutrients by forage grasses accounted for significant removal of nitrogen and phosphorus from applied wastewater during the growing season. Other renovative mechanisms, namely nitrification of applied nitrogen and phosphorus immobilization and fixation by the soils may have accounted for further renovation of the applied effuents. The introgen loading rate appeared to be the critical factor in limiting loading rate appeared to be the critical factor in limiting securing removation of the applied efflicits. The nitrogen loading rate appeared to be the critical factor in limiting the amount of wastewater that could be successfully applied to this type of land treatment system, at least over the to this type of land treatment system, at least over the short term. Also the renevative mechanisms for nitrogen were found to be seasonally dependent. Due to decreased nitrification and sorption of arimonium by soil components introgen was stored in the winter months. The sorbed ammonium underwent nitrification in the warmer months, giving rise to a high concentrations observed in leachate after the first very of waitenages, and increases after the first very of waitenages. the first year of wastewater application were attributed to mineralization of native organic-5. Application of 15 cm/week of secondary effluent containing 27 mg/l total

N to sandy loant soil produced percolate water containin NO3-N concentrations consistently in excess of accept drinking water standards (10 mg NO3-N/1), Leachin phosphorus was not observed but needs further study predict long-term effects. Winter-time application was successful in terms of operational parameters, but the renovati phosphorus was not observed but needs further study to predict long-term effects. Winter-time application was suc-cessful in terms of operational parameters, but the renovative capacity for nitrogen was impaired. The effect on the other water quality parameters such as suapended solids, BOD, fecal coliform and organic-C was essentially complete removal. There was a negative chloride balance which was presumed to be due to plant uptake.

CR 76-20 APPARENT ANOMALY IN FREEZING OF OR-

DINARY WATER. Swinzow, G.K., June 1976, 23p., ADA-039 177, 9 refs. 32-1067

ICE FORMATION, ICE CRYSTAL NUCLEI, SUPERCOOLED WATER, IMPURITIES, TEMPERATURE VARIATIONS, LABORATORY TECHNIQUES.

TECHNIQUES. Under orditions the freezing of water begins with supercooling and ice nucleation, and proceeds at OC at the ice/water interface until ice formation stops. The presence of solutes, high pressure, or dispersal in fine pores causes the water to freeze at temperatures below OC (the so-called freezing point depression). Whenever freezing begins, it proceeds at a constant temperature, or at a temperature which becomes propressively lower. A temperature rise during ice formation is considered here to be an aboundly. Under all cound circumstances, the conditions under which during ice formation is considered here to be an anomaly. Under all equal circumstances, the conditions under which an anomalous freezing temperature is observable appear to be very special. This repriv describes two deflerent experiments displaying the anomalous rise of temperature after nucleation and during ice formation. In one case twater was dispersed in the fine pures of fine powders; in the other case pure water was frozen in a transparent insoluted cell. Photographic observations were made; relations of ice surface to water volume were measured.

CR 76-21 COMPRESSIBILITY CHARACTERISTICS OF COMPACTED SNOW.

Abele, G., et al, June 1976, 47p., ADA-028 622, 5 refs. Gow. A.J.

32-1068 SNOW TEMPERATURE, SNOW DENSITY, SNOW DEFORMATION, STRESSES, PHASE TRANSFORMATIONS, RECRYSTALLIZATION. TRANSPORMATIONS, RECRYSTALLIZATION, The effects of snow temperature and initial density on the stress vs density and stress vs deformation relativiships were investigated for shallow compacted snow in the density range of 0.28 to 0.76 g/cu cm. for a stress range of 0.5 to 72 bars and a temperature range of -1 to -34C at a deformation rate of 40 cm/sec. A decrease in temperature increases the resistance to stress, the effect increasing with applied stress. For any stress, an increase in the initial density results in an increase in the resulting density, the effect decreasing with an increase in stress. The approximate decreasing with an increase in stress. The approximate specific envelopes, which define the stress required to inition any deformation of snow of a particular density and temperature, were determined. Rapid compaction of snow result in extensive recrystallization, significantly different from the of naturally compacted snow. At a stress of 72 bon transformation to see occurs only at temperatures above.

CB 74.22

CR 76-22 EVALUATION OF MESL MEMBRANE—PUNC-TURE, STIFFNESS, TEMPERATURE, SOL-VENTS

Sayward, J.M., June 1976, 60p., ADA-027 834, 30 32-1069

SOIL STRUCTURE, SOIL STRENGTH, PROTEC-TIVE COATINGS, FROST PROTECTION, CEL-LULAR PLASTICS.

Several membrane materials used or considered for MESL (membrane-enveloped seal layer) utilization of poor seals in road construction have been tested for cold effect on puncture and stiffness. PE (polyethylene) film was also tested for solvent soak effects. A symple blunt needle apparatus and stiffness. PE (polyethylene) film was also tested for solvent seak effects. A simple built needle apparatus was devised for puncture testing. For plastic films (mainly PE), both puncture resistance and stiffness increase at low temperature. For non-winen, spunhonded fabrics these properties are little affected by cold. For both non-winens and PE film, puncture and bending strengths increase linearly with weight not hickness. The soope is steeper for the non-winens, which generalls are stronger on a per unit weight hasts. PE film soaked in a hydrecarbon solvent swelled approximately 17% and lost about 30-40% of its puncture strength. These effects are apparently reversible upon drying. Consideration has been given to seasing puncture strength. These effects are apparently reversible upon drying. Consideration has been given to sealing and patching requirements and in the drying of scalant liquids when adhering film to film. Also considered have been possible slippage related to the reported low angle of friction of plastic films in soil and the possibility of lamination for improved. membrane properties.

STUDY OF PILES INSTALLED IN POLAR SNOW.

Kovacs, A., July 1926, 132p., ADA-029 191, 18 refs. 32-1070 PILE DRIVING, SNOW BEARING STRENGTH,

SNOW MECHANICS, GREENLAND.

This report describes the study of piles tested in polar snow at Camp Centery, Greenland. More than 20 piles of various lengths and since were driven, including timber, closed-ond and open-end steel pipe piles, and I- and H-piles. The H-piles were instrumented with strain pages. In addition to the driven piles, two purely end-bearing piles were installed in angered hotes and five piles were frozen in place using a smort-water slury. Driving records were obtained and are discussed. Analysis of the driving response of various piles revealed that the Hiley Soranula, and pre-smootly other similar pile driving formulas, cannot be used to product the ultimate supporting capacity of piles driven in snow. Factors such as pile inertia, rigidity, size, and tip resistance are discussed in relation to their apparent influence upon pile penetrasion. Pile load test procedures are described and test results are discussed. It was found that closed-end pipe piles are decidedly inferne to open-end pipe piles in their load-carrying capability and their ultimate supporting capacity. Although pile settlement was found to be dependent upon such variobles as pile load, time, pile shape, and stow temperature, precise effects of these variobles were not determined. Nevertheless, the capability of open-end piles to carry quite heavy loads was demonstrated and a nearyzed to reveal the strain distribution within a pile during driving and static loading. Excavations revealed the configuration of the denosfied snow deplaced along the sides and beneath the tips of a number of driven piles. Laspections of this displacement gave inought into the carrying response of each pile type.

CR 76-24

VANADRUM AND OTHER ELEMENTS 1N

CR 76-24 VANADIUM AND OTHER ELEMENTS IN GREENLAND ICE CORES. Herron, M.M., et al., July 1976, 4p., ADA-029 356, 16

Langway, C.C., Jr., Weiss, H.V., Hurley, J.P., Kerr, R., 32-1071

SNOW COMPOSITION, CHEMICAL ANALYSIS. ICE CORES, ICE COMPOSITION, IMPURITIES. GREENLAND.

Chemical englysis of surface snows and deeper ice core samples from Milcent, Greenland, indicates a marine onga-fee Na and Cl and a terrestrial origin for Al, Mn and V. Pre-1900 enrichment factors, based on average crustal V. Pre-1900 enrichment factors, based on average crustal composition, are high for Zn and Hg and appear to be related to their volutility. A comparison of pre-1900 and 1971-1973 concentrations of V and Hg shows no decided increase from industrial production, however, the abundance of Zn (relative to Al) increased three-fold during this time period. The chemical composition of ancient ice is extremely useful in interpreting modern aerosols.

CR 76-25 BASELINE DATA ON THE OCEANOGRAPHY OF COOK INLET, ALASKA. Gatto, L.W., July 1976, 84p., ADA-029 358, Bibliog-raphy p.78-81.

OCEAN CURRENTS. TIDAL CURRENTS. WATER CHEMISTRY, SEDIMENT TRANS-PORT, TURBULENT FLOW.

WATER CHEMISTRY, SEDIMENT TRANS-PORT, TURBULENT FLOW.

The primary objective of this investigation was to comple baseine information pertaining to the ocean circulation, especially the extent and patterns of tolal currents and tolal Yushing, in Caok Inlet, Alaska, utilizing aircraft and satellite imagery with corroborative ground truth data. LANDSAT. I and NOAA-2 and -3 imagery provided repetitive, synoptic views of surface currents, water mass imaginton and sediment distribution during deferent seasons and tides. Color, color infrared and thermal infrared imagery acquired on 22 July 1972 with the NASA NP-3A aircraft were used to analyze currents, mixing potterns and sediment dispersion in selective areas. Temperature, salonity and suspended sediment concentration data and hand-held photography were ntilized as ground truth information in the interpretation of the internal tand satellite imagery. Coriolis effect, semidiumal tides and the Alaska current govern the estuary circulation. Clear, oceanic water enters the inter on the southeast during floud tide, progresses northward along the east shore with minor lateral mixing, and remains a distinct water mass to the lottude of Kasifo-Nisukhk. South of the forelands make tide and a shear zone between the two water masses to the lottude of Kasifo-Nisukhk. South of the forelands are constituted in turbid infect south of Kaşi. Island. Currents adjacent to and north of the forelands as, complicated by tidal action, constituted and configuration and bottom effects. Turbulence is gresteet throughout the water column along the south sheer to and north of the forelands as, complicated by Italia action, constal configuration and bottom effects. Turbulence is greatest throughout the water column along the south shore and stransfication is more pronounced in Karistska and Kachenak Boys, especially when fresh water simoff is high Most of the soliment discharged into the infet is deposited on the extensive itali flats or removed by Italia currents along the west side during ebb flow. Bottom scouring is evident along the cast shore south of Pr. Possession or more one. CR 76-26

DEBRIS OF THE CHENA RIVER.

McFadden, T., et al, July 1976, 14p., ADA-029 357. 5 refs.

Stallion, M. 32-1073

RIVERS, LOGIAMS, UNITED STATES ALAS KA—CHENA RIVER.

Debris over a 44-mile stretch of the Chena River was studied. The study area extended from the first bridge on the Chena Riot Springs Road to the Chena River Flood Control danuite. The purpose of the study was to ancess the potential danger to the Chena River Flood Coutrol Dum outlet structure. Debris was catalogued, log pans were measured, and sources of debris were studied. The average size of logs was determined, as well as the number of logs present on the river. The authors concluded that a serious debris problem enasted and would remain scrious for the foresceable future. Recommendations for debris handling were made.

CR 76-27 ENERGY BALANCE AND RUNOFF FROM A SU-BARCTIC SNOWPACK.

Price, A.G., et al, August 1976, 27p., ADA-030 096. Bibliography p.28-29. Dunne, T., Colbeck, S.C.

32-1074

SNOW HYDROLOGY, SNOWMELT, RUNOFF. MOISTURE TRANSFER, TUNDRA VEGETA-TION, FOREST LAND.

MOISTURE TRANSFER, TUNDRA VEGETA-TION, FOREST LAND.

In Part I a physically based model was used to predict daily snowmelt on 2,000 sq m plots in the Solurcia. The plots had a range of aspects and inclinations in boreal forest and on the tundra. The energy balance, computed for each of the plots, was compensated for differences in radiative and turbulent energy fluese cannet by varied slope geometry and vegetative cover. The turbulent energy flues were also corrected for the effects of the stable stratification of the air over the snow surface. The predictions of the model were computed with daily mel's derived from runoff measured on the snowmelt plots. The results show that the method is a good predictor of daily announts of snowmelt although some uncertainties are introduced by changes in the stara turface during the melt period. In Part II, a physically based model of the movement of water through snowpacks was used to calculate hydrographs generated by distral waves of snowmelt on the tundra and in the boreal forest of subsectic Labrador. The model was tested against measured hydrographs from hillide plots that sampled as range of aspect, gradent, length, vegetative cover, and snow depth and density. The model yielded good results, particularly in the prediction of peak tunoff rates, though their the ranges over which each of the controls is likely to vary, the two most critical factors controlling the hydrograph are the snow depth and the melt rate, which must be predicted precisely for short intervals of time. Permeability of the snowpack is another supportant control, but it can be estimated closely from published values.

CR 76-28 ANALYSIS OF EXPLOSIVELY GENERATED GROUND MOTIONS USING FOURIER TECH-NIQUES.

Blouin, S.E., et al. August 1976, 86p., ADA-030 060, 18 refs.

Wolfe S.H. 32-1075

SEISMIC SURVEYS, WAVE PROPAGATION, VI-BRATION, EXPLOSION EFFECTS, NUCLEAR EXPLOSIONS, EARTH MOVEMENT, FOURIER TRANSFORMS OF SELECTED GROUND-MO-TION TIME HISTORIES FROM FIVE UNDER-GROUND HIGH-EXPLOSIVE AND NUCLEAR DETONATIONS ARE USED TO DEFINE THE TRANSMISSION PROPERTIES (TRANSFER FUNCTIONS) OF THREE ROCK TYPES.

FUNCTIONS) OF THREE ROCK TYPES.
Absorption, a measure of a reck's energy disapating characteristics, is expressed for each of the tests as a function of the frequency of transmission. Dispersion results from a variation in transmission scheetly with frequency and is described for each test by a phase velocity spectrum. The transmission properties from one of the sites are used to peculial a ground-motion time history at that site from another nuclear event. The potential use of Fourier techniques to riske ground-motion predictions and to measure in-situ material properties is discussed.

CR 74.29 FAILURE OF AN ICE BRIDGE. DenHartog, S.L., et al. August 1976, 13p., ADA-030 413, 2 reis.

McFadden, T. Crook, L.

BRIDGES, ICE COVER STRENGTH, ICF BEAR-ING CAPACITY

In order to verify current theoretical equations on see bearing capacity, a heavily leaded track was used to make successive passes over two see bridges. Breakthrough occurred on one bridge with a schicle weight of \$1,0.00 th (24,12° kg). The net thickness was \$1.7.5 in 44.8 cm. This one test was in good agreement with the theoretical equations.

CR 76-30

REMOTE SENSING OF LAND USE AND WATER QUALITY RELATIONSHIPS—WIS-CONSIN SHORE, LAKE MICHIGAN.

Haugen, R.K., et al, Aug. 1976, 47p., ADA-030 746, Bibliography p.42-43. McKim, H.L., Marlar, T.L.

32-1078

REMOTE SENSING, AERIAL SURVEYS, SPACE-BORNE PHOTOGRAPHY, INFRARED PHO-TOGRAPHY, LAND DEVELOPMENT, UNITED STATES_WISCONSIN

The focus of this investigation was to assess the The focus of this investigation was to assess the utility of remote sensing techniques in the study of tand unewater quality relationships in an east central Wisconson test area. The following types of artial unaperty were evaluated for this purpose; high altitude (60,000 ft) color, color infrared, multispectral black and white, and thermal; low altitude (fiess than 5,000 ft) color infrared, multispectral black and white, thermal, and passive microwave. A non-imaging hand-held four-band radiometer was evaluated for utility in write, thermal, and passive microwave. A non-imaging hand-held four-band radiometer was evaluated for utility in providing data on suspended sediment concentrations. Land me analysis includes the development of mapping and quantification methods to obtain baseline data for comparison to water quality variables. Suspended sediment loads in streams, determined from water samples, were related to land use differences and soil types in three major watersheds. A multiple correlation coefficient R of 0.55 was obtained for the relationship between the 0.6-07 micron incident and reflected radiation data from the hand-held radiometer and concurrent ground measurements of suspended solids in streams. Applications of the methods and baseline data developed in this investigation include mapping and quantification of laffects of land use changes on stream sedimentation, and remote sensing of suspended sediment content of streams. High altitude color infrared imagery was found to be the most acceptable remote sensing technique for the mapping and measurement of land use types.

CR 76-31 ANALYSIS OF POTENTIAL ICE JAM SITES ON THE CONNECTICUT RIVER AT WINDSOR. VERMONT.

Calkins, D.J., et al, Sep. 1976, 31p., ADA-031 572, 11

Hutton, M.S., Marlar, T.L.

32-1079

RIVER ICE, ICE JAMS, ICE MECHANICS, WATER FLOW.

Sections in the Connecticut River where ice jam potential is high were identified through the use of low-altitude black and white photographs taken during low-flow, ice-free conditions. The hydraulies and mechanics of ice jam initiation were investigated in the river reach where these sections were identified. Certain areas were found in the river were investigated in the river reach where these sections were identified. Certain areas were found in the river that had a logh susceptibility to see elogging, but this high potential decreased with increasing discharge because of the improved surface conveyance of the see through the reach. The stability of see floors was established along the channel. But the floors generally became unstable as the flow increased. This was calculated by using a Fronde number criterion. Grounding locations for see became evident when the critical Fronde number was zero for a given thathers and water depth. No single factor was determined to be responsible for intuining the see gares in the Connections flower at Windson Apparentis there existed a mutitude of interacting conditions, surface constructions, possible high backwater conditions from the Beattlebore Dam a solid oc cover in the backwater of the Brattlebore Dam that prevented see transport from the Windsor area, deep pools followed by shallow depth sections suptream of bridge piers, a greater see thickness accumulation of fragmented fises than would result if a uniform cover could be established in the same reach, and the diurnal finetization of river stage caused by the referse of water at Wilder Dam.

CR 76-32 GROUNDED ICE IN THE FAST ICE ZONE ALONG THE BEAUFORT SEA COAST OF ALAS-

KA. . A., Sep. 1976, 21p., ADA-031-352, 13 refs. 32-1080

SEA ICE, FAST ICE, ICE PHYSICS, PRESSURE RIDGES

Front large grounded multi-year shear ridge formations were found in the grounded see sub-rone of the fast see rone near the Harmson Bay Frudhow Bay area of Alaska. A lident-long cross section of one of these formations was obtained by leveling and some resonancements. These measurements revealed that the maximum ridge height was 12-6 m and that the formation was grounded in 17-18 m of water. The subsists, temperature, being soldium and density of the see were determined on samples obtained by coring. The physical characteristics of the formations as observed in satellite, SLAB, and arral imagers indicate that these formations have not invised between the time of their formation in the fall of 1978 and August of 1976. Evidence of significant aeolian debits discoloring the see is discussed. Four large grounded multi-year shear ridge formations were found in the exampled we substone of the fast see some

CR 76-33 CR 76-33
DETECTING STRUCTURAL HEAT LOSSES
DETECTING STRUCTURAL HEAT LOSSES
WITH NORTH INFRARED THERMOGRAPHY. PART & EXTINATING QUANTITATIVE
HEAT LOSS AT DARTHOUTH COLLEGE, HANOVER, NEW HAMPSHIRE.
Manis, R.J., et al., Sep. 1976, 9s., ADA-031 803, 3
refs. For parts, I, II, and III of this study see 29-2349,
30-895, and 30-1007 respectively.
Marshall, SJ., BINA, M.A.
32-1081

32-108 I BUILDINGS. HEAT LOSS, INFRARED EQUIP.

MENT. During the sinks of 1973-74 s mobile ustrated thermography system with 1974 by the expression buildings at Datameth College, Pharter Int. Hangshure. This report provides both qualitative data regarding here from through a sold of a wall of one brick domatory building latter and their insulations of aluminum reflectors between realistic and their insulations of aluminum reflectors between realistic and the will. There do no unite construction level for the strength for 22 buildings of smiles construction level for the strength for 22 buildings of smiles construction level for other than confernate meter data. The during which parts construct an anomal constraints in tellulation of their strength in the same points arings in tellulation that along with all manusements required for these calculations.

CR 76-34 CR 76-34
SOME CHARACTERISTICS OF GROUNDED
FLOEBERGS FEAR PRUDHOE BAY, ALASKA.
Koveca, A. et al. Sep. 1976, 10p., ADA-031 844, 11
tels. For wealth version of this report see 32-1082. Gow. A.J.

32-1083 SEA ICE ICE BOTTOM SURFACE, SOUNDING, ICE STRUCTURE, ACOUSTIC MEASURING INSTRUMENTS, PRESSURE RIDGES.

Some physical Conference of two provided finebetts near Product Bry, And And Angletical, Consequenced, Additional studies provided processing the control structure of the finebett, Program of the sea from for evidence of social managed affice providing of the finebetty and provided of the control of the finebetty and the providing of the finebetty debts found entitled affice from the sea from for evidence of a brief examination of the respect and seducencery debts found entitled affice the finebetty.

CR 76.35
RHEOLOGICAL IMPLICATIONS OF THE INTERNAL STRUCTURE AND CRYSTAL FABRICS OF THE WEST ANTARCTIC ICE SHEET AS REVEALED BY DEEP CORE DRILLING AT BYRD STATION.
GOW, A.J., (14), 5%, 1976, 25p., ADA-031 745, bibliography 8.22-25, Williamson, T.

32-1097

ICE SHEETS. DRILL CORE ANALYSIS, ICE ME-CHANICS I'VE STRUCTURE ANISOTROPY.
ANTARCTICA BYRD STATION.

CHANGE TO STRUCTURE ANISOTROPY.

ANTARCTICAL BY RD STATION.

Crystaliant testing by fathers of ice cores from the 2.164method ice shore it syrth Statuous Assarctica, reveal the
esistence of an majoritant testines. A strainal but fertustent increme of sand tasks preferred occurations of the seccrystals are about a strain at crystal time to recommission by a 20-64 we can a crystal time become 5and 600 on fallowed by trigothy on change in crystal streteneric 600 one fallow in ... A bond vertical cintering
of cases despited by 1.000 on ... Become trigotal cintering
of cases despited by 1.000 on ... Become trigotal sintering
of cases despited by 1.000 on ... Become trigotal cintering
of cases despited by 1.000 on ... Become trigotal cintering
of cases despited by 1.000 on ... Become trigotal cintering
of cases despited by 1.000 on ... Become trigotal cintering
of cases despited by 1.000 on ... Become trigotal indicationally
within the between the 1.000 on ... Compatible only
with a strong front form 1.000 on ... The transformation, accompanied by the growth of setsy target to institute
structure. Why office patient 1.000 on ... The transformation, accompanied by the growth of setsy target to institute
maximum fallow of the product of regional land to institute
assarched in the orthodor of first at flying Santon tasket
than to a spottage of sets of regional land to institute
than to a spottage of sets of regional land to institute
than to a spottage of sets of regional land to the order
the very floor growth of setsyle days. The force of
single-manimum growth presented with their dust lands
indicate the lands of the sets of regional the bettering
the land to the control of setsyle and translate of the set of the
tree records of stood frage of stood and proven to the
tree induced frage flags flags destruction partnership days of the
tree induced frage flags flags and the land of the set sheet
than to a set of the set of the set of the set sheet
to show the set of the set of the set sheet
to show the se

ROCK, FROZEN SOIL AND ICE BREAKAGE BY HIGH-PREQUENCY ELECTROMAGNETIC RADIATION. A REVIEW.

Hoekstra, P., Oct. 1976, 17p., ADA-039 178, 17 refs. 32-1098

ROCK EXCAVATION. FROZEN GROUND STRENGTH, EXCAVATION, DIELECTRIC PROPERTIES, ELECTROMAGNETIC PROPER-TIES, MATHEMATICAL MODELS.

TIES. MATHEMATICAL MODELS.
In the past decade, various workers have investigated the use of high-frequency electromagnetic radiation for breaking and excavating rack and fruten ground. This report reviews the high-frequency dielectric properties of these materials, the physics of heating, and the existing literature on these subjects. The high-frequency defective properties of racks and soils, and the absorption of energy by these materials, are manly determined by their inquid water contents. Computer maching was used to calculate absorption energy as a function of distance behind stradiated faces of earth materials. The returning computations showed that most enery in absorbed in the first few continueers of frozen ground and weak soils. However, in hard rocks of low water content, electromagnetic waves preferrate more decepty, and significant amounts. sous. However, in nare rocks or low water content, executing its water penteral more deceptly, and significant amounts of energy are also absorbed tens of centimeters behind the irradiated faces. Test results showed that electromagnetic neck breakage is feasible only for excavations in head rock; test results from the use of electromagnetic radiation for excavating tunnels in weak rocks and frozen ground are necessarios.

CR 76-37

AIRBORNE RESISTIVITY AND MAGNETOME-TER SURVEY IN NORTHERN MAINE POR OB-TAINING INFORMATION ON BEDROCK GEOLOGY.

un. P.V., et al. Oct. 1976, 19p., ADA-032 733, 21 refs

Arcone, S.A., Delancy, A.J. 37,1099

MAGNETIC MEASUREMENT, ELECTRICAL RESISTIVITY, GEOPHYSICAL SURVEYS GEOLOGY, UNITED SYATES-MAINE.

GEOLOGY, UNITED STATES—MAINE.
Geophysical studies were conducted during September and
October of 1975 in northern Maine to Incate reck types
sustable for construction purposes for the proposed Dickeylancoln School Dath Project. Simultaneous authorise imaginetometer and VLF electrical resistivity and of total magnetic
intensity above the cartic's luckground magnetic field. During the same time period, ground and multi-clevation surveys
were performed over a special test sector of known geology.
The ground and archorac study in the test sector aided
in interpretation of the data by revealing a strong correlation
between ignosus geology, resistivity, and magnetic intensey.
Luck of a similar correlation between resistivity and magnetic
data in the remainder of the network new suscented an alternom interpretation of the data by revealing a strong correlation between ignosing goology, resistivity, and magnetic internety Lack of a similar correlation between resistivity and magnetic data in the remainder of the survey area suggested an absence of additional areas of ignorm rocks. The multi-elevation survey of the test area indicated that changes in flight altitude, necessatisted by the topographic relief encountered, would not seriously affect the regional resistivity poterns. Although there was no strong evidence of ignorms rocks outside the test sector, soutable rock types may exist within the Dis geologic time (cyclically hedded gray slote and sandstroer) to the central part of the main survey area, where most of the high resistivity contours occur.

CR 76-38

WATER ABSORPTION OF INSULATION IN PROTECTED MEMBRANE ROOFING SYS-TEMS

Schaefer, D., Oct. 1976, 15p., ADA-032 089, 12 refs. 32-1100

INSULATION. PROTECTIVE COATINGS WATERPROOFING, ABSORPTION, ROOFS.

Current methods for evaluation of the menture absorption of plantic insulations (ASTM-C-272-55 and ASTM-C-355-64) due to vapor pressure graderate or immersion rely on short time periods to predict long term performance. This proceeding may not provide accurate information on performance processive that me pressure accurate transmission on performance stage in practice invalidation may absorb more moniture than these tests understee. A series of tests was conducted on estruded polystyrene roof moniture that had been on place, exposed to extruorumental moniture and pressure gradients, for a maximum of 36 months. Results indicate that moniture absorption of 15% by solume can be expected on the field. = the Seld

CR 74-39 EFFECTS OF WASTEWATER APPLICATION ON THE GROWTH AND CHEMICAL COMPO-SITION OF FORAGES.

Palatto, A.J., Oct. 1976, \$p., ADA-032 774, 9 refs. 32.1101

WASTES, WATER, SOIL CHEMISTRY, WATER CHEMISTRY, PLANTS (BOTANY), GRASSES.

The contribution of a forage system in the resonation of wasterstee in the processor is wastersteen by a processor sion infiltration land treatment system was studied from June 1974 to June 1975. The forage was grown in six oridors cells, three contaming a Window sandy Joan soil and three a Cariton set leasn. Direct cells received primary and three received secondary assertances of contract and contract of the secondary cells. wastewater at various application rates. Crop suchle, sods and totale analyses, plant removal efficiency and local update of applied uniforms were existed to the rate of materiales applied. Dry matter production, plant leave metal concer-

traines, and plant removal of nitrogen and phosphorus all increased as the rate of applied wastewater increased from 5 to 15 cm/week. Total dry matter production ranged from 9.63 to 12.99 metric tonethe, and sotal uptake of nitrogen and phosphorus ranged from 309 to 455 kg/ha and from 32 to 42 kg/ha, respectively. An increase in wastewater application rates supercased nitrogen and phosphorus removal efficiency by phasts. Forages receiving 5 cmf/mk of wastewater removed 1745 and 85% of the Napplied during the growing season, in contrast to the 44% removed by those treated with 15 cm/mk of wastewater amount of dry matter and removed more N and leas heavy metals than those grown on the Windoes sole. Soil analyzes in apping 1975 showed reductions in soil pH and in the total amounts of exchangeable estions, as compared to analyzes performed in spring 1974. Soils receiving the present application rate of wastewater showed the greatest reduction. Wastewater application during 1974 increased the amount of soluble soil P. Higher amounts of soil-extractable P were also noted at the highest wastewater applications rate. CR 76-40

PHOTOMACROGRAPHY OF ARTIFACTS IN TRANSPARENT MATERIALS.

Marshell, S.J., Nov. 1976, 31p., ADA-033 670, 31 refs

32-1102

ICE, IMPURITIES, PHOTOMACROGRAPHS.

Several original methods were developed to photograph tracts in transparent materials such as ice. The artifo-occurring in the surface, bulk, and interface, were gener 0.01 mm to 70 mm in size. Sample preparation, illuminati focusing and other technical problems are discussed in det Several sample photographs are included.

CR 76-41 **GEODETIC POSITIONS OF BOREHOLE SITES** OF THE GREENLAND ICE SHEET PROGRAM. Mock, S.J., Nov. 1976, 7p., ADA-033 840, 9 refs. 32-1103

GEODETIC SURVEYS, BOREHON SHEETS, ICE CREEP, GREENLAND. DOREHOLES, ICE

Eight Gencerver statues were established and suit Eight Gencerver stansons were established and suitably marked along or near the crestines of the Greenhand see sheet during GISF field operations from 1971 to 1975. At one of these stations, DYE-3, repeated Genceiver positions indicate an see velocity of 127 m/yr on an azimuth of approximately 60 deg. Data from the International Greenhand Glociological Expedition (EGIG) surveys show that ice flow in the vicinity of Crete in radiating outward from a dome to the south. Two independent calculations of the state of equilibrium at Crete indicates ice sheet thusing rates of 0.25 to 0.37 m/yr, while direct measurement of elevation change by EGIG indicates an ice sheet theleng rate of of approx 0.06 m/yr. Resolution of these differences most would further grouphystal work and deep delling in the see sheet.

CR 76-42 ARCHING OF MODEL ICE *1.0ES: EFFECT OF MIXTURE VARIATION G.S TWO BLOCK SIZES

Calkins, D.J., et al, Nov. 1976, 11p., ADA-033 \$41, 5

Ashton, G.D.

32-1104

EXPERIMENTAL DATA, FLOATING ICE, ICE DOOMS.

BOOMS.

A study of arching of mixed, square fragmented see flores at an operating in an ice boom is documented, using results from a model study in which two sizes of plantic blocks represented realise. A power function, relaxing the upstream rice concentration to the ratio of a characteristic block dimension to the gap opening, is found adequate to distinguish between arching and nonacching events for block ministers of two component sizes. It is demonstrated that when the respective total areas of the two block components are nearly equal, a ministerium of the sixels which components are nearly equal, a ministerium secretations sixuates in arch action the opening. As the mixture of two series of blocks approaches a similare none-stroll mixture, a highest concentration of tree is increded to instinct the arch. When the ratio of the block dimensions to the gap opening is equal to set less than 6 10 a seebing of the fragmented see is not possible, even when the upstream ice dockarge exceeds the maximum discharge of ice through a gap opening. The distribution of fragmented see areas is an important parameter in establishing the minimum size of opening at which an ice boson will return its arching capitality.

SUPPRESSION OF ICE FOG FROM COOLING PONDS.

McFadden, T., Nov. 1976, 75p., ADA-035 322, Bibliography p.71-75 32-1105

ICE FOG, FOG FORMATION, FOG DISPERSAL FONDS, IC COATINGS ICE COVER EFFECT, PROTECTIVE

fee for generated at the Firthern ABB power plant crotting pond contributes heavily to the total see for problem on the base. Several methods for see for suppressions were studied and from techniques were total experimentally. Fu-periments were also conducted to determine the magnitude perments were and consecred to accremine the majors of the various modes of heat transfer outless the po-imetoclossate. Values of expositive and radiative li-loss during see fog are presented. Lie cover is sh-

to be an effective ice fog suppression technique. Measurelecture films are also shown to be effective and offer some unique advantages, such as ease of application and low overall cost. The heat normally last to evaporation must be disnipated by other means during suppression. With the ice cover technique this is accomplished by melting must be designed by other means during suppression. With the ice cover technique this is accomplished by suching the ice cover. During suppression with monomolecular films, the heat must be dissipated by increasing radiative and convective losses. The rimplicity of application of monomolecular films, along with their lower cost, contine to make this technique attractive; however, the lower pond his tocompac amount of the see cover technic

CR 76-44 THERMODYNAMIC DEFORMATION OF WET SNOW.

ck, S.C., Nov. 1976, 9p., ADA-033 830, 10 refs.

WET SNOW, SNOW DEFORMATION, THER-MODYNAMIC PROPERTIES.

MODIFICATION. FINATION CONTINUES.
The deformation of wet stow is explained in terms of the thermodynamics of the three phases of water. When deformation by particle rearrangement is fully developed, deformation can occur most rapidly by melting at the puricle context. The rate of deformation is highly sensitive to the liquid names context limit immore content, norticle context total. sensitive to the liquid at, particle contact area The race of deformation is highly sensitive to the liquid water content, ionic impurey content, particle content next, and stress level. A model of the hydrostatic deformation of wet news is constructed, and examples of the deformation of wet news are given for a variety of conditions. These steads are in agreement with existing experimental evidence. The model accurately simulates the transient nature of the deformation and the effect of water consent on the quasi-stable density of wet snow subjected to a constant stress.

CR 76-45

AIR CUSHION VEHICLE GROUND CONTACT DIRECTIONAL CONTROL DEVICES Abele, G., et al, Dec. 1976, 15p., ADA-034 825, 3 refs.

Listen, R.A. 32-1107

AIR CUSHION VEHICLES, YAW,

AIR CUSHION VEHICLES, YAW,

The moneuvershiley of air cushion vehicles can become a serious operational problem when the vehicle's travel route to testicious operations problem when the vehicle's travel route to testicious operation of aerodynamic methods may be a more desirable approach, there is a practical limit to these methods and the war of ground contact devices requires considerations for providing more pusitive directional control. Wheels deserve special attention, and therefore are analyzed in more dentil because of their obvious application on a variety of lead terrains. Brake rods and harrows are more multiple on water, see and soon. The succer-object ground contact device would counce the least ecological suspect on finglic organic terrains such as tunden. Relative discession stantisty is evoluted in terms of the total pawing momenta-produced by which arrangements (might, dust, tandem), lecture of the vehicle to determine the state of the vehicle to determine the most efficace operational mode with a particular wheel arrangement for any year condition. The analysis limited to retractible devices which act as moments producing brakes or tollers and do not zeroe as either peoplesion or lead ammone mats. Construined contact with hart sections. to refrectable devices which act as moment producing brakes or rollers and do not serve as either propulsion or band support sale. Controlled ground contact with shart rections having special wearing surfaces may provide a sonable control method and would require the least significant change to the basic design of the vehicle or its components. The concept involves the use of an air flow control mechanisms for defining spacific shirt sections, thus causing shart-ground contact at selected areas of the peripheral shart.

CR 76-46

OLOGICAL PROPERTIES OF SOME TREL-LIS PATTERN CRANNEL NETWORKS ick, S.J., Dec. 1976, 54p., ADA-034 \$24, 27 refs.

32-1106 CI'ANNELS (WATERWAYS), TOPOGRAPHIC

FEATURES, DRAINAGE, CLASSIFICATIONS. The topological properties of 10 stream networks having moderate to well developed trells dramage patterns have medicate to well developed trills diamage patterns have been compared with those expected in a tepologically random population. Magnetide 4 subsectivels show a systematic departizer from expectation which can be related to geological controls. A link type classification system was developed and a surious of equations describing the probability of occurrence of link types in topologically random populations derived Analysis of the link structure in the channel naturovits showed small but persistent deviations from expectation in the well-developed trills pottern streams. The general conclusion is that the tipologically random model is a very social standard with which to compare real channel networks.

CR 74-47 DEVELOPMENT OF LARGE ICE SAWS

Garfield, D.E., et al. Dec. 1976, 14p., ADA-034 999

Hanamoto, B., Meilor, M.

ICE CUTTING, SAWS.

This report describes two mechanical incoming systems for the removal of sic collars at the high pool level on the For Lock of the St Mary 8-falls Canil at South Ste Mann, Michigan — they system was reasons kert 65 a 4 in white conducting chain som monited on 2 her, driving by a 84-hp wheeled will trencher which cut a 9-56-m-

wide kerf. The lumber-cutting spw's bre was too flexible and the desired cutting traverse speed was not met. The cust-cutting saw cut 6-ft-deep ice collers at traverse speeds of up to 10 ft/min and is acceptable. With a few modifications, the cost-cutting saw would be operational.

CR 76-46

RAPID INFILTRATION OF PRIMARY SEW-AGE EFFLUENT AT FORT DEVENS. MASSA-CHUSETTS

ite, M.B., et al, Dec. 1976, 34p., ADA-035 730, 26 refs.

rt, G.L., Condike, B.J., Vloch, E. 32-1110

GROUND WATER, WATER TREATMENT, WATER CHEMISTRY, SEWAGE TREATMENT.

Rapid infiltration has provided final treatment to unchlorinated leaboff tank effluent at Fort Devens, Massachunetta, since 1942. Wasteruster flow has varied seasonally; however, most flows to the 22 treatment heds at the installation in 1973 were 2,076 to 9,541 cu mi/day (1.3 million gallom per day). In an operation cycle of simultaneous invendation of three 0,31-hectare treatment heds for 2 days, followed or way). In an operation cycle of simultaneous insulation of there 0.31-hoctare treatment beds for 2 days, followed by a 10-day recovery period, effluent application has been about 271 May! Chemical analyses of soil amples obtained from the upper 3.05 m of the treatment bads showed that levels of organic matter ranged from robustentily to only slightly higher than those of background samples. The quality of the primary effluent applied to the treatment bads and the promature in 14 otherwation with was determined by comprehensive analysis of the samples at bronchly intervals. Groundwater quality in wells located 60 to 100 m from the application area showed that the primary effluent after flowing through the sand and gravel formation, but been submanishly removated.

CR 26-49

TREATMENT OF PRIMARY SEWAGE EFFLU-ENT BY RAPID INFILTRATION

Sotterwhite, M.B., et al. Dec. 1976, 15p., ADA-035 390, 22 refs

Condike, B.J., Stewart, G.L. 32-1111

SEWAGE TREATMENT, WATER TREATMENT. CHEMICAL ANALYSIS, SEEPAGE.

restatest of unchioranted primery sewage effluent by using apid infiltration busins resulted in a high degree of wastewater casespine in a humid, cost as eithers climate. Insulating b restatest busines for 2 days followed by 14 days of rest, roun 4 January to 21 June 1974, resulted in efforces additions utuling about 27 m. Analysis of the groundwater from the treatment size and from the weedleral area shounds. from 4 January to 21 June 1974, resulted in efficient additional tenting about 27 m. Analysis of the greendouster from the treatment site and from the perspheral area showed that total culfiers becturin, 5-day banchemical oxygen demand, and chemical oxygen demand were executively removed, while phosphorus concentrations were only one-third of the applied efforts concentrations. Total nationers additions to the treatment busine during the 7-day numbers on period were stancet basins during the T-day mandatoon period were out \$45 greater than the mirogen additions in the 1973 extigations. Even so, groundwater natiogen concessesinstance of 50% prester than the introgen assessment concentrations. Even so, groundwater integers concentration were closely comparable to those observed at the 1973 by. Efform to increase introgen removal through longer adultion periods resided at a gradual decrease in the Burston expensions of the burston. Calculations of the pair, matter additions strongly suggested that the reduced limition rates resided from surface clogung. This study word that proper management is needed if rayed infiltration and for introgen removal by maintaining efficient showed that proper management is needed if rapid infiltration businesses used for natiogen removal by maintaining efficient infiltration in northern climates

CR 77-01

GROWTH HISTORY OF LAKE ICE IN RELA-TION TO ITS STRATIGRAPHIC, CRYSTAL-LINE AND MECHANICAL STRUCTURE. iom, A.J., et al, Jan. 1977, 24p., ADA-034 228, 9 refs

Languese, D. 32-1162

LAKE ICE, ICE GROWTH, ICE STRUCTURE, ELECTRICAL RESISTIVITY, CRYSTAL ORIEN-TATION ICE MEGHANICS

frohers of the growth history and structural characteristics of wanter are contra on two New Hampshore lakes are described as metaled are successed in the content that These investigations included inconstruents of our owner thick-ness, characterization of the strangerights and crystalline struc-ture of the see, identification and classification of impo-see types and inconserverses of chetrolytic conductivity. The formation of crucks and flavo in the see and the effects on the mechanical properties of the see mere also investigated. A method of correlating see growth with surface and and temperature inconserverse in discribed and the outerelationships of the various physical and mechanical resources of temperature that we covers are discounted. reserves of temperate like are covern are discussed

COMPUTER PROGRAM TO DETERMINE THE RESISTANCE OF LONG WIRES AND RODS TO NONHOMOGENEOUS GROUND.

Arcone, S.A., Jan. 1977, 169., ADA-036-250, 6 refs. 52-1163

COMPUTER PROGRAMS, ELECTRICAL RESIS-TIVITY, MODELS, FROZEN GROUND PHY SICS

MCS.

A compact program was developed for finding the au-tensisted to ground of two simple electrodes, a straight horizontal war and a seriously direct red. The objective of this study was to develop a rapid means of finding the

te resistance to ground of sample electrode types in arctic environ-ments where a two-layer earth model, frozen and unfrocen for ground, is applicable. The program can counder homogene-ous as well as two-layer earth, and the length, domester and panishes of the electrodes. Some specific computations are presented in comparison with previous theoretical work. are preserved in comparison with previous theoretical work of other authors. The following canclusions were made:

1) A matanum run time of 165 seconds in needed for all two-layer actor models where (a) the depth of the upper loyer does not exceed 10 m, (b) the vertical rod length is less than 100 m, or (c) the horizontal were length is less than 100 m; 2) Best accuracy is obtained when rod and wire radii are less than 0.01 m; and 3) Coincidence of the exister of the vertical electrode with the 180-20per interface must be avoided.

CR 77.43

EFFECT OF TEMPERATURE ON THE STRENGTH OF FROZEN SILT.

Haynes, F.D., et al. Feb. 1977, 27p., ADA-037 932, 27 refs

17.1114

PROZEN GROUND STRENGTH, COMPRESSIVE STRENGTH, SEDIMENTS. TENSILE STRENGTH, STRAINS, TEMPERATURE EFFECTS, PERMAFROST, TESTS.

FECTS, PERMAFROST, TESTS.
Tests were conducted in unusual compression and tension to determine, the effect of temperature on the strength of fowers Furtients silt. Test temperatures ranged from 6C to -56-IC. Two machine speeds, 4.23 cm incr and 6.0623 cm/sec, were used for the constant doptocoment rate tests. From the highest to the lowest temperature, the compressive strength increased up to about one order of magnitude and the testile strength increased one-half as order of magnitude and the testile strength increased one-half as order of magnitude and the strengt are presented which correlate strength with temperature at the streng rates obtained. The install tangent and 50% strength medial and the specific energy are goon for each test. The module and force and the effects of uniform water content and ice matrix strengthening are discussed, and the test results are compared with the data of other investigations.

CR 77-04

ST. MARYS RIVER ICE BOOMS. DESIGN FORCE ESTIMATE AND FIELD MEASURE-

Perham, R.E., Feb. 1977, 26p., ADA-037 902, 13 refs. 32-1140

ICE BOOMS, RIVER ICE, ICE STRENGTH, ICE COVER STRENGTH, ICE LOADS, ICE NAVIGA-TION, UNITED STATES ST. MARYS RIVER.

A set of two ace become with a 1944 ("feet-wi es set ou the set nomes were is given to comprehen annument operang. Eveneen, them was designed to stabilishe the set cover at the harbor at Sault See. More, Michagan and Ontone, and to reduce the set horses associated with miner annument of plays on the Se. Marys Reser. The Societ from natural of ships on the Sc Marys River. The forces from instant effects on the zee cover were predicted using existing theory and physical data for the zees. The forces in the house intractive resulting from see cover and house interaction were existing. When the zee houses were mustiful, force measurement systems were specified all winter in conjunction with a modern systems were operated all winter in conjunction with a modern requirem of supplemental data gathering. The force data exhibited geneda when the force data exhibited geneda when the force data exhibited geneda when the first of ice on the house delicious and periods when the effect of ice on the house delicious and periods when the effect of ice on the house delicious substantially from predictions. Sometimes, passing also had, and is other train, the effect was negligible. The direction of travel made limit delicious on average peak loads. The maximum loads on the houses resulted from satural occurrences.

NUMERICAL STUDIES TO AID INTERPRETA-TION OF AN AIRBORNE VLF RESISTIVITY SURVEY.

sec, S.A., Apr. 1977, 10p., ADA-039 904, 17 refs.

PERMAFROST. ELECTRICAL RESISTIVITY. SITE SURVEYS, VFRY LOW FREQUENCIES, AIRBORNE RADAR, RADIO WAVES, ANAL-YSIS (MATHEMATICS)

Authorne remains a surego, which can the waverile phenomena of radionaures autrept, which can the waverile phenomena of radionaures are used as a retininaury exploration technique to find analytic areas for either represents stretching are multiply presented for the control fight has produce as as consona many forms which the except estation of the profiles or as consona many forms which the except estation of the profiles of as consona many forms which the except estation between data obstacle from achieves and ground surveys, as manyed only preferred to determine a tree loss despots of which was preferred to determine a tree loss of the control assumptions to the surface of an elastical file eath. Some of the assumptions which to simple the analysis were based on the treath of past surveys. The authorities of same plantacle, amounts once, and a create granded instance, when authorite treatment patterns were analysed. The results show that the average removable at representation is mornally such approximately to be now after a suppressible of a to a stream of the effects of resoluted constraint and anomalisms and anomalisms and to creating the effects of resoluted constraint and anomalisms and to applied to the results of action surveys.

CR 77-06

DEFENSIVE WORKS OF SUBARCTIC SNOW. Johnson, P.R., Apr. 1977, 23p, ADA-051 769, 11 refs.

SNOW (CONSTRUCTION MATERIAL), SNOW DENSITY, FORTIFICATIONS, MILITARY OPERATION.

ERATION.

Field tests at Fort Wainwright, Alaska, carried out in March-April 1975 showed that the typical subartice snow of interior Alaska can be used effectively to provide protection from both rifle and machine gun fire. The undisturbed snow had an average density of 0 18 g/cu cm, but simple processing, such as shoveling, increased the density to around 0 34 g/cu cm. Further processing increased the density to above 0 40 g/cu cm, but densities much above that value were difficult to obtain with simple hand equipment. Tests of the Mil6 rifle and M60 and M2HB machine guns showed that bullet penetration was inversely related to density—the higher the density the lower the bullet penetration. Design values for the three weapons were determined. A number of types of snow trenches and structures were designed and tested. They were found to provide good protection, in part since bullets showed a strong tendency to ricochet from the snow surface when striking it at a low angle Burlap bags filled with snow to revet structures worked very well. Several types of Russian defensive works of snow were tested but proved unsuitable in the light, weak subarctic snow. The times required for troops to build evertal types of the stream of the part of the part of the troops to build everal types of the proved unsuitable in the light, weak subarctic snow.

subarctic snow The times required for troops to build several types of structures using only shovels and scoops were recorded.

CR 77-07

MECHANICS OF CUTTING AND BORING. PART 4: DYNAMICS AND ENERGETICS OF PARALLEL MOTION TOOLS.

Mellor, M., Apr. 1977, 85p., ADA-040 760, Bibliography p.80-82. 32-1142

DRILLING, ROCK EXCAVATION, ICE CUT-TING, BOREHOLE INSTRUMENTS, PERMA-FROST, METALS, DESIGN.

FROST, METALS, DESIGN.

The report deals with the cutting of rock and similar materials by parallel motion tools. It examines cutting forces and energy requirements, taking into consideration tool geometry, wear, operating conditions, and material properties. After an introductory discussion of terminology, some general principles are outlined, and relevant theoretical ideas on metal cutting and rock cutting are reviewed. The next section, which is the heart of the report, reviews experimental data on the magnitudes and directions of cutting forces. There is a graphical compilation of data, including some from obscure or unpublished sources. The variables covered include chipping depth, rake angle, relief angle, side rake, base angle, tool width, tool compliance, tool speed, tool wear, tool interactions, and material properties. The second major part of the report treats the energetics of cutting it begins with a short discussion of relevant principles, and continues with a compilation and review of experimental data, covering the same independent variables as the force section. The report ends with a concise summary of general behavior for parallel motion tools.

REMOTE SENSING OF ACCUMULATED FRA-ZIL AND BRASH ICE IN THE ST. LAWRENCE RIVER.

Dean, A.M., Jr., Apr. 1977, 19p., ADA-039 905, 7 32.1143

FRAZIL ICE, ICE CONDITIONS, RIVER ICE, REMOTE SENSING, AIRBORNE RADAR, AERI-AL SURVEYS, CANADA-SAINT LAWRENCE RIVER

A broadbanded impulse radar system was used for aerial detection of accumulated frazil and brash ice in a 95-km reach of the St Lawrence River near Ogden Island — The remote sensing and data reduction system developed for the project provided data sufficient for production of a contour map having 1-ft intervals — With this contour map, the accumulation pattern of frazil and brash ice could be analyzed Recommendations are given for improving the performance of the aerial profiling system

CR 77-09

LABORATORY INVESTIGATION OF THE ME-CHANICS AND HYDRAULICS OF RIVER ICE JAMS.

Tatinclaux, J C., et al, Apr 1977, 45p., ADA-032 471,

Lee, C L, Wang, T.P., Nakato, T., Kennedy, J.F.

ICE JAMS, ICE MECHANICS, ICE COVER STRENGTH, COMPRESSIVE PROPERTIES, ICE FLOES, ICE CONDITIONS, EXPERIMENTAL DATA

This report presents experimental results on the conditions

of constricted passage to channel width and is proportional to a negative power of the ratio of floe length to width of constricted passage. The coefficient of proportionality and the negative exponent of this power function appear to be dependent upon the ratio of floe length to floe thickness and to be strongly affected by the properties of the maternal of the laboratory floes, in particular by the interparticle friction or cohesive characteristics. From energy analysis of floe submergence, a relationship between the thickness of a jam formed by accumulation and submergence of floes and the approach flow characteristics was derived and found to fit the experimental data satisfactorily. The relationship predicts that a stable jam cannot be formed when the approach flow velocity exceeds a certain value. This phenomenon was observed experimentally, and the measured maximum values of approach velocity were found to be in excellent agreement with the predicted values. In both studies on jam initiation and development, it was found that surface tension, and therefore the wetting properties of the maternal used for small laboratory floes, have a significant effect on the submergence velocity of small floes, and should be taken into consideration when small-scale laboratory investigations of ice jam phenomena are conducted using floes made of artificial maternal. Experiments on compressive strength floating, fragmented ice covers were conducted for ranges of cover length and cover thickness, using three different floes shapes and sizes. It was found that the compressive strength was inversely proportional to compressive order thickness and floe shape of size remains unclear partly because of the intented ranges of the chees and floe size investigated and partly because of the experimental scatter in the results CR 77-10. CR 77-10

ICE FORCES ON VERTICAL PILES.

Nevel, D.E, et al, Apr. 1977, 9p., ADA-051 770, 16 refs

Perham, R.E., Hogue, G B

ICE PRESSURE, PILE STRUCTURES, ICE BREAKING, ICE LOADS, ICE COVER THICK-ICF NESS, AIR TEMPERATURE.

NESS, AIR TEMPERATURE.

The amount of force that an ice sheet can apply to a vertical pile was tested by lowering a hydraulic ram device into a hole cut in an existing ice sheet. The device had a large base and shoved a relatively narrow vertical pile in a horizontal direction. Test variables were pile widths—15 in to 36 7 in, pile shapes—flat, round, 45 deg and 90 deg wedges; ice thickness—26 in to 8.8 in, and ram speed—0.07 in./sec to 18.75 in/sec, but not all shapes and sizes were tested at all speeds. Air temperature was 20F (-6.7C)—Forces and displacements were measured electronically—The findings are presented as a table of test results and as bar graphs of the resultant ice pressures versus the pile width-to-ice-thickness ratio, pile width and shape combination and and pile velocity—The types of failures in the ice sheet were classified as crushing, splitting, buckling, bending, and creeping—The ice sheet generally withstood a high initial load followed by several lower peak load levels—The maximum ice pressure measured was 610 psi for a 12.6-in.-diam round pile in 8.4-in-thick ice CR 77-11 CR 77-11

OBSERVATION AND ANALYSIS OF PROTECT-ED MEMBRANE ROOFING SYSTEMS.

Schaefer, D., et al, Apr 1977, 40p., ADA-040 220, 5 refs.

Larsen, E.T., Aamot, H.W.C. 32-1146

ROOFS, HEAT LOSS, THERMAL INSULATION, THERMAL PROPERTIES, COLD WEATHER CONSTRUCTION, CLIMATIC FACTORS, TESTS, EFFECTIVENESS.

EFFECTIVENESS.

Two performance indicators, effectiveness and thermal efficiency, are defined and used to evaluate the year-round performance of three protected membrane roofs in Alaska and New Hampshire Effectiveness is a measure of the deviations of ceiling temperatures from a yearly average, with large deviations indicating erratic performance in the roofing-insulation system and small departures indicating a thermally stable system. Thermal efficiency, the ratio of calculated heat loss to measured heat loss, is affected by climatic conditions such as rain, snow, solar radiation and wind. Thermal efficiency values of 100% or greater are possible since the calculated heat loss is based only on the inside and outside air temperature differences and the thermal properties of her roof components. Results of the year-round evaluation indicate that the three protected membrane roofs generally have high values of both effectiveness and thermal efficiency. CR 77-12

ROOF LOADS RESULTING FROM RAIN-ON-

Colbeck, S.C., May 1977, 19p., ADA-040 536, 11 refs

ROOFS, SNOW LOADS, LOADS (FORCES), DRAINAGE, RAIN, ANALYSIS (MATHEMAT-

A computer program to calculate the increased live load on a snow-covered toof due to rain-on-snow is given. For the 25-year rainstorm falling on a heavy snow load on a flat roof in Hanover, New Hampshire, an additional 98 kg/sq m (20 lb/sq ft) of liquid water is added to the live load. The additional load due to rain-on snow is very sensitive to the snow properties and characteristics of the roof. A wide range of live loads is possible, depending on the particular circumstances.

CR 77-13

APPLICATIONS OF REMOTE SENSING IN THE BOSTON URBAN STUDIES PROGRAM, PARTS I AND II. Merry, C.J., et al, June 1977, 36p., ADA-049 285.

ADA-049 286, 15 refs.

McKim, H.L. 32-2699

REMOTE SENSING, AERIAL SURVEYS, URBAN PLANNING, UNITED STATES—MASSACHUSETTS—BOSTON.

URBAN PLANNING, UNITED STATES—MAS-SACHUSETTS—BOSTON.

The cost effectiveness of remote sensing techniques was compared to that of the conventional techniques used by the U.S. Army Engineer Division, New England, in the Boston Harbor-Eastern Massachusetts Metropolitan Area study A total of 6 level 1, 18 level II, and 18 level III land use categories were mapped from NASA RB-57/RC-8 high altitude aircraft photography for six selected 7.5 minute quadrangles located in the Boston area Watershed and political boundaries could not be mapped from the NASA photography Imperious surfaces and curb lengths were mapped from low altitude aircraft photography obtained with a Zeiss RMK 15/23 camera system (measured scale 1.3500) for two sites in the Boston South and Newton quadrangles The remote sensing procedures used in this study usually provided much greater detail than conventional procedures. The remote sensing procedures were not always cost-effective when compared to the conventional procedures, but they were always more accurate. Therefore, remote sensing techniques should be used and appropriate photographic resolution and scale factors taken into consideration when mapping land use, curb density and impervious surfaces for use in the STORM (storage, treatment, overflow, runoff) model

CR 77-14 ICE BREAKUP ON THE CHENA RIVER 1975

McFadden, T., et al, June 1977, 44p, ADA-043 070. Bibliography p.17-19. Collins, C.M.

32.1152

ICE BREAKUP, RIVER ICE, DAMS, BRIDGES, FLOOD CONTROL, ICE COVER THICKNESS, ICE VOLUME, UNITED STATES—ALASKA— CHENA RIVER.

CHENA RIVER.

The breakup of the Chena River was observed and documented during the spring of 1975 and 1976. This study attempted to determine the potential for damage to the proposed Chena River flood control dam from ice and debris during breakup. Results of this study were compared to those of a 1974 companion study. In 1975, ice thicknesses were determined to be 15% thinner than in 1974 and ice volume was 33%, smaller. No major ice floes were observed in 1975 and no significant flooding occurred, although the approaches to a bridge at the damsite were eroded by debris and high water immediately after breakup. The 1976 breakup was milieer than that of 1975. Minor flooding in the lower river was caused by jamming of a few large ice pieces, but no property damage resulted.

EXPERIMENTAL SCALING STUDY OF AN ANNULAR FLOW ICE-WATER HEAT SINK.

Stubstad, J M., et al, June 1977, 54p., ADA-045 869. Ouing W F

ICE WATER INTERFACE, HEAT TRANSFER, UNDERGROUND FACILITIES, HEAT RECOV-ERY, COOLING SYSTEMS, MODELS, COMPUT-ERIZED SIMULATION.

ERIZED SIMULATION.

A laboratory experimental study was conducted on a scale model of an annular flow ice-water heat sink to be used to store the waste heat produced in a hardened defense installation operating in an isolated mode. The study examined 1) scaling relationships for predicting the performance of prototype units using data from scale models, 2) the accuracy of a computer prediction technique developed during an earlier study, 3) the heat transfer phenomenon at the ice-water interface, and 4) some practical aspects related to the operation of a prototype installation. The scaling relationships and the computer program were found to be sufficiently accurate for use in developing a prototype vink design. During operation the scale model sink provided an almost constant low temperature source of coolant water an almost constant low temperature source of coolant water for approximately one-half its useful life and thereafter behaved like an ordinary stored water reservoir type heat sink. No significant operational problems were discovered.

CR 77-16 ICEBREAKER SIMULATION.

Nevel, DE, July 1977, 9p. ADA-044 109, 6 refs.

ICEBREAKERS, ICE BREAKING, ICE NAVIGATION, MATHEMATICAL MODELS, SIMULA-TION.

A brief discussion is given of the ways an icebreaker breaks A brief discussion is given of the ways an icebreaker breaks ice. Since the icebreaking process is so complex, the solution of a mathematical model does not appear to be feasible. As an alternative, it is suggested that physical models be used to design icebreakers. The appropriate scaling laws for physical models are developed and their practical limitation discussed. CR 77-17

ICE ACCUMULATION ON OCEAN STRUC-TUBES

Minsk, L.D., Aug. 1977, 42p., ADA-044 258, Bibliog-

ICE ACCRETION, ICE FORMATION, SHIP IC-ING, ICE PREVENTION, ICE REMOVAL, SEA SPRAY, AIR TEMPERATURE, WATER TEMPERATURE, WHID FACTORS, FREEZING

A literature search was made for information on the accretion of ice on ocean structures and on methods for control. The bulk of the reports were in Russian, with some additional Japanese, British, American, Canadian, and Icelandic sources. Analysis of icing reports indicated that sea spray is the most important cause of ship icing, with lesser amounts due to freezing rain, snow, and fog. Icing is a potential danger whenever air temperatures are below the freezing point of water and the sea temperature is 6C or lower Theoretical work on the ice accretion process is discussed, and a method is suggested, based on Russian experiments, for calculating the sea spray accumulation rate for cylindrical and flat surfaces as a function of water source temperature, are temperature, and wind speed. Other factors that influence icing seventy are ship size and configuration, angle between ship course and water heading, and ship speed Icing in the north temperate latitudes generally occurs in the rear of barometric depressions. Maps showing limits of various degrees of icing seventy are included. Atmospheric icing measurements on tall land-based structures are presented, and potential maximum accumulations estimated. Control measures are discussed, though no completely effective A literature search was made for information on the accretion ed, and potential maximum accumulations estimated. Control measures are discussed, though no completely effective method is available Mechanical (impaction) methods are the most common, but experiments have been conducted on heated, icephobic, and deformable surfaces, and with freezing point depressants. No device for the unequivocal measurement of ice accumulation is available, though some experimental methods are suitable for controlled testing; it is recommended that a device be developed.

CR 77-18

ICE ARCHING AND THE DRIFT OF PACK ICE THROUGH RESTRICTED CHANNEL

Sodhi, D.S., Aug. 1977, 11p., ADA-044 218, 23 refs. 32-1156

PACK ICE, SEA ICE, DRIFT, CHANNELS (WA TERWAYS), ICE JAMS, MATHEMATICAL MODELS.

Models originally developed to describe the arching and Models originally developed to describe the arching and the movement of granular materials through hoppers or chutes are applied to the arching and drift of pack ice in straits and gulfs having lengths of 50 to 500 km. Verification of the usefulness of the models is attempted by making comparisons with ice deformation patterns as observed via satellite imagery in the Bering Strait region and in Amundsen Gulf. The results are encouraging in that there is good correspondence between observed arching and lead patterns and those predicted by theory. In addition, values determined via the model for the angle of internal friction (approx 30 deg to 35 deg) and the cohesive strength per unit thickness (approx 2,000N/m) are similar to values obtained by other approaches. It is estimated that if the wind velocity parallel It is estimated that if the wind velocity parallel Strait exceeds approx 6 m/s, there will be Bering Strait exceeds approx 6 m/s, there through the strait

CR 77-19

MECHANICS OF CUTTING AND BORING. PART 6: DYNAMICS AND ENERGETICS OF TRANSVERSE ROTATION MACHINES.

Mellor, M., Aug 1977, 36p, ADA-045 127, 3 refs 32-1157

ROCK DRILLING, EXCAVATION, ICE CUT-TING, DRILLS, PERMAFROST, DESIGN.

The report deals with forces and power levels in cutting machines having a disc or drum that rotates about an axis perpendicular to the direction of advance. The forces on individual cutting tools are related to position on the rotor and to characteristics such as tool layout, rotor speed, rotor size, machine advance speed, and rotor torque. rotor size, machine advance speed, and rotor torque. Integration leads to expressions for force components acting on the rotor axis, taking into account tool characteristics, cutting depth of the rotor, and rotor torque estimates of tractive thrust and thrust normal to the primary free surface. For self-propelled machines, this leads to considerations of traction, normal reaction, weight and balance, and power/weight ratios. Specific energy consumption is analyzed and related to machine characteristics and strength is analyzed and related to machine characteristics and vitingin of the material being cut. Power per unit working area is discussed, and data for existing machines are summarized Power requirements for ejection of cuttings are analyzed, and the hydrodynamic resistance on underwater cuttings is treated. A number of worked examples are given illustrate the principles discussed in the report

CR 77-20

INVESTIGATION OF AN AIRBORNE RESISTIVITY SURVEY CONDUCTED AT VERY LOW FREQUENCY.

Arcone, S A., Aug 1977, 48p., ADA-044 684, Bibliog-

raphy p.44-45. 32-1158

AERIAL SURVEYS, REMOTE SENSING, AIR-BORNE RADAR, ELECTRICAL RESISTIVITY, GEOLOGIC STRUCTURES, VERY LOW FRE-QUENCY, GEOPHYSICAL SURVEYS, SUBSUR-FACE INVESTIGATIONS, UNITED STATES— MAINE-ALLAGASH.

An airborne survey of earth electrical resistivity, computed from the complex tilt of the electric field vector of a VLF from the complex tilt of the electine field vector of a VLF (178 kHz) radio surface wave, has been studied. The survey was conducted at a 150-m mean flight altitude. The bedrock of the survey area was slate containing an igneous stock. Topography was found to distort the resistivity contours through its effect upon the vertical component of the electric field. At 300-m flight altitude most resistivity information was retained due to the deterioration of topographic influence. The phase of the tilt, which cannot be distinguished from the amplitude by an airborne antenna system, was determined from a ground survey of the surface impedance and was found to be an important influence on the airborne detection of high resistivity areas. The entire 150-m survey was reevaluated with topographic effects removed. The resolution of the igneous geology improved and several of these improvements were verified by the ground measurements.

CR 77-21

MID-WINTER INSTALLATION OF PROTECT-ED MEMBRANE ROOFS IN ALASKA Aamot, H.W.C., Aug. 1977, 5p., ADA-045 356, 2 refs.

THERMAL INSULATION, WEATHER CONSTRUCTION, COST ANALYSIS,

WEATHER CONSTRUCTION, COST ANALYSIS, UNITED STATES—ALASKA.

Cold weather limits the successful application of built-up roofing, but often a roof installation must be completed late in the fall or in the winter The loose-lad protected membrane roof with a synthetic sheet membrane can be installed in the middle of the winter with complete reliability. A synthetic membrane is traditionally more expensive than built-up roofing (rising crude oil prices, however, have reversed this condition), but it has two special features besides its suitability for winter installation it can be placed on a damp deck, if necessary, and, being loose-laid, it does not split because of deck movement This report documents information on the installation of two roofs in Anchorage, Alaska, during January and February 1972, including a discussion of the necessary snow removal from the bare deck and the use of portable shelters for preparing the lap joints between sheets during very cold weather. The winter installation caused no special construction problems and the advantages of the synthetic membrane make it an attractive alternative to built-up roofing The cost of loose-laid protect-de membrane roofs in Alaska was, in 1972, nearly 3300 per square (\$28/sq m), including insulation Prices are rising as labor costs rise and as more insulation is specified. UNITED STATES-ALASKA.

CD 77.22

CR 77-22
BASEPLATE DESIGN AND PERFORMANCE:
MORTAR STABILITY REPORT.
Aitken, G W., Aug 1977, 28p, ADB-021 703L, 4 refs
Distribution limited to U.S. Gov't agencies only.

MILITARY EQUIPMENT, SOIL STRENGTH, STATIC STABILITY, FOUNDATIONS.

STATIC STABILITY, FOUNDATIONS.

The results of field test programs conducted to evaluate the performance of several prototype baseplates on sand and clay soils are presented. One test series was accomplished to develop a possible alternative baseplate for the 60-mm Lightweight Company Mortar System (LWCMS). Three prototype baseplates were used in this series which resulted in design recommendations for a very lightweight, three-spade baseplate for use with the LWCMS. Another part of the program consisted of design and testing of a rototype baseplate for use with the LWCMS another part of the program consisted of design and testing of a rototype baseplate for use with an improved 81-mm mortar. part of the program consisted of design and testing of a prototype baseplate for use with an improved 81-mm mortar system. Design goals, which were verified in the test program, were to provide a displacement reduction of up 50% and substantial reductions in tilt relative to the present M3 baseplate Results obtained using a baseplate test fixture having spades of variable depth and configuration indicated that spade depth was very important on sand but of minor influence on clay. The influence of spade depth on displacement and tilt in both three- and four-spade configurations is covered in detail. Some data on the influence of socket height and perforation pattern on performance are also included

COLLABORATION OF ARCHITECT A BEHAVIORAL SCIENTIST IN RESEARCH AND

Ledbetter, CB, Aug. 1977, 8p., ADA-045 418, 33 refs.

COLD WEATHER CONSTRUCTION, BUILD-INGS, ENVIRONMENTS, PROFESSIONAL PER-SONNEL, RESEARCH PROJECTS, HOUSES

This report discusses the relationship between an architect and a behavioral scientist. Some of the discussion applies

to this cooperative work for design of buildings. The bulk, however, relates to the cooperation of architect and behavioral scientist while conducting research. Examples from collaborative research at Alaskan military installations cited which demonstrate the roles and contributions

EVALUATION OF EXISTING SYSTEMS FOR LAND TREATMENT OF WASTEWATER MANTECA, CALIFORNIA, AND QUII OUINCY. WASHINGTON.

Iskandar, I.K., et al, Sep. 1977, 34p, ADA-045 357, 28

Murrmann, R.P., Leggett, D.C.

32-101
WASTE DISPOSAL, GROUND WATER, SOIL
CHEMISTRY, LAND DEVELOPMENT, WATER
TREATMENT, ENVIRONMENTAL IMPACT.

TREATMENT, ENVIRONMENTAL IMPACT. Wastewater disposal sites at Mantees, California, and Quincy, Washington, were evaluated for their current performance and for the long-term impact of wastewater application. These sites have been operated as slow-infilitation, land-disposal systems for up to 20 years. Current performance was evaluated in terms of water quality, while soil chemical parameters were measured to determine the effects of prolonged wastewater application at the sites. No significant effects on the performance were found to be due to differences in pretreatment. A difference between the performances of the two sites was attributed mainly to management practices. effects on the performance were found to be due to differences in pretreatment. A difference between the performances of the two sites was attrabuted mainly to management practices, site history and climatic differences. While leaching of nitrate was observed at both sites, the impact on groundwater quality generally was found to be within the accepted limits (less than 10 mg/l of NO3-N). Leaching of phosphorus to a depth of 150 cm was found at both sites but was higher at Manteca. This was thought to be due to p.oblems associated with crop menagement, land use, and mode and schedule of wastewater application. Total and extractable phosphorus increased in the surface soil layers with time However, soil nitrogen appeared to decrease, probably because of mineralization. Soil organic matter and cation exchange capacity increased. Some increase in exchangeable Na was noted, but not enough to produce alkaline or saline conditions. A drop in soil pH at Quincy after prolonged application is thought to have been due to removal of carbonates by leaching and by H+ from nitrification. If these disposal areas were managed as treatment sites, leachate quality should meet proposed Environmental Protection Agency guidelines for drinking waters.

CR 77-25

DETECTION OF MOISTURE IN CONSTRUC-TION MATERIALS

Morey, R.M., et al, Sep. 1977, 9p., ADA-045 353, 4 refs.

32-1164

CONCRETE CURING, CONSTRUCTION MATERIALS, MOISTURE, ROOFS, AIRBORNE RADAR, REMOTE SENSING, DETECTION, CONCRETE DURABILITY, RADAR ECHOES.

Results of a study to determine the feasibility of using an impulse radar to detect moisture variations in the built-up roof at CRREL and to monitor the curing of concrete are presented. The results indicate that impulse radar can be used to detect wide variations in roof mosture associated with built-up roof surface deterioration and that this technique has the potential of providing a nondestructive test method for measuring the strength of concrete during curing

CR 77-26

INTERMITTENT ICE FORCES ACTING ON IN-CLINED WEDGES.

Tryde, P., Oct. 1977, 26p., ADA-046 590, 15 refs.

ICE LOADS, LOADS (FORCES), ICE PRESSURE, WEDGES, ANALYSIS (MATHÉMATICS), THEO-

A theory for ice forces acting on inclined wedges has been developed, thus making it possible to predict the magnitude of the intermittent ice forces from knowledge of the physical parameters of the system. The theory has been verified by model tests with artificial and natural ice

OBSERVATIONS OF THE ULTRAVIOLET SPECTRAL REFLECTANCE OF SNOW.

O'Brien, H.W., Oct. 1977, 19p, ADA-046 349, 11 refs.

SNOW OPTICS, REFLECTIVITY, SPECTROPHO-TOMETERS, ULTRAVIOLET RADIATION

The spectral reflectance of natural snow in the range of 0.20- to about 0.40-micron wavelengths was studied in the laboratory using both continuous spectral scanning and fixed bandpass measurements. White barium sulfate pressed powder was used as a standard for comparison. The reflectance uer was used as a standard for comparison. The reflectance of fresh snow was found to be very high (usually nearly 100%) and only weakly wavelength dependent from 0.24 micron to the visible range. In the 0.20- to 0.24-micron of the spectrum, the reflectance was found to be quite erratic. Possible reasons for the irregularities in reflectance measurements are discussed. FREEZE-THAW TESTS OF LIQUID DEICING CHEMICALS ON SELECTED PAVEMENT MATERIALS.

Minsk, L.D., Nov. 1977, 16p., ADA-051 771, 7 refs. 32-2726

FREEZE THAW TESTS, CHEMICAL ICE PRE-VENTION, CONCRETE DURABILITY, BITUMI-NOUS CONCRETES.

Tests were conducted to assess the extent of surface legradaresist were concluded to assess the extent of solutee legitude-tion resulting from the application of non-chloride descing chemicals on three types of airfield pavements. The chemi-cals tested were proprietary mixtures of urea, formamide, and ethylene glycol, sodium chloride, distilled water, and dry specimens were used as controls and for comparison Pavements included new and old specimens of open-graded asphaltic concrete and old specimens of dense-graded asphaltic concrete. Portland cement concrete specimens used were new and old, with and without air-entrainment. New and old tar rubber concrete specimens were also tested Samples were subjected to up to 60 frezez-thaw cycles with deicing chemicals flooding their upper surface Each specideicing chemicals flooding their upper surface decimen was rated on a scale of 0-5 after every five freezeman was rated on a scale of 0-5 after every five freezeman between the control of the control o cretes were largely unaffected.

INTERNAL STRUCTURE OF FAST ICE NEAR NARWAHL ISLAND, BEAUFORT SEA, ALAS-

Gow, A.J., et al, Oct. 1977, 8p., ADA-047 785, 13 refs. Weeks, W.F. 32-2727

FAST ICE, ICE STRUCTURE.

Results of measurements of salanity, grain size, substructure dimensions and crystal fabrics of the undeformed 2.15-m-thick annual sea ice sheet near Narwhal Island, Alaska, are presented. A notable observation was the formation of a dominant c-axis horizontal structure in all ice below 14 cm, including transformation to a pronounced east-west alignment of the c-axes by a depth of 66 cm. This study confirms earlier reports of the occurrence of very strong horizontal c-axis alignments in arctic fast ice

COMPUTER MODEL OF MUNICIPAL SNOW REMOVAL.

Tucker, W.B., Nov 1977, 7p., ADA-047 360, 10 refs. 32-1630

SNOW REMOVAL, URBAN PLANNING, COM-PUTERIZED SIMULATION.

A general computer model to simulate municipal snow removal has been developed Programs which aid in the routing Ageneral computer model to simulate municipal snow removal has been developed Programs which aid in the routing of snowplows are a part of this package Once vehicle routes are created, the simulation program can be used to assess situations varying both equipment and meteorological parameters Time for each plow to complete its route is calculated. Considerations are made for the above variable parameters plus plowing windrow, route starting depth, overlap-ping trick routes and intersection delay time. The effects of storm length, snowfall rate and starting depth on total plowing time are examined in a test case

CR 77-31
ROOF MOISTURE SURVEY: TEN STATE OF NEW HAMPSHIRE BUILDINGS. Tobiasson, W., et al, Dec 1977, 29p., ADA-048 986,

5 refs. Kothonen, C., Dudley, T.

32-2695 ROOFS, WATER CONTENT, INFRARED PHO-TOGRAPHY.

TOGRAPHY.

Ten roofs in Concord. New Hampshire, were surveyed for wet insulation using a hand-held infrared camera. Suspected wet areas were marked on the roof with spray paint and roof samples were obtained to verify wet and dry conditions. Recommendations for maintenance and repair were made based on infrared findings, water contents, and visual examinations. An incremental economic study is presented to serve as a guide in determining the most cost-effective approach.

CR 77-32 HEAT TRANSFER OVER A VERTICAL MELT-ING PLATE.

Yen, Y.-C., et al, Dec. 1977, 12p , ADA-049 437, 11

Hart, M.M. 32-2696

HEAT TRANSFER, CONVECTION, ICE MELTING, WATER FLOW, EXPERIMENTAL DATA An experimental study of for ed convective heat transfer over a vertical melting plate has been conducted. This study covers water velocities ranging from 17 to 98 mm/s and bulk water temperatures from 11 to 750C. The experimental results are correlated in terms of Nusvelt, Prandtl and Reynolds numbers with a moderate correlation coefficient of 0.843. The results are expected to be useful in predicting the heat transfer characteristics of a much larger prototype inconsists. ice-water heat sink

AXIAL DOUBLE POINT-LOAD TESTS ON SNOW AND ICE.

Kovacs, A., Mar 1978, 11p., ADA-053 321, 11 refs. 32-3535

ICE MECHANICS, SNOW MECHANICS, COM-PRESSIVE STRENGTH, INDEXES (RATIOS), STRAIN TESTS, ANTARCTICA—MCMURDO SOUND.

SOUND.

The results of axial double point-load tests on disk samples of snow and ice obtained from the area of McMurdo Sound, Antarctica, are presented.

They show the effects of temperature, sample length, load point diameter and specific gravity on failure load.

It was determined that 13 samples should be tested to obtain a representative mean strength index. The results show that the axial double point-load test has good possibilities as a rapid field test for determining the unconfined compressive strength of snow and ice but that further evaluation of the variables affecting test results must be made. (Auth)

CR 78-02

SOME ELEMENTS OF ICEBERG TECHNOLO-

Weeks, W.F., et al, Mar 1978, 31p., ADA-053 431, 52 refs

Melior, M. 32-3536

ICEBERG TOWING, ICE (WATER STORAGE), ENGINEERING.

ENGINEERING.

Many of the technical questions relating to iceberg transport are given brief, but quantitative, consideration. These include iceberg genesis and properties, the mechanical stability of icebergs at sea, towing forces and tug characteristics, drag coefficients, ablation rates, and handling and processing the iceberg at both the pick-up site and at the final destination. In particular, the paper attempts to make technical information on glaciological and ice engineering aspects of the problem more readily available to the interested planner or engineer Specific conclusions include. 1) No unprotected iceberg, no matter how long or wide, would be likely to survive the ablation caused by a long trip to low latitudes 2) leebergs that have a horizontal dimension exceeding 2 km may well be prone to breakup by long wavelength swells 3) To avoid the dangers associated with an iceberg capsizing, the width of a 200-m-thick iceberg should always be more than 300 m 4) For towing efficiency the length/width ratio of a towed iceberg should be appreciably greater than unity 5). For a pilot project, the selected iceberg would have to be quite small, if for no other reason than the practical availability of tug power (Auth.)

CR 78-03 BEARING CAPACITY OF RIVER ICE FOR

Nevel, D.E., Apr. 1978, 22p., ADA-055 244, 7 refs. 33-2527

RIVER ICE, ICE STRENGTH, VEHICLES, FLOATING ICE

The mathematical theory for the bearing capacity of river ice for vehicles is presented. The floating ice sheet is assumed to have simple supports at the shore line. Solutions are presented for loads uniformly distributed over circular and rectangular areas. Numerical evaluations are made for a number of vehicles and the results presented in graphical

CR 78-04

COMPARISON BETWEEN DERIVED INTER-NAL DIELECTRIC PROPERTIES AND RADIO-ECHO SOUNDING RECORDS OF THE ICE SHEET AT CAPE FOLGER, ANTARCTICA. Keliher, T. Z., et al., Apr. 1978, 12p., ADA-055 245, 17

Ackley, S.F.

32-4366
ICE SHEETS, ICE ELECTRICAL PROPERTIES, ICE PHYSICS, RADIO ECHO SOUNDINGS, DIE-LECTRIC PROPERTIES, ICE COVER THICK-NESS, ICE DENSITY, ANTARCTICA—FOLGER, CAPE

Measured physical properties of core to bedrock taken at Cape Folger, East Antarctica, are used to compute a profile of dielectric properties and from this, a depth-reflection coefficient profile for comparison with the observed radio-cellections. The measurements available on physical properties are density variations, bubble size and shape changes, and crystal fabric variations. The close correspondence between the depths of the bubble shape changes (which are definitely deformational features), and the depths of the density variations, and between both of these and the radio echo layers indicates that deformational events in the ice sacet's history are represented by the variations in the physical property and associated radio-echo records. (Authmod.)

CR 78-05 VISCOELASTIC DEFLECTION OF AN INFI-NITE FLOATING ICE PLATE SUBJECTED TO A CIRCULAR LOAD.

Takagi, S., Apr. 1978, 32p., ADA-054 896, 19 refs. 32-4367

FLOATING ICE, PLATES, VISCOELASTICITY, LOADS (FORCES), ANALYSIS (MATHEMAT-ICS).

ICS).

The viscoelastic deflection of an infinite floating ice plate subjected to a circular load is solved, assuming the Maxwell-Voigt type four-element model. An effective method is developed for numerical integration of the solution integrals, of which each integrand contains a product of Bessel functions extending to infinity. The theoretical curve is fitted to the field data, but the material constants thus found varied with time and location.

CR 78-06

SEGREGATION FREEZING AS THE CAUSE OF SUCTION FORCE FOR ICE LENS FORMA-TION.

Takagi, S., Apr. 1978, 13p., ADA-055 780, 38 refs. For another version see 32-3470.

32-4368

ICE LENSES, ICE FORMATION, SOIL FREEZ-ING, GROUND ICE, FROST HEAVE, SOIL ME-CHANICS, MATHEMATICAL MODELS, FROZ-EN GROUND THERMODYNAMICS.

CR 78-07

IN-PLANE DEFORMATION OF NON-COAXIAL PLASTIC SOIL.

Takagi, S., Apr. 1978, 28p., ADA-054 217, 28 refs. 32-3962

THEORIES, SOIL CREEP, PLASTIC DEFORMA-TION, BOUNDARY VALUE PROBLEMS

TION, BOUNDARY VALUE PROBLEMS

The theory of non-coaxial in-plane plastic deformation of soils that obey the Coulomb yield criter on is presented. The constitutive equations are derived by use of the geometry of the Mohr circle and the theory of characteristic lines it is found that, for solving a boundary value problem, the non-coaxial angle must be given such values that enable us to accommodate the presupposed type of flow in the given domain satisfying the given boundary conditions. The non-coaxial angle is contained in the constitutive equations as a parameter. Therefore, the plastic material obeying the Coulomb yield criterion is a singular material whose constitutive equations are not constant with material but are variable with flow conditions.

CR 78-09 INTERACTION OF A SURFACE WAVE WITH A DIELECTRIC SLAB DISCONTINUITY

Arcone, S.A., et al, Apr. 1978, 10p., ADA-055 956, 15

32-4369 ICE ELECTRICAL PROPERTIES, DIELECTRIC PROPERTIES, WAVE PROPAGATION, ELECTRIC FIELDS, MICROWAVES, AIRCRAFT ICING, HELICOPTERS, ICE REMOVAL.

The interaction of a 5 1-GHz transverse electric surface wave with a dielectric slab is experimentally investigated. The wave is initially supported by a dielectric substrate resting upon a metallic ground-plane. A slab, made of the same dielectric material as the substrate and variable is height, is then placed upon the waveguide. The results for a small slab sitting on the substrate showed that the discontinuity was a very inefficient launcher of reflected surface waves Investigations of these reflections with a trough waveguide showed that, for values of slab height comparable to the exponential decay height of the surface wave, the effections remain very small. However, as the slab height is increased beyond the decay height of the surface wave, the effections remain very small. However, as the slab height is increased beyond the decay height, the reflected amplitude approaches the theoretical value for a plane wave reflected from the interface between air and the same dielectric. The results are applicable to surface wave methods of microwave deicing of wings and helicopter rotors. The interaction of a 5 1-GHz transverse electric surface wave

CR 78-09

FLEXURAL STRENGTH OF ICE ON TEMPERATE LAKES—COMPARATIVE TESTS OF LARGE CANTILEVER AND SIMPLY SUPPORT-ED BEAMS

Gow, AJ, et al. Apr 1978, 14p. ADA-054 218, 9

Ucda, H.T., Ricard, J.A.

32-3963

LAKE ICE, FLEXURAL STRENGTH, STRESS CONCENTRATION, SUPPORTS

CONCENTRATION, SOPPORTS Large, simply supported beams of temperate lake ice were found, generally, to yield significantly higher flexural strengths than the same beams tested in the cantilever mode. Data support the view that a significant stress concentration may exist at the fixed corners of the cantilever beams. Maximum effects are experienced with beams of cold, brittle ice substantially free of structural imperfections, for this kind of ice the strength difference factor here attributed to the effect of stress concentrations, may exceed 2.0, that is simply of stress concentrations, may exceed 20, that is simply supported beams test a factor of 2 or more stronger than the same beams tested in the cantiever mode. In ice that has undergone extensive thermal degradation, the stress

concentration effect may be eliminated entirely supported beams generally yield higher strengths when the top surfaces are placed in tension. This behavior is stituthed to differences in ice type; the fine-grained, crack-free top layer of snow-ice, which constituted up to 50% of the ice cover in the current series of tests, usually reacted more strongly in tension than the coarse-grained crack-prone bottom lake are.

CR 78-10

COMPRESSION OF WET SNOW.

Colbeck, S.C., et al, Apr. 1978, 17p., ADA-055 246, 34

Shaw, K.A., Lemieux, G.

WET SNOW, SNOW COMPRESSION, SNOW WATER CONTENT, VISCOSITY, SALINITY, SNOW MELTING, STRESSES, IONS.

SNOW MELTING, STRESSES, IONS.

The compressibility of wet snow is described in terms of pressure melting and nonlinear viscous deformation at grain contacts. The results of experiments with different salinities and liquid water contents are compared with computed densities. The decreasing compressibility of wet snow with increasing salinity and decreasing liquid content is quantified and explained. Simultaneous particle growth and the doubly charged layer at phase boundaries are included in the model. The results snow that the density of wet snow increases approximately as a power of time but is highly dependent on the stress, initial particle size, liquid water content, and ionic impurity content of the srow.

MECHANICS OF CUTTING AND BORING. PART 8: DYNAMICS AND ENERGETICS OF CONTINUOUS BELT MACHINES.

Mellor, M., Apr. 1978, 24p., ADA-055 247.

ROCK EXCAVATION, BOREHOLE INSTRU-MENTS, ROCK DRILLING, EXCAVATION, ICE CUTTING, MACHINERY, PERMAFROST, DE-

The report deals with forces and power requirements for cutting machines of the belt type, as exemplified by large chain saws and ladder trenchers. The forces of single cutting tools are considered, and related to the overall forces cuting tools are considered, and related to the overall forces on a cutter bar Forces are related to power, and sources of loss are identified Tractive thrust and normal reaction are analyzed and used to assess the traction, weight and balance factors for self-propelled machines Specific energy consumption and performance index are treated, and concepts of power density and apparent belt pressure are introduced Requirements for acceleration of cuttings are assessed, and the report concludes with a set of worked examples

CR 78-12

REPETITIVE LOADING TESTS ON MEM-BRANE-ENVELOPED ROAD SECTIONS DUR-ING FREEZE-THAW CYCLES.

Smith, N, et al, May 1978, 16p., ADA-056 744, 15

Eaton, R A., Stubstad, J.M.

32-4407

LOADS (FORCES), ROADS, FREEZE THAW CY-CLES, LOW TEMPERATURE TESTS, SUB-GRADE PREPARATION, WATERPROOFING, SOIL WATER MIGRATION.

SOIL WATER MIGRATION.

Road test sections of membrane-enveloped silt and clay soils overlain with asphalt cement concrete were subjected to repetitive dynamic plate-bearing loadings to determine their strength variations during freeze-thaw cycles. The recoverable surface deformations in the load deflection bowl were continuously measured during the loading cycles and analyzed, using the Chevron layered clastic computer program to obtain the in situ resilient deformation modulus of the various section layers at different stages of the freeze-thaw cycles. The resilient stiffness of the pavement system (the total load per unit of resilient load plate deflection) was also calculated for the various freeze-thaw conditions. The modulus values of the asphalt cement concrete varied inversely with its temperature by an order of magnitude (90,000 psi). The resilient stiffness of the pavement system varied in the same manner by nearly a factor of eight (2284 kipy/in). The resilient stiffness of the pavement system varied in the same manner by nearly a factor of eight (2284 kipy/in). The resilient stiffness of the pavement system varied in the same manner by nearly a factor of eight (2284 kipy/in). Despite the wide strength variations of the sections during freeze-thaw cycles, membrane-enveloped fine-grained soils can be utilized instead of granular materials as base and subbase layers in flexible pavements in cold regions where moisture augration is a major concern. Moisture migration did not occur at saturation levels up to 75°c, thus there was no strength loss during thawing. loss during thawing

CR 78-13

PREFERRED CRYSTAL ORIENTATIONS IN THE FAST ICE ALONG THE MARGINS OF THE ARCTIC OCEAN.

Weeks, W.F., et al. June 1978, 24p., ADA-059 024, 77 rcfs.

Gow, A.J.

33-1520

SEA ICE, FAST ICE, ICE CRYSTAL STRUCTURE, OCEAN CURRENTS

Field observations of the growth fabrics of the fast and near-fast ice along the coasts of the Beaufort and Chukchi Seas show that at depths of more than 60 cm below the upper ice surface, the sea ice crysta's show striking alignments

within the horizontal plane. In general, the c-axes of the crystals were aligned roughly E-W parallel to the coast In the vicinity of islands the alignment roughly paralleled the outlines of the islands, and in narrow passes between islands the alignment paralleled the channel Our observations, as well as similar observations made in the Kara Sea by Cherepanov, can be explained in it is assumed that the c-axes of the crystals are aligned parallel to the "long-term" current direction at the sea ice/sea water interface. The alignments are believed to be the result of geometric selection among the growing crystals, with the most favored orientation being that in which the current flows normal to the plates of ice that make up the dendritic ice/water interface characteristic of sea ice.

BUCKLING PRESSURE OF AN ELASTIC PLATE FLOATING ON WATER AND STRESSED UNIFORMLY ALONG THE PERIPHERY OF AN INTERNAL HOLE.

Takagi, S., June 1978, 49p., ADA-056 585, 10 refs. 32-4408

FLOATING ICE, ICE STRENGTH, BOUNDARY VALUE PROBLEMS, ANALYSIS (MATHEMAT-ICS).

The analytical solution and the numerical study of the eigenval-The analytical solution and the numerical study of the eigenvalue problem for determining the buckling pressure of an infinite elastic plate floating on water and stressed uniformly along the periphery of an internal hole is presented. The boundary conditions considered are the clamped-, simple-, and free-edge conditions Small buckling pressure occurs only for the free-edge condition. The shape of the deflection for the free-edge condition suggests that buckling is an important mechanism of failure

ON THE DETERMINATION OF HORIZONTAL FORCES A FLOATING ICE PLATE EXERTS ON A STRUCTURE.

Kerr, A.D., Aug. 1978, 9p., ADA-060 444, 26 refs. For this report from a different source see 32-4451.

FLOATING ICE, ICE PRESSURE, LOADS (FORCES), OFFSHORE STRUCTURES, ICE STRENGTH

This report first discusses the general approach for calculating horizontal forces an ice cover exerts on a structure lice force determination consists of two parts (1) the analysis of the in-plane forces, assuming that the ice cover remains intact, and (2) the use of a failure criterion, since an ice force cannot be larger than the force capable of breaking up the ice cover. For an estimate of the largest ice force cannot be larger than the force capable of breaking up the ice cover For an estimate of the largest ice force, an elastic plate analysis and a failure criterion are often sufficient A review of the literature revealed that, in the majority of the analyses, it is assumed that the failure load is directly related to a "crushing strength" of the ice cover However, observations in the field and tests in the laboratory show that in some instances the ice cover fails by buckling This report reviews the ice force analyses based on the buckling failure mechanism and points out their shortcomings. The report then presents a new method of analysis which is based on the buckling mechanism.

HYDRAULIC MODEL INVESTIGATION OF DRIFTING SNOW.

Wuebben, J.L. June 1978, 29p., ADA-059 175 33-1767

HYDRAULIC STRUCTURES, SNOWDRIFTS. MODELS, BOUNDARY VALUE PROBLEMS, SNOW FENCES.

A model investigation of drifting snow conditions was conducted in a hydraulic flume using a sand-water analog. Model results were evaluated to define modeling parameters that would allow quantitative correlation between measured prototype drift conditions and the model. Models of the fence were constructed for three heights and two geometric scales Geometric scaling was based on terrain roughness and boundary layer thickness considerations, while velocity scaling was based on particle fall velocity and threshold of motion characteristics. Simulation of the atmospheric boundary layer was found to be of primary importance. Velocity scaling analysis suggested the use of a significant wind concept. A model investigation of drifting snow conditions was conduct teristics Simulation of the atmospheric boundary lays was found to be of primary importance. Velocity scalin analysis suggested the use of a significant wind concepbased on a combination of velocity magnitude and frequency Similarity of precipitation rate was not essential, and could be altered within limits to adjust the time scale

SHORELINE CHANGES ALONG THE OUTER SHORE OF CAPE COD FROM LONG POINT TO MONOMOY POINT.

Gatto, L.W., July 1978, 49p., ADA-060 297, 52 refs

SHORELINE MODIFICATION, AERIAL SUR-VEYS, PHOTOINTERPRETATION

VEVS, PHOTOINTERPRETATION

This investigation utilized historical and recent aerial photographs and satellite imagery in 1) estimating changes in positions of the high-water line and sea cliff break and base in rates of accretion and or errosion, and in volumes of transported sediment, and 2) providing a preliminary evaluation of the direction of litteral transport along the ower Cape Cod coast. This investigation has illustrated a photointerpretation technique that is useful in performing a reconsistsment of coastal change. The data obtained from this method can be used to supplement those acquired by ground

surveys and are valid as first approximations for planning subsequent, more detailed surveys.

ESTUARINE PROCESSES AND INTERTIDAL HABITATS IN GRAYS HARBOR, WASHINGTON: A DEMONSTRATION OF REMOTE SENS-ING TECHNIQUES

Gatto, L.W., July 1978, 79p, ADA-061 823, 49 refs 33-1523

ESTUARIES, SHORELINE MODIFICATION, REMOTE SENSING, AERIAL SURVEYS, SPACE-BORNE PHOTOGRAPHY, TIDAL CURRENTS, SEDIMENTATION, MAPPING.

SEDIMENTATION, MAPPING.
The primary objective of this project was to demonstrate the utility of remote sensing techniques as an operational tool in the acquisition of data required by the U.S. Army Corps of Engineers, Seattle District, in the Grays Harbor dredging effects project, and related projects. Aerial imagery was used to map surface circulation and suspended sediment patterns near the hopper dredge pump site at the harbor entrance and near pulpmill outfails in Aberdeen, and to map the areal distribution and extent of intertidal habitats. The surface circulation maps, prepared from the aerial photographs and thermal imagery, compared favorably with the large-scale circulation patterns observed in the Grays Harbor hydraulic model at the U.S. Army Engineer Waterways Experiment Station.

Of the imagery provided by NASA, the thermal imagery was more useful than the color or color infrared (CIR) photographs for mapping circulation, while the CIR photographs were more useful than the thermal imagery or the color photographs for mapping intertidal habitats. Current velocities estimated from dye dispersion patterns and drifting dye drogues were comparable at some habitats Current velocities estimated from dye dispersion patterns and drifting dye drogues were comparable at some location to velocities measured by in situ current meters and in the hydraulic model Based on a cursory evaluation of LANDSAT-1 imagery acquired in January, February, and October 1973, it had limited utility in providing data on surface circulation patterns in Grays Harbor

CR 78-19 PRIMARY PRODUCTIVITY IN SEA ICE OF THE WEDDELL REGION.

Ackley, S.F., et al, July 1978, 17p, ADA-059 344, 24 refs.

Taguchi, S., Buck, K R. 33-1524

SEA ICE, ICE CORES, BIOMASS, WEDDELL

Physical and biological measurements were made of sea icc cores taken from 685 to 785 in the Weddell Sea. Fluorissicance measurements indicated an algal community that was strongly associated with salinity maxima within the icc. Maximum concentration of chlorophyll a ranged from 030 to 454 mg/stere. Comparisons with the water column standing crop indicated that the standing crop within the icc represents a minor but significant percentage of the total standing crop for the region. The ice algal community is apparently distinct from others that have been described for land-fast ice in McMurdo Sound, sea ice in the Arctic and pack ice off East Antarctica. The highest concentrations of biological material are found in the bottom or top of the sample in those regions, whereas the Weddell Sea samples are concentrated at intermediate depths (65 m to 215 m) within the ice. A qualitative model indicating the relationship between thermally-induced brine migration and subsequent algae growth is presented. This model, indicates the distribution of algae within the ice is dependent on the unique thermal and physical setting for Weddell Sea pack ice where brine drainage processes are initiated by spring and summer warming, but are not carried through as completely as in other regions. (Auth.)

MEASUREMENT AND IDENTIFICATION OF AEROSOLS COLLECTED NEAR BARROW,

Kumai, M., July 1978, 6p., ADA-058 606, 9 refs 33-1525

AEROSOLS, PARTICLE SIZE DISTRIBUTION, ELECTRON MICROSCOPY.

ELECTRON MICROSCOPY.

Measurements of the concentrations of Aitken nuclei in maritime air were made near Barrow, Alaska, in June 1975, with a modified Nolan-Pollack small-particle detector. The concentrations varied from 50 to 300 particles/cu cm, depending upon meteorological conditions. The mean Aitken nuclei count was 100 particles cu cm for diameters greater than 002 microns. Transmission electron micrographs of activols in maritime air near Barrow were taken. The size range was incasured to be 0.01 to 2.5 microns in diameters with the most frequently observed diameter being 0.04 microns. The volume of the maritime air and the collection efficiency of activol particles on filmed grids for electron microscopy were measured. The activol concentrations were found to be 76 to 101 particles cu, the mean concentration was calculated to be 87 particles cu cm. The acrosol particles in the maritime air were identified by electron microscopy and selected area electron diffraction analysis. About 20 of the acrosol particles were identified, and 80 of the particles were too small for electron diffraction analysis.

ANALYSIS OF THE MIDWINTER TEMPERA-TURE REGIME AND SNOW OCCURRENCE IN

Bilello, M.A., et al, Sep. 1978, 56p., ADA-066 934. Appel, G.C. 33-4415

33-4415 AIR TEMPERATURE, SNOWFALL, METEORO-LOGICAL DATA, WEATHER FORECASTING, STATISTICAL ANALYSIS.

STATISTICAL ANALYSIS.
This study investigates the possibility of providing estimates of the time of occurrence and length of the freezing season for any location in East and West Germany by using the average January air temperature (AJAT) as an index. The results indicate that reliable values of the mean freezing index can be obtained from the AJAT relationships which are developed for Germany. This association is further verified using data from the northeastern part of the US, and the AJAT is then used to determine the average starting and ending dates (and hence the probable length) of the freezing season for stations in Germany. The AJAT and the average dates of snowfall occurrence for numerous locations in the US, and Germany are also correlated. Interrelationships between these parameters and the average number of days with snow on the ground for stations up to 3000 m in elevation in Germany are examined.

UNDERSEA PIPELINES AND CABLES IN POLAR WATERS

Mellor, M., Sep. 1978, 34p, ADA-086 161, 19 refs.

Special environmental factors that influence the design, laying and maintenance of undersea pipelines and cables in polar waters are described. Various approaches to the protection of submarine pipes and cables are considered, and prime emphasis is given to burial techniques for shallow water A wide range of methods for trenching and burying are discussed, and technical data are given.

INFLUENCE OF FREEZING AND THAWING ON THE RESILIENT PROPERTIES OF A SILT SOIL BENEATH AN ASPHALT CONCRETE PAVEMENT.

Johnson, T.C., et al, Sep. 1978, 59p., See also 32-3761 Cole, D.M, Chamberlain, E.J.

BITUMINOUS CONCRETES, SUBGRADE SOILS, SOIL FREEZING, GROUND THAWING, ELAS-TIC PROPERTIES.

TIC PROPERTIES.

Stress-deformation data for silt subgrade soil were obtained from in-situ and laboratory tests, for use in mechanistic models for design of pavements affected by frost action. Plate-bearing tests were run on bituminous concrete pavements constructed directly on a silt subgrade, applying repeated loads to the pavement surface while the silt was frozen, thawing, thawed, and fully recovered. Repeated-load laboratory traxial tests were performed on the silt in the same conditions. Analysis of deflection data from the in-situ tests showed resilient moduli of the silt as low as 2000 kPa for the critical thawing period, and 100,000 kPa or higher when silt was fully recovered. Analysis of the laboratory tests, which gave moduli comparable to the latter values, showed that resilient modulus during recovery from the thaw-weakened condition can be modeled as a function of the changing moisture content.

CR 78-24 PERFORMANCE OF THE ST. MARYS RIVER ICE BOOMS, 1976-77.
Perham, R.E., Sep. 1978, 13p., ADA-061 431, 5 refs

33-1526

ICE BOOMS, ICE PRESSURE, ICE NAVIGA-TION, COLD WEATHER PERFORMANCE.

ICE BOOMS, ICE PRESSURE, ICE NAVIGATION, COLD WEATHER PERFORMANCE.

The ice booms on the St Marys River at Sault Ste. Marie, Michigan and Ontario, were operated a second winter, 1967-71, under colder conditions, with less water flow, lower water levels, and 25% fewer ships in the river than during the previous year. The ice cover behind the booms remained frozen to shore for longer periods, and the loads registered in the booms were relatively unaffected by ship passages compared with the previous year's activity. As in the previous year, most structural load changes in ook place in the west ice boom and were due to movements of the ice cover immediately upstream of the boom. The cover broke free from shore on three occasions the first and thrd occasions were minor events, but on the second incassion the cover cracked free, the timbers remained troved to it and the boom structure became damaged by the subsequent ice activity. Three anchor line assemblies broke over a period of about 4 hours, the two latter beasks occurred while a ship was operating in the ice. These events point out several factors to be considered in ice booms, such as designing the booms to withstand the action of the solid ice cover as well as the fragmented ice cover, keeping the structures and their assembly simple, and inspecting components and assemblies carefully nents and assemblies carefully

RIVER CHANNEL CHARACTERISTICS AT SE-LECTED ICE JAM SITES IN VERMONT

Gatto, L.W., Oct. 1978, 52p., ADA-061 778, 30 refs. 33-1527

ICE JAMS, CHANNELS (WATERWAYS), REMOTE SENSING, PHOTOINTERPRETA-TION, TOPOGRAPHIC FEATURES, RIVER ICE. REMOTE SENSING, PHOTOINTERPRETATION, TOPOGRAPHIC FEATURES, RIVER ICE. The objectives of this investigation were to describe channel characteristics and geographic settings of ice jam sites from aerial photographic interpretation, to indicate which characteristics may be important in causing ice jams, and to suggest additional uses of serial photographs. Uncontrolled photomosaics of each site were assembled and major river characteristics were delineated on the photomosaics. Characteristics described include man-made structures, falls, rapids, changes in channel depths, channel islands, mid-channel shoals or bars, niver bed material, river sinuosity, meanders, floodplain width, riparian vegetation, and types of development on the floodplain. River channel widths were measured from the photographs along rivers where ground truth data were available for comparison. Lengths of channel riffles and pools were measured along the rivers where variations in river depths were evident on the photographs. Aerial photographs provide a regional perspective for evaluating channel characteristics at an ice jam site and for analyzing the geographic setting at each site during ice-free conditions. Photographs taken after ice jams have formed are useful in monitoring ice jam formation, in analyzing ice characteristics, and in documenting ice jam breakup and movement CR 78-26 CR 78-26

ICE FOG SUPPRESSION USING REINFORCED THIN CHEMICAL FILMS.

McFadden, T., et al, Nov. 1978, 23p., ADA-063 107, 20 refs.

Collins, C.M.

ICE FOG, FOG DISPERSAL, CHEMICAL ICE PREVENTION.

PREVENTION.

Ice fog suppression experiments on the Fort Wainwright Power Plant cooling pond were conducted during the winters of 1974-76. Baseline information studies occupied a sizable portion of the available ice fog weather in 1974-75. Then hexadecanol was added to the pond and dramatically improved visibility by reducing fog generated from water vapor released by the pond at 1-4C. Although this temperature was not low enough to create ice fog, the cold vapor fog created was equally as devastating to visibility in the vicinity of the pond. During the winter of 1975-76, suppression tests were continued, using films of hexadecanol, mixes of hexadecanol and octadecanol, and ethylene glycol monobuty either (EGME). Suppression effectiveness at colder temperatures was studied and limits to the techniques were probed A reinforcing grid was constructed that prevented breakup of the film by wind and water currents. Lifetime tests indicated the EGME degrades much more slowly than either hexadecanol or the hexadecanol-octadecanol mix. The films were found to be very effective fog reducers at warmer temperatures but still allowed 20% to 40% of normal evaporation to occur. The vapor this produced was sufficient contracts was sufficient. temperatures on sain anisone 20.5 to 9.5 thomas exapora-tion to occur. The vapor thus produced was sufficient to create some ice fog at lower temperatures, but this ice fog occurred less frequently and was more quickly dispersed than the thick fog that was present before application of

TEMPERATURE ON THE EFFECT OF TEMPERATE STRENGTH OF SNOW-ICE.

Haynes, F.D., Dec. 1978, 25p., ADA-067 583.

SNOW STRENGTH, ICE STRENGTH, TEMPER-ATURE EFFECTS, TENSILE PROPERTIES, COMPRESSIVE STRENGTH.

Uniaxial compression and tension tests were conducted on Uniaxial compression and tension tests were conducted on polycrystalline snow-ice to determine the effect of temperature on its strength. Test temperatures ranged from -0.1C to -54C. Two machine speeds, 0.847 mm/s and 847 mm/s were used for the constant displacement rate tests. The compressive strength at -54C was about one order of magnitude higher than at -0.1C. The tensile strength at langent and 50° strength moduli are given for the compression tests, while the secant modulus to failure is given for the tension tests. The mode of fracture is discussed and the test results are compared with data from other investigations.

TUNDRA DISTURBANCES AND RECOVERY FOLLOWING THE 1949 EXPLORATORY DRILLING, FISH CREEK, NORTHERN ALAS-KA.

Lawson, D E., et al, Dec. 1978, 81p. ADA-065-192,

Brown, J. Everett, K.R., Johnson, A.W., Komárková, , Murray, D.F., Webber, P.J.

33,2739 HUMAN FACTORS, ENVIRONMENTAL PACT, OIL SPILLS, DAMAGE, EXPLORATION, TUNDRA VEGETATION, REVEGETATION.

A 1949 drill site in the Naval Petroleum Reserve Number 4, Alaska, the I ish Creek Test Well I, was examined in August 1977 to determine the disturbance caused by drilling activities and to analyze the response and recovery of the

vegetation, soils, permafrost, and surficial materials to that disturbance. Man-made disturbances include bladed and unbladed vehicular trails, a winter runway, executions, plings, remains of camp structures, steel drums and other solid waste, and hydrocarbon spills. The most intense and lasting disturbance to the vegetation, soils, and permafrost resulted from bulldozing of surface materials, diesel tuel spills, and rails developed by multiple passes of vehicles. Thermokarst subsidence and thermal erosion, caused by increased thay of permafrost due to disturbance, resulted in the development of a hummocky topography and water-filled depressions at the drill site. Some ice wedges disturbed in 1949 are still metting. Soil disturbance ranges from minor modification to complete destruction of the soil morphology. The effects of hydrocarbon spills are still detectable in the soils. Little of the original vegetation remains in the intensely disturbed area, such as around the drill pad where a grass-dominated community prevails. After 28 years, the v-getation cover is closed over most mesic sites, shallow we sites are well vegetated, and xeric sites, areas of dieselfuel spills and areas of severe erosion remain mostly bare. Pioneering plant species on bare, disturbed areas are members of mature vegetation assembliges from the undisturbed tundra which have high reproductive and dispersal capacities. A hypothetical model of natural revegetation and vegetation recovery is proposed. Vascular plants, bryophytes, and lichens were collected from the Fish Creek site area for the first time. Recommendations on cleanup and restoration of sites are presented. of sites are presented.

CR 79-01 STUDY OF WATER DRAINAGE FROM CO-LUMNS OF SNOW.

Denoth, A, et al, Jan. 1979, 19p., ADA-066 935 Seidenbusch, W., Blumthaler, M., Kirchlechner, P, Ambach, W. 34-1108

SNOW, WATER FLOW, DRAINAGE

Experiments were conducted to study the flow of water through columns of homogeneous, rejacked snow. The gravity flow theory of water flow through snow was verified, although possibly there is some dependence of the relative permeability on the state of metamorphism of the snow Also, at very large values of saturation there may be some additional flow in saturated charnels

CR 79.02 EFFECT OF WATER CONTENT ON THE COM-PRESSIBILITY OF SNOW-WATER MIXTURES. Abele, G., et al, Jan. 1979, 26p., ADA-066 936, 6 refs. Haynes, FD.

SNOW WATER CONTENT, SNOW COMPRESSION, SNOW DENSITY, SNOW DEFORMA-TION.

The stress-density relationships of snow-water mixtures were ine stress-density relationships of snow-water mixtures were investigated and are shown as functions of water content, initial snow density, initial snow-water mixture density and rate of deformation. An increase in water content in snow at a particular density or a decrease in the rate of deformation (or strain rate) decreases the stress, but apparently not the specific energy required to reach a specific mixture density. density.

CR 79-03 BLANK CORRECTIONS FOR ULTRATRACE ATOMIC ABSORPTION ANALYSIS. Cragin, J.H., et al, Jan. 1979, 5p., ADA-066 979, 2

refs.

Quarry, S T. 33-3166

WATER CHEMISTRY, CHEMICAL ANALYSIS, METALS, ATOMIC ABSORPTION.

METALS, ATOMIC ABSORPTION.

Both flame and flameless atomic absorption(AA) measurements require a distilled water blank correction. This correction is due to the analyte contained in the distilled water used to prepare the standards and not, as commonly thought, to the reference "blank" used to zero the instrument Flameless AA analyses of acidified heavy metal samples generally require additional corrections for the furnace deflection blank and for an acid blank. To prevent adsorption losses, the acid blank should be determined by extrapolation of a series of acid dilutions in distilled water.

COMPUTER MODELING OF ATMOSPHERIC ICE ACCRETION Ackley, S.F., et al., Mar. 1979, 36p., ADA-068 582, 25

refs Templeton, M K.

ICE ACCRETION, METEOROLOGICAL FAC-TORS, ICE PHYSICS, HELICOPTERS

TORS, ICE PHYSICS, HELICOPTERS
A computer model is described to compute the amount of ice accretion on an object under a variety of initial conditions. Numerical techniques are best applied to these problems because of time dependent effects governing the amount of ice collected and the variety of initial conditions that can lead to ice accumulation. The helicopter rotor ising problem adds an additional complexity since the velocity along the rotor blade varies over a wide range, strongly affecting the amounts of ice collected at different blade positions. The physics of ice accretion is reviewed, and the accounting for the time-dependence in the computer model is described.

and indicate the dependence of ice accretion on velocity, droplet sizes, cloud liquid water content, and temperature for a cylindrical object of constant size

GROUTING SILT AND SAND AT LOW TEM-PERATURES—A LABORATORY INVESTIGA-

Johnson, R., Mar. 1979, 33p, ADA 068 741, 4 refs. 33-3867

LOW TEMPERATURE TESTS, GROUTING, CHEMICAL REACTIONS, COMPRESSIVE STRENGTH.

This report presents data from an experimental program undertaken to develop information on proposed and existing chemical grout solutions to provide engineering properties in connection with grouting of soils in ambient temperatures of 39 F and below Twelve grout solutions were investigated, including organic chemicals, sodium silicates, cements, and clay (bentonite).

CR 79-06 NONDESTRUCTIVE TESTING OF IN-SERVICE HIGHWAY PAVEMENTS IN MAINE.

Smith, N., et al, Apr. 1979, 22p, ADA-069 817. Eaton, R.A., Stubstad, J. 34-1843

ROADS, COLD WEATHER TESTS. BEARING STRENGTH, FLEXURAL MENTS.

STRENGTH.

Nondestructive repetitive plate bearing (RPB) tests were conducted on various test sections in state highways in Maine during April 13-15, 1976. The RPB test consists of making resilient surface deflection measurements during repetitive loadings at various radii from the load plate. The pavement system stiffness was calculated, and the resilient modulus values for the various pavement layers were determined with the Chevron computer program for a layered elastic system. A thawed analysis using nondimensional deflection curves for the various sections provided a guide to the susceptibility of the pavement systems to surface failure and pothole development. Some companions to surface failure and pothole development. Some companions to surface failure and nonstabilized angiregate and soil were made with calculated stiffness values. The moduli of the various materials were also compared. The residual surface deflections during testing for several pavement systems indicated calculated stiffness values. The moduli of the various materials were also compared. The residual surface deflections during testing for several pavement systems indicated a linear logarithmic relationship with number of load applications. A relationship between the modulus of the aspha't cement concrete pavement and pavement temperature was developed for the limited temperature range during the testing

PENETRATION TESTS IN SUBSEA PERMA-FROST, PRUDHOE BAY, ALASKA. Blouin, S E, et al, May 1979, 45p., ADA-071 999, 9

refs.

Chamberlain, E J., Seilmann, P.V., Garfield, D.E 33-4437

SUBSEA PERMAFROST, BOTTOM SEDIMENT, TESTS, PENETROMETERS, OFFSHORE DRILLING.

Sediments beneath the Beaufort Sea near Prudhoe Bay, Alaska, were probed at 27 sites using a static cone penetrometer to determine engineering properties and distribution of material types, including ice-bonded sediments. The probe provided both point and casing resistance data and thermal profiles. At five sites these data were correlated with information from adjacent drilled and sampied holes. These control data and the quality of the probe information permitted profiles of sediment type and occurrence of ice bonded material to be developed along these lines that included union sensition. data and the quality of the probe information permitted profiles of sediment type and occurrence of ice bonded material to be developed along three lines that included various geological features and depositional environments. Material properties were quite variable in the upper 14 m of sediments probed. In general, softer, finer-grained vediments occurred in the upper layers, while penetration refusal was, but in stiff gravels 10 to 12 m below the seabed. Seabed teriperatures during the study were all below OC. However, because of uncertainties in freezing point values caused by brines, evaluation of the penetration resistance data was required to identify the occurrence of ice-bonded sediments. The coupling of thermal and penetration resistance data revealed that seasonally ice-bonded sediments occurred where the sea ice froze back to or near the seabed. Deeper perennially frozen sediments also appeared to be present at several probe sites. The penetration data obtained can be used to aid in the design of shallow and deep foundations in both ice-bonded and unfrozen subsea sediments.

SEA ICE RIDGING OVER THE ALASKAN CON-TINENTAL SHELF.

Tucker, W B., et al, May 1979, 24p., ADA-070 572, 24 refs

Weeks, W.F., Frank, M

33-4223
SEA ICE DISTRIBUTION, PRESSURE RIDGES, ICE DEFORMATION, SURFACE ROUGHNESS, PROFILES, LASERS, MATHEMATICAL MODELS, STATISTICAL ANALYSIS, REMOTE SENS-ING. FORECASTING

Sea tee ridging statistics obtained from a series of laser surface roughness profiles are examined. Lach set of profiles consists of six 200-km-long flight tracks oriented approximately perpendicular to the coastline of the Chul-chi and Beaufort.

Scas. The flights were made in February, April, August, and December 1976, and one and ional profile was obtained north of Cross Island during Marc... 1978. It was found that although there is a systematic variation in mean indge leight (h) with season (with the highest values occurring in late winter), there is no systematic spatial variation in at a given time. The number of ndges/km is also high during the late winter, with the highest values occurring in the Barter and Cross Island profiles. In most profiles, the ice 20 to 60 km from the coast is more highly deformed than the ice either nearer the coast or farther seaward. The Wadhams model for the distribution of ridge heights gives better agreement with observed values in the higher indge categories than does the Hibler model. Estimates of the spatial recurrence frequency of large pressure ridges are mad by using the Wadhams model and also by using an extreme value approach. In the latter, the distribution of the largest ridges per 20 km of laser track was found to be essentially normal. Wadhams' distribution consistently profiles.

CR 79-09 CR 79-09
SEDIMENTOLOGICAL ANALYSIS OF THE
WESTERN TERMINUS REGION OF THE
MATANUSKA GLACIER, ALASKA.
Lawson, D.E., May 1979, 112p., ADA-072 000, Refe

p.109-112. 33-4438

GLACIAL DEPOSITS, GLACIAL GEOLOGY, SEDIMENT TRANSPORT, GLACIAL TILL.

SEDIMENT TRANSPORT, GLACIAL TILL.
Sedimentation at the terminus of the Matanuska Glacier has been found to be primarily subaerial in a 100- to 300-m wide, ice-cored zone paralleling the edge of the active ice. Certain physical and chemical characteristics of the cand debris of the superglacial, englacial and basal zone of the glacier indicate the debris of the basal zone, the primary source of 5-diment, is entrained during freeze-on of meltwater to the glacier sole. Till formation results from the melting of buried ice of the basal zone. Meltonitude in the sole of the control of the sole of the debris of the debris, other properties are not as well preserved. Most deposits result from resedimentation of till and debris by sediment gravity flows, meltwater sheet and rill flow, slump, spall, and ice ablation. Depositional processes are interrelated in the process of backwasting of ice-cored slopes. Sediment flows are the primary process of resedimentation. Their physical characteristics, multiple mechanisms of flow and deposition, and characteristics of their deposits vight the water content of the flow mass. Deposits of each process are distinguished from one another by defaulted the of their deposition and other or the content of the flow mass. each process are distinguished from one another by detailed analysis of their internal organization, geometry and dimensions, and the presence of other internal and related external features

Genetic facies are defined by these characteristics

ULTRASONIC VELOCITY INVESTIGATIONS OF CRYSTAL ANISOTROPY IN DEEP ICE CORES FROM ANTARCTICA.

Kohnen, H., et al, May 1979, 16p., ADA-071 451, 23 refs.

33-4204

ICE SHEETS, GLACIER FLOW, ICE CORES, ICE CRYSTAL STRUCTURE, ICE ACOUSTICS, ANISOTROPY, WAVE PROPAGATION, ULTRA-SONIC TESTS, ICE CRYSTAL SIZE, SHEAR PROPERTIES, ANTARCTICA—B\ RD\ SYATION, ANTARCTICA—LITTLE AMERICA STATION.

ANTARCTICA—LITTLE AMERICA STATION. Ice cores from Byrd Station and Little America. V have been used to test an ultrasonic technique for evaluating crystal anisotropy in the Antarctic Ice Sheet. P-wave velocities measured parallel and perpendicular to the vertical axes of cores from the 2164-m-thick ice sheet at Byrd Station have yielded iesults in excellent agreement with the observed c-axis fabric profile and with the in-situ. P-wave velocity profile measured parallel to the bore hole axis. Velocity differences in excess of 140 m/s for core samples from deeper than 1300 m attest to the strong single pole clustering of crystallographic c-axis about the vertical especially in the zone from 1300-1800 m. Such oriented structure is compatible only with strong horizontal shearing in the zone. The cristence in an ice sheet of widespread shearing several hundred meters above its bed raises serious questions as to the validity of current concepts of the flow of large ice masses that tend to gloss over originore crystal alignments of this magnitude. The ultrasonic technique has proven to be a fast and powerful tool for determining crystal fabrica in ces sheets. Results from Byrd Station and Lattle America. in ice sheets Results from Byrd Station and Little America V, together with fabric data from several other locations in East Antarctica suggest that crystal orientations within the Antarctic Ice Sheet tend to be characterized by either single or multi-pole clustering of c-axes about a vertical symmetry axis

CR 79-11 SNOWPACK OPTICAL PROPERTIES IN THE

Berger, R.H., May 1979, 16p ADA-071 004 34-1366

SNOW OPTICS, SNOW DENSITY, LIGHT SCAT-TERING, REFLECTIVITY

A theory of the optical properties of snow in the 2.20 microns region of the infrared has been developed. Using this theory it is possible to predict the absorption and scattering coefficients and the emissivity of snow as function.

of the snow parameters of grain size and density, for densities between 0.17 and 0.4 g/cu cm. The absorption and scattering coefficients are linearly related to the density and inversely related to the everage grain size. inversely related to the everage grain size

The emissivity is independent of grain size and exhibits only a weak dependence upon density

CR 79-12 POINT SOURCE BUBBLER SYSTEMS TO SUP-

PRESS ICE. Ashton, G.D., May 1979, 12p, ADA-071 038, 8 refs.

33-4224 ICE REMOVAL, BUBBLES, ICE MELTING, HEAT TRANSFER, WATER FLOW, AIR TEM-PERATURE, PILES, OFFSHORE STRUCTURES, COMPUTERIZED SIMULATION.

An analysis of a point source bubbler system used to induce local melting of an ice cover is presented. The analysis leads to a numerical simulation programmed in FORTRAN which may be used to predict the effectiveness of such systems. An example application is presented using a typical record of average daily air temperatures. The FORTRAN program for the point source simulation as well as a FORTRAN program for line source systems are included in the Appendix.

CR 79-13 TURBULENT HEAT TRANSFER IN LARGE AS-PECT CHANNELS.

Haynes, F.D., et al, May 1979, 5p., ADA-071 003, 6

Ashton, G.D. 33-4136

HEAT TRANSFER, CHANNELS (WATER-WAYS), ICE WATER INTERFACE, TURBULENT FLOW, RIVER FLOW, ICE COVER EFFECT, MATHEMATICAL MODELS, WATER TEMPER-ATURE

ATORE Heat transfer in turbulent flow was measured in a rectangular channel with a width of 0.254 rn and a flow depth of 0.0254 m. Correlations between the Nusselt and Reynolds numbers are given for a range of 3.02x1000 is less than Re is less than 2.236x10,000. A Prandtl number range of 9.90 is less than or equal to 12.28 for water was used in the tests. The results are compared with those of other investigations and show that some well-known correlations underpredict the heat transfer by about 35%. CR 79-14

ACCELERATEL ICE GROWTH IN RIVERS. Calkins, D.J., May 1979, 5p., ADA-071 015, 5 refs.

53-413/
FRAZIL ICE, RIVER ICE, ICE GROWTH, ICE
COVE- THICKNESS, HEATTRANSFER, SLUSH,
POROSI IY, MATHEMATICAL MODELS
Solid tee growth rates due to the presence of frazil sissh
beneath the ice cover have been shown to be greater than
the so-called static growth The frazil slush reduces the

beneam the ice cover have oven shown to be greater than the so-called static growth. The frazil slush reduces the effective heat of ice solidification and the frazil particles freeze into the interstitual water. Numerical schemes are presented which clearly show the effect of frazil ice porosity on i c cover growth rates and the numerical model using air temperature as the major input is impared with field data on ice thickness in a small river laden with frazil ice beneath its cover. ice beneath its cover

CR 79.15 DETECTION OF ARCTIC WATER SUPPLIES W.TH GEOPHYSICAL TECHNIQUES

A one, S A., et al, June 1979, 30p , ADA-072 157, 38

Delancy, A J., Sellmann, P.V. 33-4423

WATER SUPPLY, DEFECTION, GROUND WA TER, WAVES MAGNETIC PROPERTIES. RADIO

This report discusses the application of several modern geo physical techniques to groundwater expioration in areas of permafrost. These methods utilize the principles of magnetic induction and radiowave surface impedance in the 10-to 400 kHz band, the techniques of impulse and side-looking radar in the 50- to 10 000 MHz band, and also some optical radar in the 50- to 10 000 MHz band, and also some optical techniques using imagery obtained from a satellite, all for detecting free water under an i.e cover in shallow, almost completely frozen lake basins, and thaw zones within lake beds, stream channels and in permafrost in general. The radar studies demonstrate the use of these techniques for determining depth of free water and ice cover thickness on lakes and rivers.

CR 79-16 CONSTRUCTION AND PERFORMANCE OF MEMBRANE ENCAPSULATED SOIL LAYERS IN ALASKA.

Smith, N. June 1979, 27p, ADA-073 531, 17 refs. 34-134

SOIL FREEZING, COLD WEATHER TESTS, FROST PROTECTION, SOIL WATER, WATER-PROOFING, FROST HEAVE

In 1973 two membrane encapsulated soil layer (MESL) test In 1973 two membrane encapsulated soil layer (5185), feet sections were constructed into existing gravel surfaced roads at Limendorf ALB and at Lt Wainwright in Anchorage and Lairbanks, Alaska respectivels. The Himendorf ALB MESL contains a suits clay soil and the Et Wainwright MISL contains a nonplastic silt. Both sections were constructed at soil moisture contents of approximately 2% to 3% below optimum for the CE-12 compactive effort. There were no indications of soil moisture migration during freezing in either test section, and at, r-thaw field California Bearing Ratio values were nearly equal to values measured before freezing. There is growing evidence of a slight increase in the overall soil moisture content in the Elmendorf AFB in the overall soil moisture content in the Elmendorf AFB MESL, p subly from moisture entering through the single layer polyethylene sidewalls which were not treated with asphalt emulsion. There is good evidence that the membrane of the same section might have received damage during a soil sampling operation which allowed localized moisture infiltration. A two-layer polyethylene membrane used in the Ft. Wainwright MESL is considered a more positive moisture barrier than the single sheet and a justifiable added cost for permanent construction.

CD 70-17 ROOF RESPONSE TO ICING CONDITIONS. Lane, J.W., et al, July 1979, 40p., ADA-074 477, 12 cefe

Marshall, S.J., Munis, R.H.

Pazsint, D.A.

ROOFS. THERMAL CONDUCTIVITY, ICING, MELTING, SLOPE ORIENTATION.

MELTING, SLOPE ORIENTATION.

Six test roofs of two different slopes—16.3 deg and 39.8 deg, and three different roof coverings—asphalt shingles, cedar shingles, and corrugated aluminum sheeting, were constructed at USACRREL, Hanover, New Hampshire, and were instrumented with thermocouples, heat flow meters, and calibrated gutters the winters of 1971-72 and 1972-73. The degree of 1971 and 1972-73. It was found that eave using is a sensitive function of the slope, roof covering composition, and solar radiation. The effects of wind were not investigated, the slats were screened to remove all information corresponding to windspeeds over 8 km/h in order of increasing tendency to form tee dams on the eaves, the roofs were high-slope asphalt, high-slope cedar, and low-slope aluminium, low-slope asphalt, low-slope cedar, and low-slope aluminium. high-slope aluminum low slope aluminum

INSULATING AND LOAD-SUPPORTING PROPERTIES OF SULFUR FOAM FOR EXPEDIENT ROADS IN COLD REGIONS. Smith, N., et al, Sep. 1979, 21p., ADA-074 694, 6 refs.

ROADS, THERMAL INSULATION, CELLULAR MATERIALS, BEARING STRENGTH, FREEZE

THAW CYCLES.

Temperatures of the subgrade and of sulfur foam insulation test sections in an expedient road were monitored with thermocouples to document freezing and thawing conditions. Vehicular trafficking was conducted in a limited basis to determine the load supporting capabilities of the foam. The sulfur foam, placed directly under a prefabricated surface mat, was found to be unsuitable for use as an expedient thermal insulation and traffic load supporting material, primarily because of its low tensile strength and high brittleness. The insulating value of sulfur foam produced by the batch process in the field was about one-half that of extruded polystyrene, meaning double the thickness for equal protection against thaw.

CR 79.19 CR 79-19 CRITICAL VELOCITIES OF A FLOATING ICE PLATE SUBJECTED TO IN-PLANE FORCES AND A MOVING LOAD.

Kerr, A.D., Aug. 1979, 12p., ADA-075 455, 6 refs

FLOATING ICE, DYNAMIC LOADS, A SLOCK

The critical velocities of loads moving over floating ice plates have been determined by several authors. In all these analyses it was assumed that the in-plane force field in the ice cover is zero. However, due to constrainat thermal strains, in-plane forces do occur in the field. The purpose of the present paper is to determine their effect upon the critical velocities of the moving loads. It is shown that a uniform compression force field reduces the critical velocity, whereas a tension force has the opposite

VOLUMETRIC CONSTITUTIVE LAW FOR SNOW SUBJECTED TO LARGE STRAINS AND STRAIN RATES.

Brown, R.L., Aug 1979, 13p., ADA-075 474, 10 rcfs. 34-913

SNOW DEFORMATION, SNOW COMPRESSION, VOLUME, STRAINS, STRAIN TESTS DYNAMIC LOADS, TRACKED VEHICLES

A volumetric constitutive equation was developed to character rize the behavior of snow subjected to large compressive volumetric deformations. By treating the material as a suspension of air soids in a matrix material of polycrystalline. ice, a rate-dependent volumetric constitutive law was formulatce, a rate-opendent volumetric constitutive law was formulated and found to accurately predict material response to pressure loads for a wide range of load rates. Comparison of the theory with shock wave data was not considered in this paper, although the constitutive law appears to be valid for such load vituations. One application to oversnow

mobility of tracked vehicles was made. In this case, power requirements due to snow compaction were calculated parametrically in terms of vehicle speed, tra k loading, and sno v

CR 79-21 TOWING SHIPS THROUGH ICE-CLOGGED CHANNELS BY WARPING AND KEDGING. Mellor, M., Sep. 1979, 21p., ADA-077 801, 6 refs. 34-1380

CHANNELS (WATERWAYS), ICE COVER, ICE PRESSURE, SHIPS, ANCHORS.

CHANNELS (WATERWAYS), ICE COVER, ICE PRESSURE, SHIPS, ANCHORS.

The report studies the question of whether Great Lakes freighters could move effectively through ice-clogged channels with the aid of tows provided by warping or kedging systems. Ten operational concepts are outlined, and their advantages and disadvantages are noted. The crushing resistance of floating brash ice is then analyzed. The neutral, retive and passive state, of stress for laterally confined brash ice are considered, and the resistance to horizontal turnisting by a smooth vertical wall is calculated for cohesion between the ice fragments. The thickening of the ice cover in the vicinity of a "pusher" and the formation of pressure ridges are analyzed in order to estimate the amount of pile-up that can occur against a ship hull. The analysis then moves on to consideration of ship resistance at the bow, tangential friction at the bow, and the hull friction aft of the bow section. Comparisons are made between thrust from the ship's screws and the calculated ice resistance. The next section of the report estimates the force requirements for a waiping or ledging system in terms of thrust augmentation for existing vessels. Tow cable requirements are given, and estimates are made for cable anchors and for anchorage of underwater structures. The force and power requirements for winches and windhawas are given, the practical problems involved in the pickup or transfer of cables are mentioned, and the report concludes with a brief appraisal. The conclusion is that a simple warping tug system is appropriate for a full-scale experiment, a chain ferry with auxiliary barge seems attractive for an operational system, and a chain ferry with auxiliary barge seems attractive for an operational system, and a chain ferry with auxiliary barge seems attractive for an operational system, and a chain ferry with auxiliary barge seems attractive.

CR 79-22 CRYSTAL ALIGNME'S TS IN THE FAST ICE OF ARCTIC ALASKA.
Wecks, W F, et al, Oct 1979, 21p, ADA-077 188, 9

refs

Gow, A.J. 34-1379

ICE CRYSTAL STRUCTURE, FAST ICE, ICE CRYSTAL GROWTH, SEA ICE, OCI AN CUR-RENTS

Field observations at 60 sites located in the fast or near-fast ice along a 1200-km stretch of the north coast of Alaska between Bering Stro., and Barter Island hive shown that 95% of the ice samples exhibit striking c-axis alignments within the horizontal plane. Such ally immusts were usually well developed by the time the ice was 50 cm thick and in some cases when the ice was 20 cm thick. In all cases the degree of preferred orientation increased with depth in the ice. Representative standard constitution are smaller. Field observations at 60 sites located in the fast or near cases the degree of preferred orientation increased with depth in the ice. Representative standard distantions around a mean direction in the horizontal plane are commonly test than 10 deg for samples collected nest the bottom of the ice. The general patterns of the digniments support a correlation between the preferred casts direction and the current direction at the ice water interface. A comparison between casts alignments and spot current measurements made at 42 locations shows that the most frequent current direction ice is des with the mean casts direction. Such alignments are 6 levels to be the result of geon true selection with the most favored intentation for the facilities of the first flow normal to take the first standard flow in which the current flows normal to take the deficiency of the samples of the first flows normal to take the deficiency of the first flows normal to take the deficiency of the first flows normal to take the first flows normal to take the first flows normal to take the flows of the current flows normal to the fit its good the dendritie sea neersea water or the

EFFECTS OF SEAS NAL CHANGES AND GROUND ICE ON I TROMAGNETIC SURVEYS OF PERMAPROST.

Arcone, S A., et 2l, Oct 1979, 24p., ADA-077 903 Delaney, A J., Sellmann, P V.

PERMAFROST DISTRIBUTION. ELECTRO-MAGNETIC PROSPECTING, SEASONAL SEASONAL VARIATIONS, GROUND ICE

VARIATIONS, GROUND ICE. The performance of surfact repedance and magnetic induction electromagnetic of surfact repedance exploration techniques was studied seasonally at various sites in Aliska where permafrost and massive ground tice a curred. The methods used have greatest sensitivity within about 20 m of the surface and are, therefore, must applicable for shallow subsurface investigations. The selection of study sites was based on anticipated contrasts in electrical resistivity between ground tice and adjacent carth materials. A magnetic induction instrument, using a sep, ration of 3.66 m between the transmitter and receiver annotation as the received was able to detect near surface cones of macine ice and to provide data regarding permifrost distribution, in both the Fairbanks and Prudhoe Biy are is

CR 79-24

ANTIFREEZE-THERMODRILLING FOR CORE THROUGH THE CENTRAL PART OF THE ROSS ICE SHELF (J-9 CAMP), ANTARCTICA. Zotikov, I.A., Nov. 1979, 12p., ADA-078 748, 11 refs.

ICE SHELVES, ICE CORES, DRILL CORE ANAL-YSIS.

YSIS.

By using a new thermocoring technique, a hole was successfully called through the 416-m thickness of the Ross Ice Shelf at J-9 Carr., This report provides a description of the drill and an account of this drilling project. A provisional examination of the core shows the ice shelf to consist of 410 m of snow and glacial ice underlain by 6 m of sea ice formed by direct freezing of sea water to the bottom of the Ross Ice Shelf (Auth)

C., ARGED DISLOCATION IN ICE: 1. EXIST-

PINCE AND CHARGE DENSITY MEASURE-MENT BY X-RAY TOPOGRAPHY. Itageki, K., Nov. 1979, 12p., ADA-078 775, 23 refs. 1608

ELECTRICAL PROPERTIES. ELECTRIC CHARGE, DISLOCATIONS (MATERIALS), RAY ANALYSIS, ICE CRYSTAL STRUCTURE.

The motion of dislocations in single crystal ice under an electi. fit.d was observed by using X-ray topographic methods Electric charge density or, these dislocations was deduced from the amplitude and length of the dislocation segment under the known AC electrical field. In finear charge density, considerable variation is possible, depending on the effective field acting on the dislocation lines.

CR 79-26 LAKE CHAMPLAIN ICE FORMATION AND ICE FREE DATES AND PREDICTIONS FROM METEOROLOGICAL INDICATORS.

Bates, R E, et al, Nov. 1979, 21p., ADA-079 640, 11

Brown, M.-L. 34-1745

LAKE ICE, ICE FORMATION, ICE BREAKUP, METEOROLOGICAL DATA, PERIODIC VARIA-

TIONS
A 19-yr record of the annual closing and opening rates of operation of the Lake Champlain ferry at Grand Isle, Vermont, which are controlled by the lake's nee cover, was made available to CRREL. These navigation records accurately approximated the freeze-over and breakup dates for the ferry crossing area between Gordon Landing. Vermont, and Cumberland Head, New York. When compared statistically with water temperature and climatological data for the same years at nearby Lake Champlain locations, the dates allowed accurate predictions of nee formation. From nearby air temperature records, cumulative freezing degreeday (C) curves were plotted for each year of record, and nee formation dates and standard deviations were predicted with considerable accuracy. Several methods of predicting ice formation on Lake Champlain were attempted. The most accurate approach used a combination of water temperatures and freezing degree-days. The influence of wind speed on ice cover formation and prediction are also discussed in the report.

CR 79-27 SOME BESSEL FUNCTION IDENTITIES ARIS-ING IN ICE MECHANICS PROBLEMS. Takagi, S., Nov. 1979, 13; DA-078 709, 10 refs.

ICE MECHANICS, ANALYSIS (MATHEMAT-

ICS).

ome Bessel function identities found by solving problems Some Bessel function identities found by solving problems of the deflection of a foating ite, plate by two different methods are rigorously proved. The master formulas from which all the identities are derived are in a Fourier recupriceal relationship, connecting a Hankel Inction to an exponential function. Many new formulas can be derived from the master formulas. The analytical method presented here now opens the way to study a hitherto impossible type of problem the deflection of floating clastic plates of various shapes, and boundary, continues. shapes and boundary onditions

CR 79-28 ELECTRON MICROSCOPE INVESTIGATIONS OF FROZEN AND UNFROZEN BENTONITE. Kumai, M., Nov. 1979, 14p, ADA-078 776, 12 refs 34-1578

ELECTRON MICROSCOPY, FROZEN GROUND PHYSICS, SOIL STRUCTURE, CLAY SOILS

PHYSIAS, SOIL STRUCTURE, CLAY SOILS
Transin soon and scanning electron micrographs of Umat
bentenite revealed thin, mica like grains with irreg slar shapes
Most of the bentonite showed electron diffraction ring patterns,
but some showed hexagonal net patterns as well as ring
patterns. The lengths of the unit cells were calculated
to be 5.18. A slong the a-axis and 8.97. A along the beaus
semiquinitiative analyses were made using an energy dispersive spectrometer. Common elements such as Si, Ty, Al, Fe,
Mg, Na and K. w. re determined. The molecular ratio of SiO2Al, O was a incultied to be 492-100 for the bulk sample, in
dicating that I must bentomite is similar in most respects to
Myoning bentonite, and is classified as a montimerillointe
The microstructure of frozen Umait bentomite was observed at
a specimen temperature of 100C using a scanning electron

microscope equipped with a cold stage
Frozen bentonite and segregated ice patterns formed from wet bentonite were examined using an 1-ray map and Si X-ray line scan. Sublimation processes of ice in the frozen bentomite were observed at specimen temperatures of -60 and -80C. After sublimation of the ice, the bentonite displayed a honeycomb structure. It was concluded that the freezing-sublimation cycle in frozen soil increases the permeability of water vapor due to the three-dimensional structure of the coagulated clay formed by freezing

CR 79-29

ANALYSIS OF PLASTIC SHOCK WAVES IN SNOW.

Brown, R.L., 1979, 14p., ADA-080 051, 12 refs.

WAVE PROPAGATION, SNOW DEFORMA-TION, SHOCK WAVES, LOADS (FORCES), ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).

At analytical study of the propagation of shock waves in snow was carried out to evaluate the response of medium density snow to high rates of loading. One solution was developed for steady shock waves, this resulted in calculation of pressure jump, density jump and stress wave speed. Correlation with available experimental data was fecund to be good. Nonsteady shock waves were also considered in order to evaluate wave attenuation rates in snow. Very few data were available to compare with the analytical results, so no definite conclusions on the part of the study could be made. The results show, however, that shock waves that produce plastic deformation attenuate at extremely high rates and that differences in pressure between two waves are quickly eliminated within a short distance. Calculations were also made to evaluate the effect of wave frequency are quickly eliminated within a short distance Calculations were also made to evaluate the effect of wave frequency on attenuation rates. The results show that, for plastic waves, frequency is not a predominant factor for determining attenuation rates (Auth.)

CR 79-30

SUPPRESSION OF RIVER ICE BY THERMAL EP?LUENTS.

Ashton, G.D., Dec. 1979, 23p., ADA-080 654, 5 refs

RIVER ICE, ICE CONTROL, THERMAL DIFFU SION, THERMAL POLLUTION, HEAT TRANS-

The ice suppression resulting from discharge of warm water into rivers during winter is analyzed with emphasis in two different cases. In Part 1, the case of a thermal effluent fully mixed across the flow section is analyzed to include the effects of unsteadiness in the effluent temperature and the meteorological variations. The location of the ice the effects of unsteadiness in the effluent temperature and the meteorological variations. The location of the see edge is determined either by O C water temperature criterion or an equilibrium tee melting analysis. The choice of the applicable criterion emerges naturally from the analysis, even though the location of the ice edge may be considerably different when a sites a "rate analysis is done. In Part 2, the case of a side discharge of heated effluent is a zed, also in an insiteady manner, and the effects of time edispersion are included in the analysis. Compariso accepted in the analysis of the properties of the case of a side discharge of heated effluent is a zed, also in an insiteady manner, and the effects of time edispersion are included in the analysis. Compariso accepted in the analysis of the case of a side discharge of the case of a sid

IMPROVED ENZYME KINETIC MODEL FOR NITRIFICATION IN SOILS AMENDED WITH AMMONIUM. 1. LITERATURE REVIEW

Leggett, D.C., et al, Jan 1980, 20p, ADA-082 303, Refs. p.18-20. Iskandar, I.K.

35-2583

WASTE TREATMENT, WATER TREATMENT, CHEMISTRY, SOIL MICROBIOLOGY, GROWTH.

Previous research indicates that intrification in pure cultures can be represented by Michaelis-Menten kinetics. However, the effects of temperature and especially pH have not been treated systematically in any of the previous reviews of the subject. The work reported here is an attempt to synthesize reported temperature and pH effects on intrification and nitrifier growth rates. In addition we attempt to extend the principles of microbial kinetics to soils. Our work indicates that pH effects can be interpreted mechanistically as inhibitions by hydrogen and hydroxyl ions, initious acid, and ammonia. These are incorporated into the Michaelis-Menten expressions. It is also our observation that ammonium oxidizers in natural habitats are chalacterized by lower Michaelis constants than pure cultures. This is significant particularly in terms of their prowth and activity in acid soils. Alternatively, we speculate that provincestion. Previous research indicates that nitrification in pure cultures of ammonium oxidizers in acid soils is due to spati-heterogeneity of "pH" at the microsite level

CR 80-02

WINTER THERMAL STRUCTURE, ICE CONDI-TIONS AND CLIMATE OF LAKE CHAMPLAIN. Bates, R.E., Jan. 1980, 26p., ALA-082 304, 7 refs

33-238:
LAKE ICE, ICE CONDITIONS, FHERMAL REGIME, ICE FORMATION, ICE THERMAL PROPERTIES, WATER TEMPERATURE, METEOROLOGICAL DATA, WINTER, THERMISTORS, STEFAN PROBLEM

Winter stermal structure and tee condition in the land fast fee cover of Take Champlain were scaled in detail for the winters of 1975-76 and 1976-77. The lake was instrumented to a depth of 9.5 m with a string of highly

calibrated thermistors attached to an ice mooring system and connected to a data logger at Shelburne Point, Vermont, during the winter of 1975-76 and at Gordon Landing on Grand isle. Vermont, during 1 77 This data logger automated and the surface of the lake through snow, ice and water vertical profiles to the bottom of the lake every four hours. Pertinent meteorological parameters are presented for the appropriate to the bottom of the lake every four hours. Pertinent meteorological parameters are presented for the appropriate measurement sites during the two winter periods, November 75-April 76, and November 76-April 77. Computations were made of fir-zing, degree days for both winters and correlated with 1 mation dates. Predictions of ice growth, using the 5 mation with an empirical coefficient, were correlated to the control of the

CR 80-03

REVEGETAL O'. ... TWO CONSTRUCTION SITES IN NEW AMPSHIRE AND ALASKA. Palazzo, A.J. e. Jan. 1980, 21p., ADA-082 305, 36

Rindge, S.D., Goog D.A.

REVEGETATIO FWAGE L'SPOSAL LAND RECLAMATION SES, GEAVEL, GRGAN-RECLAMATION SES, GFAVEL, CRGANIC SOILS, SLUCKEL, NUTRIEN CYCLE.

Reveget tion technically vere investigated for gravel soils in cold egions. The gravel soil test site, were established in Hanover, New Harroshire, and Fairbanks, Alaska. During in Hanover, New Harr oshire, and Fairbanks, Alaska During three growing seasons, we studied the applicability and cost effective less of various nutrient sources and nulch materials. The missources included sewage sludge (49, 60 and 600 lb/acre). The mulching inaterials were wood fiber mulch with various types of tackifiers, peat moss, and sewage sludge. The effects of refertilization during the second growing season were also studied.

ENVIRONMENTAL ANALYSIS OF THE UPPER SUSITNA RIVER BAS. USING LANDSAT IM-

Gatto, L. W., et al, Jan. 1987, 41p., ADA-084 909, 52 refs.

Merry, CJ, McKim, H.L, Lawson, DE. 34-3198

AERIAL SURVEYS, REMOTE SENSING, SPACE-BORNE PHOTOGRAPHY, LANDSAT MAP-PING, PHOTOINTERPRETATION, SPACE-CRAFT, RIVER BASINS, ENVIRONMENTS, UNITED STATES—ALASKA—SUSITNA RIVER UNITED STATES—ALASKA—SUSITNA RIV.:R
The primary objectives of this study were to 1) prepare
a map from Landsat imagery of the Upper Sustina River
Basin drainage network, lakes, glaciers and snowfields, 2)
identify possible faults and lineaments within the upper basin
and within a 100-km radius of the proposed Devil Canyon
and Watai... dani sites as observed on Landsat imagery,
and 3) prepare a Landsat-derived map showing the distribution
of surficial geologic materials and poorly drained areas. The
EROS Digital Image Enhancement System (EDIES) provided
computer-enhanced images of Landsat-1—scene 5470-19560.
The EDIES frive color composite of this scene was used
as the base for mapping diamage network, lakes, glaciers
and snowfields, six surficial geologic materials units and
poorly drained areas. Some langle-band and other color
composites of Landsat images were used during interpretation
All the above maps were prepared by photointerpretation
of Landsat images without using computer analysis, aerial
photographs, field data, or published reports

CR 80-05

CR 80-05

ASPHALT CONCRETE FOR COLD REGIONS; A COMPARATIVE LABORATORY STUDY AND ANALYSIS OF MIXTURES CONTAINING SOFT AND HARD GRADES OF ASPHALT CEMENT. Dempsey, P.J. et al, Jan. 1980, 55p., ADA-082 198.

Ingersoll, J., Johnson, T.C., Shahin, M.Y.

BITUMENS, BITUMINOUS CONCRETES, PAVE MENTS, CEMENT ADMIXTURES, TENSILE PROPERTIES. CRACKING (FRACTURING). STRAIN TESTS, THERMAL EFFECTS, VISCOSI-Y TRAFFICARII ITY

*Y, TRAFFICABILITY
Payements containing soft asphalt cement have been shown in the past to be less succeptible to low-temperature contractio-cracking, but more susceptible to traffic load-associated distress in ware weaths. This resease comprised laboratory testing to determine the properties of asphalt-aggregate mixtures containing three grades of asphalt-aggregate mixtures containing three grades of asphalt cements, and analyses to project the performance of payements containing each of the asphalts, in resisting thermally induced distress and traffic associated distress. From the results it is concluded that only the softest asphalt cement cested (AC 25) would perform satisfactorily in a cold clinic to 25. The moderately soft (AC 5) and moderately hard (so 20) asphalt cements showed little susceptibility to thermal care long in a moderate and a warm climitation respectively. The AC 25 and AC 5 asphalts are not recommended for use in warm climates however, owing to increased susceptibility to rutting under traffic. increased susceptibility to rutting under traffic

MAXIMUM THICKNESS AND SUBSEQUENT DECAY OF LAKE, RIVER AND FAST SEA ICE IN CANADA AND ALASKA.

Bilello, M.A., Feb 1980, 160p., ADA-084 488, 57

ICE COVER THICKNESS, ICE MELTING, ICE DETERIORATION, LAKE ICE, RIVER ICE, SEA ICE, FAST ICE, AIR TEMPERATURE, ICE FORE CASTING

Weekly measurements of the thickness of lake, river and fast sea ice made over a period of 10 to 15 years at 66 locations in Canada and Alaska are analyzed, and the portion locations in Canada and Alaska are analyzed, and the portion of the data relating to maximum ice thickness and decay (i.e. the decrease in ice thickness) is examined. Ice thickness surves revealed individual patterns of ice decay, and comparisons between locations disclosed major contrasts in the amount of ice are ation and the times of maximum ice and ice cleara. Although many factors affect the ice decay process, this study investigates in detail the effect of thawing temperatures. Concurrent measurements of the air temperature at each location, and et a possible analyze the relationship. temperatures

Concurrent measurements of the air temperature at each location made it possible it analyze the relationship between accumulated thawing degree flays (ATDD) and ice cover decay.

Other factors affecting ice ablation and breakup, such as snow-ice formation, snow cover depth, solar radiation and wind are also discussed

CR 811-07

WASTEWATER TREATMENT IN COLD RE-GIONS BY OVERLAND FLOW.

Martel, C.J., et al, Feb 1980, 14, . ADA-084 489, 16

Jenkins, TF, Palazzo, AJ. 34-3325

WASTE TREATMENT, WATER TREATMENT, IRRIGATION, COLD EATHER PERFORM-ANCE, ENGINEERING, SOIL CHEMISTRY, AGRICULTURE

Primary effluent, secondary effluent (package extended aeration plant effluent with BOD's often greater than 30 mg/liter) tion plant effluent with BOD's often greater than 30 mg/liter) and tapwater were applied to separate sections of a pilot-scale overland flow site in a cold regions environment. The average application rate for each section was 50 cm (20 mg.) per weck. Performance was evaluated for one year. May 1977 to June 1978. Results of this study demonstrated inat overland flow can renovate both primary and secondary effloent during spring, summer and fall seasons. However, durin: winter, runoff water quality for the primary section condended to the secondary of almost no pollutants during its critic operation. Aminonia was the easiest form of nitrogen to remove and nitrate was the most difficult. Rainstorms did not cause a "flushing" effect. However, ammonia and nitrate concentrations in the runoff increased during shownelt. The a "flushing" effect However, ammonia and nurate concentrations in the runoff increased during snownelt. The forage yield from the primity and secondary sections was almost twice that of a typical New Hampshire hayfield Wastewater application during winter caused only minor cases of plant injury. Based on these results, a minimum of 30 days of storage is reconsulated if overland flow is used as a polishing nurses. used as a polishing process. If overland flow is used to treat primary effluent, the number of storage days predicted by FPA-1 computer program appears to be adequate

CR 80-08

ANALYSIS OF THE PERFORMANCE OF A 140-FOOT GREAT LAKES ICEBREAKER: USCGC

Vance, G.P., Feb. 1980, 28p., ADA-084 736, 8 refs.

ICEBREAKERS, BUBBLES, PROTECTIVE COAT-INGS, ICE COVER THICKNESS, ICE FRICTION. ICE STRENGTH.

ICE STRENGTH.
This report presents the results of the tests on the new 18 Coast Guard 140-G iccbreaker Katmai Bay (WTGB-101) in the level plate ice and brash ice in Whitefish Bay and the St. Marys kiver — The results indicare that the vessel can penetrate 22 in of level freshwater i.e. with 2-3 in of now cover—It can also penetrate up to 48 in of brash ice in a continuous mode and at least 30 in of plate ice by backing and famining — The installed bubbler system decreased the required power of the vessel from 10 to 40° in brash ice and 25 to 48°, vleed to The low friction coating appears to be effective—i decreasing the friction factor when it remains into t. When it peels off, it appears to make conditions worse than pin point. An average dynamic friction lactor of 0.15 could be used over the entire hull for these tests.

CR 80-09

HIGH-EXPLOSIVE CRATFRING IN FROZEN AND UNFROZEN SOUS IN ALASKA.

Teb 1959 24p. AD 1-084 702, 8 refs

FROZEN GROUND MI CHANICS, EXPLOSION EFFICE & SEASONAL FREIZE THAW, I ALIKS, EXCAVATION, ILSTS

EXCAVATION, 11.518.

Explosive craceting tests were conducted in seasonally frozen and thawed gravel u.l.: Richardson near Anchorage. Miska, and in seasonally frozen and thawed silt ocerlying permafrost and in silt permafrost at l.t. Wasa right near. Fairbanks, Maska. I plosive charge weights ranged from 26 to 4120 lb, and charge burnel depths ranged from about 3 to 40 ft.—The cube root of the charge weights of any was ared to determine a common scaled craft. In pressors and optimism

scaled depth of build of the charge. Test results for frozen and thawed gravel were essentially the same occause of the low moisture content and the relatively shallow depth of firezing (5 to 5 ft). The optimum depth of buried the charge for maximizing the apparer radius and depth and the true radius was about 18 tiles the cuce root of the charge weight for both the frozen and thawed conditions, in seasonally frozen silt overlying a talk and silt permafrost, the maximum scaled crater dimensions and optimum sealed build depths of the charge were smaller than for the thwed condition experience for the true crater dimensions and an optimum build depth for the true crater that is larger than for the thawed condition. The results for the homoger-cous silt permafrost were very similar to the frozen gravel results, with much smaller maximum crater dimensions and smaller optimum charge burial depths than for the thaved silt overlying permafrost.

MATHEMATICAL MODEL TO CORRELATE FROST HEAVE OF PAVEMENTS WI'L LABORATORY PREDICTIONS.

Berg, R.L., et al, Feb. 1980 49p., ADA-084 737, 67 refs

Cuymon, G., Johnson, T C. 34-3200ء

34-3200
MATHEMATICAL MODELS, FROST HEAVI
FROST PENETRATION, HEAT TRANSFER,
SOIL WATER MIGRATION, PAVEMENTS,
COMPUTERIZED SIMULATION, LABORATORY TECHNIQUES, FORECASTING.

COMPUTERIZED SIMULATION, LABORATO-RY TECHNIQUES, FORECASTING.

A mathematical model of coupled heat and moisture flow in soils has been developed. The model includes algorithms to phase change of soil moisture and frost heave and permits several types of boundary and initial conditions. The finite element method of weighted residuals (Galerkin procedure) was chosen to simulate the spatial regime, and the Ciank-Nicholson method was used for the time domain portion of the model. To fac.litate evaluation of the model, the heat and moisture fluxes were extentially decoupled; moisture flux was then simulated accurately, as were heat flux and frost heave in a laboratory test. Companson of the simulated and experimental data illustrates the importance of unsaturated hydraulic conductivity. It is one parameter which is difficult to measure and for which only a few laboratory test results are available. Therefore, cuisaturated hydraulic conductivities calculated in the computer mod... may be a significant source of error in calculations of frost heave. The algorithm incorporating effects of surcharge and overburden was inconclusively evaluated. Time-dependent frost penetration and frost heave in laboratory specimens were closely simulated with the model. After 10 days of simulation, the computed frost heave was about 23 cm vs 20 cm and 28 cm in two tests. Frost penetration was computed as 15 cm and was measured at 120 cm and 122 cm in the two laboratory samples after 10 days.

CR 80-11 ROOF LEAKS IN COLD REGIONS: SCHOOL AT

CHEVAK, ALASKA.
Tobiasson, W., et al, Apr. 1980, 12p., ADA-084 914.
Johnson, P.R.

ROOFS, LEAKAGE, BUILDINGS, MELTWATER, SNOW ACCUMULATION, CONDENSATION, SUBPOLAR REGIONS.

SUBPOLAR REGIONS.
Four types of roof leaks occurred at a new school building in Cheval. Alas. a 1) blowing snow entered the roof through eave vent and then melted, 2) slish and ice in roof valleys caused meliwate, to overflow the valley flashing and run into the bairing, 3) water entered at a roof/wall intersection and 4) in warva areas water entered through gaps in the stoping ply 1000 deck. Sealing the eave vents made it impossible blowing snow to enter the roof at the caves eliminated the valley teing problem Missing flashing was responsible for the roof-wall intersection leaks. The absence of a vapor barrier in the roof was the cause of many leaks. It was recommended that the roof be repaired from the exterior by removing componen elements down to the plywood deck, installing an adhered continuous vapor barrier and reassembling the roof. An alternative roof cladding of compiration shingles was discussed as was conversion to a "cold roof." The roof was repaired and midfied following recommendations, and problems appear to have been solved.

SIMPLIFIED MODEL FOR PREDICTION OF NITROGEN BEHAVIOR IN LAND TREAT-MENT OF WASTEWATER.

Selim, H.M., et al, Apr. 1980, 19p., ADA-085 191, 23

refs. Iskandar, I.K

34-3263

WASTE TREATMENT, WATER TREATMENT.

WASTE TREATMENT, WATER TREATMENT, NUTRIENT CYCLE, SOIL CHEMISTRY
A simplified model for simulation of nitrogen transformations and transportation in land treatment of wastewater is presented. The purpose of the model is to predict the behavior of NH4-N and NO3-N in the soil profile in land treatment systems. The program is based on the solution of the transient soil water flow equation simultaneously with the equations describing the transformation, transport, and plant uptake of nitrogen in the soil. The program is valid.

for uniform as well as multilayered soil profiles and can for uniform as well as multilayered soil profiles and can be adapted to incorporate various nitrogen transformation mechanisms and boundary conditions. The model can be used as a tool to predict the fate of nitrogen in land treatment systems. Model sensitivity to changes in the rate of nitrification, ammonium ion exchange, and ate of plant uptake of nitrogen is also described. Description of the computer program, the program listing, and an example of input data and a two-week computer simulation of output data are presented.

CR 90-13 FRACTURE BEHAVIOR OF ICE IN CHARPY IMPACT TESTING.

Itagaki, K., et al, June 1980, 13p. ADA-089 920. 17

Sabourin, L

ICE CRACKS, FRACTURING, IMPACT TESTS TEMPER/ JURE EFFECTS, DOPED ICE, IC COMPOSITION, ICE CRYSTAL STRUCTURE.

COMPOSITION, ICE CRYSTAL STRUCTURE. Specimens prepared from various types of ice without introducing excessive defects were tested at temperatures ranging from -2 to -190C. These tests indicated slightly higher Chaipy values at lower temperatures and in more highly dispersed material concentrations. Three modes of fracture occurred during testing. Depending on the temperature and the material composition, either of the first two modes rormal fracture or multiple fracture, will appear and will small a normal frequency distribution of Charpy values in each type of ice. The third mode, fracture from both ends, which requently occurred in the (NH4F) doped ice, gave Charpy values two to five times higher than the mean value for normal fracture. It can, therefore, be concluded that certain types of doping can alter the mode of fracture, the which drastic modifications of impact resistance may be possible.

CR 80-14 CR 80-14 GEOBOTANICAL ATLAS OF THE PRUDHOE BAY REGION, ALASKA. Walker, D.A., et al, June 1980, 69p., Refs. p.45-47. Everett, K.R., Webber, P.J., Brown, J.

TUNDRA, GEOMORPHOLOGY, PERMAFROST, SOILS, VEGETATION, LANDFORMS, ECOSYSTEMS, MAPS, PLANTS (BOTANY), ENVIRONMENTS, PHOTOGRAPHY, ECONOMIC DEVEL-

UNITED STATES-ALASKA-JUDHOE BAY

. JUDHOE BAY

This atlas illustrates the interrelationships among the landtorms, soils and vegetation of a portion of the Arctic Coastal

Plain of Alaska. The Prudhoe Bay region is dominated
by an alkaline peaty coastal tundra, a type that has not
been intensively studied. Forty-two vegetation communities, thirteen maior landicorms, end eight soil types are desenbed. Several of the plant communities and one soil,
the Pergelic Crobotoil, have not been described previously.

The vegetation is discussed with respect to three important
gradients temperature, soil pH and soil moisture. Other
aspects of the Prudhoe Bay environment, including geology,
permafforst, and winter and summer climate, are discussed
and illustrated. Also included are historical descriptions permatrost, and winter and summer climate, are discussed and illustrated. Also included are historical descriptions of the development of the oilfield and of selected scientific investigations in the Alaskan Arctic. Master maps present the landforms, soils and vegetation of a 145-sq km portion of the oilfield road network at a scale of 1 12,000. Derived geobotanical special purpose maps, useful for land-use planning and management of the ecosystem, are expanned and several examples are shown for a 3-6 so km portion of the oilfield

CONSTRAINTS ON MEASURING TIME BUILDING R-VALUES. Flanders, S.N., June 1980, 30p., ADA-089 712 18

refs

COLD WEATHER CONSTRUCTION, CONSTRUCTION MATERIALS, THERMAL PROPERTIES, THERMAL CONDUCTIVITY, BUILDINGS. HEAT FLUX, TIME "ACTOR, COMPUTER APPLICATIONS, ANALYSIS (MATHEMATICS)

PLICATIONS, ANALYSIS (MATHEMATICS)
This report discusses the time constraints on measuring the thermal resistance (R-value) of building components. Temperature changes on either side of a building component perturb measurement accuracy. Long measurement times and measurement times corresponding to a consistent durinal cycle can be satisfactory, however, individual temperature changes cause significant error for shorter measurement periods. This report shows how to scale the thermal properties of individual constituent inaterials in a building element. to determine its characteristic thermal time constant. The report then demonstrates the size of measurement error result ing from a variety of changes in temperature with representative walls of different time constants

CR 80-16
MORPHOLOGY AND DISTRIBUTION OF THE ACANTHOECIDAE (CHOANOFLAGELLATA)
FROM THE WEDDELL SEA DURING THE AUSTROMATHE AUGUST 1977.

Buca, K.R., July 1980, 26p., ADA-090 680, 35 refs.

PLANKTON, MARINE BIOLOGY, SEA ICE DIS-TRIBUTION, OCEAN ENVIRONMENTS, ICE EDGE, CRYOBIOLOGY, ANTARCTICA—WED-DE L. SEA

PE J. SEA

Etc. 'species of loricate choanoflagellates (Acanthoecidae)

were observed in samples obtained from the Weddell Sea

during the austral summer, 1977. Habitats in which choanoflagellates were found included the writer column, the edges

of ice floes, ponds on ice floes, and the interiors of ice

floes. The pre-ence of choanoflagellates within the ice

midicates that the may be a closely coupled tro-thic relationship with the other biological components of the ice community, the ice algorized the bacteria. The presence in the

tier of seven socious with both a caudal appendage and

anterior projections suggests a positive relationship between

this lorica configuration and the ice habitat. Me banisms

of variance of transverse costal diameters retween genera

may be useful to the taxonomy and phylogeny of this family.

Luth mov.)

NOW PADS USED FOR PIPELINE CONSTRUCTION IN ALASKA, 1976: CONSTRUCTION, USE AND BREAKUP.

hnson, P R., et al, July 1980, 28p., ADA-090 521, 11

Collins C.A. 35-2584

COLD WEATHER CONSTRUCTION, PIPE-LINES, SNOW ROADS, PERMAFROST PRESER-VATION, SNOW STRENGTH, SOIL TRAFFICA-BILITY, ENVIRONMENTAL PROTECTION, AR-TIFICIAL SNOW.

TIFICIAL SNOW.

Construction pads made of snow were used to build two sections of the Trans Alaska Pipeline and a small gas pipeline during the wheter of 1975-76. Construction during the winter of 1975-76. Construction during the winter has become increasingly common in the Arctic. Surface travel and the use of heavy construction equipment on the unprotected tundia have been sexurely ("stricted, even during the winter, so the use of temporary winter roads and construction pads built of snow and ice has been advocated and its being adopted. The three snow construction pads used on a large scale in Alaska. Snow roads and construction pads have two objectives to protect the underlying vegetation and upper layers of the ground, and to provide a hard, smooth surface for travel and the operation of equipment. Several types have been built, and a built of the striction pads have for the provide and the operation of the six Alaska Pipeline and the small gas pipeline in 1975-76 were and ind observed while in use.

HEAT AND MASS TRANSFER FROM FREELY FALLING DROPS AT LOW TEMPERATURES. Zarling, J.P., Aug. 1980, 14p., ADA-090 52: 18 refs. 35-594

DROPS (LIQUIDS), FREEZING, HE.V. DROPS (LIQUIDS), FREELING, INC.
FER. MASS TRANSFER, LOW TEMPL
TESTS, SUPERCOOLING, ICE PHYSI S, COMPUTER APPLICATIONS, CONSTRUCTION

MATENALS
The use of ice as a structural material is common practice for certain applications in cold regions
Techniques such as surface flooding o, water spraying are used to accelerate ice growth rates, thereby lengthening the winter construction season. This report examines the heat and mass transfer rates from freely falling water drops in cold air. Design equations which predict the amount of supercooling of the drops as a function of outdoor ambient temperate e, drop size and distance of fall are given.

CR 80-19 ENVIRONMENTAL ENGINEERING AND ECO-LOGICAL BASELINE INVESTIGATIONS ALONG THE YUKON RIVER-PRUDHOE BAY HAUL ROAD.

Brown, J. ed. Sep. 1980, 18 n., ADA-094 497, Refs. p. 151-155 For individual chapters see. 35-1769 through 35-1772

Berg, R.L., ed. 35-1768

MATERIALS

ROADS CONSTRUCTION, PERMAFROST, SEA-SONAL FREEZE THAW, REVEGETATION, PIPELINES, SOIL EROSION, ENVIRONMEN-TAL IMPACT, ENGINEERING, ECOLOGY.

TAL IMPACT, ENGINEERING, ECOLOGY.

During the period 1975-1978 the Federal Hig way Administration sponsored a series of environmen all engineering investigations along the Yukon Rise to Prudhoe Bay Haul Road
In 1976 the Department of Fuergy joined the investigations
with a series of ecological projects which continue to the
present. Both agencies research efforts were conducted
on a cooperative haus with CRRL's in-house research program. The objectives of the research focused on D in

evaluation of the performance of the road, 2) an assessment of changes in the environment associated with the road, 3) documentation of flora and vegetation along the 577-km-long transect, 4) methodologies for revegetation and restoration, and 5) an assessment of biological parameters as indicators of environmental integrity. In support of these objectives, specific studies were undertaken that investigated the climate along the road, thaw and subsidence beneath and adjacent to the road, drainage and side slope performance, distribution and properties of road dust, vegetation distribution, vegetation distrubtance and recovery, occurrence of weeds and weedy species, crosson and its control, revegetation and restoration, and construction of the fuel gas line. This report presents background information on the region, detailed results of the road thaw subsidence and dust investigations, and summaries of revegetation, fuel gas line, vegetation distribution, soil, and weed studies.

INVESTIGATIONS OF SEA ICE ANISOTROPY, ELECTROMAGNETIC PROPERTIES, STRENGTH, AND UNDER-ICE CURRENT ORIENTATION.

Kovacs, A., et al, Sep. 1980, 18p., ADA-092 089, 16 refs

Morey, R.M. 35-1891

SEAICE, ANISOTROPY, ICE STRENGTH, ELEC-TROMAGNETIC PROPERTIES, ICE CRYSTAL STRUCTURE. BRINES. OCEAN CURRENTS. RADIO ECHO SOUNDINGS.

RADIO ECHO SOUNDINGS.

Results of impulse radar studies of sea ice give support to the concept of a sea ice model in which the ice bottom is composed of an array of lossy parallel plate waveguides. The fundamental relation between the average bulk brine volume of sea ice and its electrical and strength properties discussed as is the remote detection of under-ice currer alignment. It was found that 1) the average effective balk dielectric constant is dependent upon the average bulk brine volume of the sea ice, 2) sea ice anisotropy, arising from a bottom structure of crystal platelets with a preferred casis horizontal alignment, can be detected by radio echo from a bottom structure or crystal patients with a preterror castic horizontal alignment, can be detected by radio echo sounding measurements made not only on the ice surface but also from an airborne platform; 3) the effective coefficient of reflection from the sea ice bottom decreases with increasing average effective bulk dielectric constant of the ice, decreases with increasing bulk brine volume, and is typically one to two orders of magnitude lower than the coefficient of reflection from the ice, surface; and 4.) the losses in sea ice increases from the ice surface; and 4) the losses in sea ice increase with increasing average bulk brine volume.

CR 80-21

MECHANICS OF CUTTING AND BORING.
PART 5: DYNAMICS AND ENERGETICS OF
INDENTATION TOOLS.

Mellor, M., Sep. 1980, 82p., ADA-092 365, 40 refs.

DRILLING, ICE CUTTING, EXCAVATION, PER-MAFROST, ROCK DRILLING, LOADS, (FORCES), EQUIPMENT, DYNAMIC LOADS, STRESSES, DESIGN. LOADS

DIRECTED, DESION.

This report deals with the cutting of rock and other brittle materials by means of indentation tools. The principles of indentation cutters are dealt with at length, the coverage including elastic contact stresses for initial leading by various types of indenters, application of formal plasticity theory to penetration analysis, and a variety of theories and penetration analyses that are not based on plasticity theory. Practical indentation mechanisms are described, and theoretical indentation to the dynamics and correction of instance. analyses are given for the dynamics and energetics of various types of roller cutters. The final section reviews experimen-tal investigations and results for rock-cutting discs, giving a systematic summary of available data

NEUMANN SOLUTION APPLIED TO SOIL SYSTEMS

Lunardini, V.J., Oct. 1980, 7p., ADA-092 244, 12 refs.

SOIL FREEZING, GROUND THAWING, FREEZE THAW TESTS, THERMAL CONDUCTIVITY, THERMAL DIFFUSION, ACTIVE LAYER PHASE TRANSFORMATIONS, TIME FACTOR, ANALYSIS (MATHEMATICS).

TOR, ANALYSIS (MATHEMATICS).
The mily complete, analytic rolution for conduction problems with has achange is the Neuman a solution. The Neumana solution is valid for phase change in a semi-infinite, homogeneous medium with a step change in a semi-infinite, homogeneous medium with a step change in surface temperature. Starting from an initial temperature which can be different than or equal to the fusion temperature of the medium. The Neumann solution, when applied to soils, forms the basis of a number of formulae for calculating the depths of freezing or thaming widely used graphs were previously developed that are valid only when the retrieval conductivities and thermal diffusivities, of the throng and conductivities and thermal diffusivities, of the frozen and thawed soils are unity. In this, ort general charts, applicable to any property ratios, are developed. The figures have been drawn specifically for soil systems, but they are applicable to any material with appropriate property ratios.

CR 80-23

MODELING OF ANISOTROPIC ELECTRO-MAGNETIC REFLECTION FROM SEA ICE. Golden, K.M., et al, Oct. 1980, 15p., ADA-094 620, 21 refs.

Ackley, S.F. 35-1722

ANISOTROPY, SEA ICE, ELECTROMAGNETIC PROPERTIES, BRINES, DIELECTRIC PROPERTIES, MATHEMATICAL MODELS, ICE CRYSTAL STRUCTURE, REFLECTIVITY, RADAR **ECHOES**

ECHOES.

The contribution of brine layers to observed reflective anisotropy of sea ice at 100 MHz is quantitatively assessed. The sea ice is considered to be a stratified, inhomogeneous, anisotropic dielectric consisting of pure ice containing ordered arrays "conducting inclusions (brine layers). Below the transition some, the ice is assumed to have constant azimuthal casts on ation within the horizontal plane, so that the orientation some layers is uniform. The brine layers are also assumed: 5 to become increasingly well-defined with depth, since adjacent brine inclusions tend to fuse together with increasing temperature. A theoretical explanation for observed reflective anisotropy is proposed in terms of anisotropic electric flux penetration into the brine layers. Fenetration anisotropy and brine layer geometry are linked to anisotropy in the complex dielectric constant of sea ice. In order to illustrate the above effects we present a numerical method of approximating the reflected power of a plane wave pulse incident in a slab of sea ice. Mixture dielectric constants, i...lustated for two polarizations of the incident wave, are used to calculate power reflection coefficients for the two polarizations.

MEASUREMENT OF THE SHEAR STRESS ON THE UNDERSIDE OF SIMULATED ICE COV-RS.

Calkins J., et al, Oct. 1980, 11p., ADA-094 621, 15 efs. Vuller, A.

:5-1723

IZE MECHANICS, SHEAR STRESS, HYDRAU-LICS, SUBGLACIAL OBSERVATIONS, SUR-FACE ROUGHNESS, WATER, VELOCITY, EX PERIMENTATION, MODELS.

PERIMENTATION, MODELS.
The fluid shear stress applied to the underside of a simulated floating ice cover was measured in a laboratory flume. The measured values were compared with values of the shear stress computed from the von Karnan-Prodit velocity distribution fitted to the velocity profiles managed velocity that the cover. For the loner velocity runs (about 6079 m/s) the measured and computed values of the shear stress were in close agreement. At the high velocity flows (about 0.138 m/s) the measured values were roughly one-half those calculated from the velocity distribution. As the underside of the cover became increasingly rougher, the position of maximum velocity moved closer to the bottom of the channel, It was shown that the Darcy friction condition, ent is exponentially related to a normalized ice cover thickness, which suggests that it is measure of the roughness of a fragmented ice cover.

CR 80-25
SINGLE AND DOUBLE REACTION BEAM LOAD CELLS FOR MEASURING ICE FORCES.
Johnson, P.R., et al., Oct. 1980, 17p., 15 refs.

Zarling, J.P. 35-1724

ICE LOADS, RIVER ICE. BRIDGES, MEASURING INSTRUMENTS, LOADS (FORCES).

ING INSTRUMENTS, LOADS (FORCES).

Two new types of load cells for attachment to bridge piers and direct measurement of ice for es were developed and tested with one type ben,g installed on a pier of the Yukon River Bridge northwest of Fairbanks. Alaska Both types of load cells used beams supported by base plates and carried nose plates that were loaded by the ice. The loads were imposed at the beams at locations differing from the support reactions so that the loads developed moments in the beams. By instrumenting them with strain gauges, the loads could be measured. Details of the design of the load cells, the means of calculating the loads and experience obtained with load cells are discussed.

BLOCK MOTION FROM DEPONATIONS OF BURIED NEAR-SURFACE EXPLOSIVE AR-RAYS.

Blouin, S.E., Dec. 1980, 62p. ADA-095 492, 31 refs

35-1999 ROCK MECHANICS, EXPLOSION EFFECTS, EXPLOSIVES, SUBSURFACE STRUCTURES, SOIL MECHANICS.

SOIL MECHANICS.

A vital concert to the survivability of hardened underground structures in rock is the relative displacement induced along geologic discontinuities by nearby caplisions. Such displacement, commonly termed block motion, can occur along faults, joints, bedding planes and other structural weaknesses in rock. This report documents all occurrences of block motion observed during the development of DIHEST, a series of shallow-buried high exposive experiments designed to simulate the direct induced ground motions from a nuclear surface burst. Instances of block motion are described,

along with pertinent details of the explosive arrays, geology and ground motion fields. The influence of these and other factors on the direction and magnitude of block motion is discussed.

CR 80-27

PHASE CHANGE AROUND A CIRCULAR PIPE. Lunardini, V.J., Dec. 1980, 18p., ADA-094 600, 12

35-1894

35-1894
PIPES (TUBES), HEAT TRANSFER, PERMA-FROST THERMAL PROPERTIES, STEFAN PROBLEM, PHASE TRANSFORMATIONS, FROZEN GROUND STRENGTH, THERMAL DIFFUSION, FREEZE THAW CYCLES, ANAL-YSIS (MATHEMATICS).

YSIS (MATHEMATICS).

No general, analytical solution exists for phase change around a cylinder, thus, approximate methods have been evaluated. The heat balance integral technique applied to the cylinder gave excellent results when compared to published numerical solutions. Graphical solutions are given for phase change about a cylinder for ranges of the Stefan number, superheat parameter, and property value ratios for typical soils. An approximate, general solution has been derived which is reasonably accurate and can be used for any values of the above-mentioned parameters. The effective thermal differenties method has been shown to be useful for practical forms. above-mentioned parameters. The effective thermal dif-fusivity method has been shown to be useful for practical problems of phase change

CR \$0-28 CLEARING ICE-CLOGGED SHIPPING CHAN-

Vance, G.P., Dec. 1980, 13p., ADA-095 490, 18 refs. 35-2000

CHANNELS (WATERWAYS), ICE REMOVAL, ICE NAVIGATION, ICE CONDITIONS, RIVER ICE, STREAM FLOW, WATER LEVEL.

ICE, STREAM FLOW, WATER LEVEL.
This report investigates the feasibility of clearing ice from the shipping channel of the St. Marys River. Four basic concepts are investigated: disposal under the ice, disposal on top of the ice, sturrying and rafting — Each technique was found to have application in limited portions of the river with the exception of disposal on top of the adjacent ice sheet, which is deemed feasible throughout the river system — Disposal onto the adjacent ice sheet will increase the free stream velocity less than 1.0 ft/s (3.05 cm/s) and raise the water level less than 1.0 ft/s (0.305 cm/s) are model and field tests are recommended to validate the findings of this report. of this report.

CR 20-29

CR 80-27
FATE AND EFFECTS OF CRUDE OIL SPILLED
ON SUBARCTIC PERMAFROST TERRAIN IN
INTERIOR ALASKA.

Johnson, L.A., et al, Dec. 1980, 67p., ADA-095 49i, Refs. p.41-43. Sparrow, E.B., Jenkins, T.F., Collins, C.M., Davenport, C.V., McFadden, T.

35-2001

OIL SPILLS, PERMAFROST, VEGETATION, DAMAGE, SOIL MICROBIOLOGY, THAW DEPTH, SLOPES, FREEZE THAW CYCLES.

DEPTH, SLOPES, FREEZE THAW CYCLES. This study was conducted to determine the short- and long-term physical, chemical and biological effects of spills of hot Prudhoe Bay crude oil on permafrost terrain near Fairbanks, Alaska Two experimental oil spills, one in winter and one in summer. of 7570 laters (2000 gallons) were rusde at a forest site The winter-spill oil moved mythin the surface moss layer beneath the snow The summer-spill oil moved gramanly below the moss in the organic soil. The oil moved faster and further downslope in the summer spill. Oil in the winter spill stopped during the first day but remobilized and flowed further downslone in the spring. The total area affected by the number spill was nearly one and one-half times as large as that affected by the winter spill. The initial heat of the spilled oil had little measurable thermal effect on the soil. However, thaw depth significantly increased following two full thaw seasons. The greatest increased following two full thaw seasons. The greatest increased following two full thaw seasons. The greatest increased occurred beneath oil black-ened surfaces. Exporation of volatile components is the most significant weathering process in the first two years. Volatiles exaporated faster from surface oil than from ol carried deeper into the soil profile. Microbial degradation has not been observed. The indigenous soil microbial oppulations, ranging from inhibition to stimulation, with stimulation appearing to predominate. Vegetation showed both Diecidous species showed damage faster than evergreen species. This study was conducted to determine the short- and longcies

CR 80-30

FIELD COOLING RATES OF ASPHALT CON-CRETE OVERLAYS AT LOW TEMPERATURES. Eaton, R A., et al. Dec 1980, 11p. ADA-095 489, 7

Berg, R.L. 35-2002

TEMPERATURE EFFECTS, BITUMINOUS CON-CRETES, COOLING RATE, LOW TEMPERA-TURE TESTS, ROADS, PAVEMENTS, COMPAC-

Six overlay test sections were placed on an existing test road in Hanover New Hampshire, to gain experience in

compaction of asphalt pavements at rolling temperatures as low as 150 F The asphalt cement and aggregate used had mix characteristics similar to those of the mix expected to be used for a proposed overlay project at Thule Air Base, Greenland. Results of the overlay tests showed to be used for a proposed overlay project at Thule Air Base, Greenland. Results of the overlay tests showed that computer-modeled cooling curves can be accurate predictors of the actual asphalt overlay cooling with time. In Addition, the effects of temperature upon compaction were determined and it was found that nuclear gauges, when used and calibrated properly, successfully monitored mix density changes during compaction

CR 80-31

ICING ON STRUCTURES.

Minsk, L.D., Dec. 1980, 18p, ADA-095 474, 34 refs. 35-2003

STRUCTURES, ICING, ICE ACCRETION, ICE LOADS, ICE PREVENTION, HUMIDITY, WIND PRESSURE, ICE COVER THICKNESS.

Ice accretion on structures built on the earth's surface is discussed. Sources of water are the atmosphere or water discussed. Sources of water are the atmosphere or water bodies near or surrounding the structure lee types include frost, rime, glaze and spray; properties and conditions governing their formation are presented. Methods of estimating accretion rates and total accretion or structures are given, and extracts from U.S and Canadian codes for ice and wind loads on structures are included. Techniques for preventing ice accretion or removing accreted ice are presented

CR \$1-01

ANALYSIS OF ICE JAMS AND THEIR METEOROLOGICAL INDICATORS FOR THREE WINTERS ON THE OTTAUQUECHEE RIVER, VERMONT.

Bates, R.E, et al, Feb. 1981, 27p., ADA-099 173, 11 refs.

Brown, M.-L

35-3926

ICE JAMS, ICE BREAKUP, ICE FORMATION. RIVER ICE, METEOROLOGICAL DATA.

The formation of see jams and their meteorological indicators were studied in detail for the winters of 1975-76, 1976-77 and 1977-78 on the Ottauquechee River at and east of Woodstock, Vermont. Meteorological data are presented for nearby National Weather Service Co-Operative Stations as well as for CRREL sites on the Ottauquechee River The severity of each winter is discussed, as are the effects In a severity of each winter is discussed, as are the effects of a heavy rainfall on a high water-equivalent snow cover. The resultant runoff and subsequent ice jamming that occurs is discussed. Continuous monitoring of water temperature before, during and immediately after an ice cover formed on the river during the winter of 1977-78 is included. The report includes a section on warm sewer outfall effects on the ice at and below a municipal treatment plant. Retrieved data will asset in future modeling studies a belo reserved. data will assist in future modeling studies to help predict ice formation, growth, decay and jamming of river ice covers

CR \$1-02

HYPERBOLIC REFLECTIONS ON BEAUFORT SEA SEISMIC RECORDS

Neave, K.G., et al. Mar. 1981, 16p., ADA-099 172, 8 refs.

Sellmann, P.V., Delaney, A.J

36-31R

BOTTOM SEDIMENT, SEISMIC REFLECTION, OCEAN BOTTOM, ICE CONDITIONS, SEA ICE. REAUFORT SEA.

Many hyperbolic reflections have been observed on marine Many hyperbolic reflections have been observed on manne seismic records obtained during oil exploration in the Beaufort Sea, and on USGS seismic sub-bottom profiles from the Frudhoe Bay vicinity. A hyperbolic projection system was designed to rapidly measure seismic velocities from the curves on the records. The velocities observed were approximately the velocity of sound in water. The hyperbolic signals also showed dispersion properties similar to acoustic normal modes in shallow water. These observations indirect that the signals responsible for the hyperbolic reflections propagate as normal modes within the layer, with very limited penetration of the seabed. Determinations of the dominant frequency of these seanls indicate that the neglection into penetration of the scabed Determinations of the dominant frequency of these signals indicate that the penetration into the scabed has a characteristic attenuation depth (skin depth) of about 1.5 m for the sub-bottom profiles and 12 m for the marine records. If therefore appears that some hyperbolic reflections may be generated by variations in materials that occur near the scabed There is some evidence of incently of the anomalies, possibly related to sediment-filled or open ice gouges, or other changes in material properties at shallow depths.

CR \$1-03

HYDRAULIC MODEL STUDY OF A WATER IN-TAKE UNDER FRAZIL ICE CONDITIONS. Tantillo, T.J., Mar. 1981, 11p., ADA-099 171, 8 refs 36-319

WATER INTAKES, ICE CONDITIONS, FRAZILICE, HYDRAULIC STRUCTURES, ICE PREVEN-TION, PROTECTION, MODELS, BUOYANCY

TION, PROTECTION, MODELS, BUOYANCY A 1 24 scale hydraulic model study of a water intake under frazil ice conditions is presented. The intake, liceated 9 m below the surface of the St. Lawrence River in Massena New York, has a throughflow of 0 14 cut m s. The model study, conducted in the refrigerated flume facility of the U.S. Army. Cold Regions Research and Engineering Laboratory, investigated methods of minimizing the frazil ice blockage on the intake. Two protective structures were modeled

and the relative benefits of each are presented — The addition all cross-sectional area provided by the protective structures lowered the vertical velocity component of the intake water to 0.0027 m/s — At this velocity the buoyant force acting on the frazil ice particle is larger than the downward drag force, causing the particle particle to rise. — The results demonstrate that under certain low flow conditions a protective structure—can minimize frazil ice blockage—problems

CR 81-04 MOVEMENT STUDY OF THE TRANS-ALASKA PIPELINE AT SELECTED SITES

Ueda, H.T., et al, Apr. 1981, 32p., ADA-101 605, 3

Garfield, D.E., Haynes, F.D. 36-320

PIPELINES, MECHANICAL PROPERTIES, STA BILITY, PIPELINE SUPPORTS, ANCHORS, UNITED STATES—ALASKA.

UNITED STATES—ALASKA.

Eight sites along the trans-Alaska pipeline from the Denali Fault to Fairbanks were selected for pipeline and pipeline support movement studies. Four measurement surveys were conducted, starting before oil pumping operations began up to September 2, 1978, to determine the lateral and longitudinal pipe movement due to the thermal expansion of elevated sections of the pipeline, the tilt of the vertical support members (VSM's), and the changes in relative elevation of the support crossbeams. A maximum lateral and longitudinal motion of the pipe of 13 3/4 in and 2 3/16 in respectively were measured up to September 1978. Tilt data for 180 VSM's showed intile change over a one-year period, with only 5 VSM's tilting more than 0.5 deg. Relative elevation measurements showed insignificant changes for two sites compared over a one-year period. Comparisons of our data with as-built elevations at 8 sites shows a few large differences that cannot be readily explained. In general the pipeline and its supports, at least at the sites studied, show minimal movement and activity.

CR \$1-05 VIBRATIONS CAUSED BY SHIP TRAFFIC ON AN ICE-COVERED WATERWAY.

Haynes, F.D., et al, Apr. 1981, 27p., ADA-101 541, 11

Maattanen, M.

36-321 SHIPS, VIBRATION, ICE BREAKING, ICE COV-ER. FROZEN GROUND, SEISMOLOGY.

SHIPS, VIBRATION, ICE BREARING, ICE COVER, FROZEN GROUND, SEISMOLOGY.

Vibrations have been felt on shore along the St. Marys River in Michigan during the passage of ships through ice vibration measurements were made on a ship, on the ice, on the shore, and on buildings along the shore. Vibration levels in 1979 were about an order of magnitude lower than levels that would cause damage to building walls. Two factors, however, could have reduced the vibration levels in 1979 a lack of ice jams and a record high snow cover which prevented the soil from freezing. Vibration levels with an ice cover are about four times those without an ice cover are about four times those without an ice cover lectreaking and opening the channel can reduce vibration levels by about 50% for a ship following closely behind another ship. The dominant frequencies measured on shore were associated with propeller excitation. The dominant frequencies and magnitudes measured on the bow of a ship are an order of magnitude higher than those on the shore and are related to icebreaking by the bow Vibration magnitudes are dependent upon the velocity of the ship, the erroy expended by the ship, the cross-sectional area of the ship, weather, conditions of the ice and soil, and site-specific conditions. Further studies are needed to determine the effects of these factors and to determine the mode of energy transmission. the mode of energy transmission

INVESTIGATION OF THE ACOUSTIC EMIS-SION AND DEFORMATION RESPONSE OF FI-NITE ICE PLATES.

Xirouchakis, P.C., et al. Apr. 1981, 19p., ADA-103

Chaplin, M. St. Lawrence, W.F.

ICE ACOUSTICS. FRACTURING, ICE LOADS, PLATES. ICE DEFORMATION, ICE CRACKS. ANALYSIS (MATHEMATICS)

ANALYSIS (MATTER-MATTER)

A procedure is described for monitoring the microfracturing activity in ice plates subjected to constant loads. Sample time records of freshwater ice plate deflections as well as corresponding total acoustic emission activities are presented. The linear clastic, as well as viscoelastic, response for a simply supported rectangular ice plate is given. Suggested future work using to above procedure is discussed.

CR \$1.07 HYDRAULIC CHARACTERISTICS OF THE DEER CREEK LAKE LAND TREATMENT SITE DURING WASTEWATER APPLICATION.

Abele, G., et al. Apr. 1981, 37p., 3 refs. McKim, H.L., Caswell, D.M., Brockett, B.E. 36-390

WATER, WASTE DISPOSAL. TREATMENT, HYDRAULICS, DRAINAGE, IR-RIGATION, SEEPAGE, LAND RECLAMATION During the summer of 1979, wastewater was applied 10 times to the Deer Creek Lake, Ohio land treatment site Wastewater fistribution on the ground during spray application is not uniform some locations receive less than 70% and

others more than 130°, of the mean amount applied The saturated infiltration rate ranges from moderately slow (0.6 cm/hr after 1 hr) to slow (0.3 cm/hr after 12 hours) The flow rate increases approximately as the cube under-drain flow rate increases approximately as the cube of time until 1 hour after the end of application and then decreases as the reciprocal of time squared. The rate and amount of drainage increases with an increase in the initial soil water content and can be predicted from soil tension measurements. It was possible to calculate the mass water budget at the end of a typical application to within 88% of the actual water applied. under-drain

CR 81-08 SEASONAL GROWTH AND UPTAKE OF NU-TRIENTS BY ORCHARDGRASS IRRIGATED WITH WASTEWATER.

Palazzo, A J., et al, May 1981, 19p. ADA-101 613, 33

refs. Graham, J.M.

GRASSES, NUTRIENT CYCLE, GROWTH, WASTE DISPOSAL, WATER TREATMENT, IR-RIGATION, LAND RECLAMATION, SEASON-AL VARIATIONS.

AL VARIATIONS.

A 2-year field study determined the seasonal growth and nutrient accumulation of a forage grass receiving 7.5 cm/wk of primary treated domestic wastewater. The average N and P concentrations in the wastewater were 31.5 and 6.1 mg/l respectively. An established sward of Pennlate orchardgrass (Dactylis glomerata L.) was managed on an annual three cutting system. Grass samples were periodically taken to determine plant dry matter accumulation and uptake of N, P and K. Changes in nutrient uptake within a harvest period were related to both changes in dry matter accumulation and plant nutrient concentration. For maximum yields and nutrient removal, it is recommended that accumulation and plant nutrient concentration For maximum yields and nutrient removal, it is recommended that orchardgrass be initially harvested at the early heading stage of growth in the spring Subsequent harvests should be performed at 5- to 6-week intervals Average daily dry matter, N and P accumulation was greatest during the first harvest period (May in Hanover, N H) This would be the most appropriate time to increase the application rate, thus treatment excess wastewater stored during the most the most appropriate time to increase the application rate, thus treating excess wastewater stored during the winter. Estimates of monthly plant removal for N and P are presented as a guide in designing land treatment systems according to the procedures given in the EPA/Corps Land Treatment Design Manual

CR 81-09 ON THE BUCKLING FORCE OF FLOATING ICE

Kerr, A.D., June 1981, 7p., ADA-103 733, 12 refs.

LOADS, PLATES, FLOATING ICE, ICE VER STRENGTH, DYNAMIC LOADS, COVER COVER STRENGTH, DY MATHEMATICAL MODELS

The calculation of the largest horizontal force a relatively thin floating ice plate may exert on a structure requires the knowledge of the buckling load for this floating plate in the published iterature on the stability of continuously In the published literature on the stability of continuously supported beams and plates, it is usually assumed that this buckling force corresponds to the lowest bifurcation force p(cr). However, recent studies indicate that, generally, this is not the case, and this report clarifies the situation for floating ice plates. This problem is first studied on a simple model that exhibits the buckling mechanism of a floating ice plate but is amenable to an exact nonlinear analysis. This study, shows that, depending on the ratio of the rigidities of the "fiquid" and "plate", the post-buckling branch may rise or drop away from the bifurcation point

CR 81-10
REVIEW OF THERMAL PROPERTIES OF SNOW, ICE AND SEA ICE.

Yen, Y.-C., June 1981, 27p, ADA-103 734, Refs. p 25-27. 36-393

ICE THERMAL PROPERTIES, SEA ICE, SNOW DENSITY, SNOW THERMAL PROPERTIES, ICE DENSITY, THERMAL PROPERTIES, COMPRES-SIVE PROPERTIES, THERMAL EXPANSION.

This treatise thoroughly reviews the subjects of density, thermal expansion and compressibility of ice, snow density change attributed to destructive, constructive and melt metamorphism. and the physics of regulation and the effects on penetration rate of both the thermal properties of the wire and stress level. Heat capacity latent heat of fusion and thermal conductivity of ice and snow over a wide range of temperatures. conductivity of ice and snow over a wide range of temperatures were analyzed with regression techniques. In the case of snow, the effect of density was also evaluated. The contribution of sapor diffusion to heat transfer through snow under both natural and forced convective conditions was assessed. Expressions representing specific and latent heat of sea ice in terms of sea ice salinity and temperature were given. Theoretical models were given that can predict the thermal conductivities of fresh bubbis ice and sea ice in terms of salinity, temperature and fractional air content. The salinity is a salinity to the conductivities of the substitutional air content.

CR 81-11 PREDICTION OF EXPLOSIVELY DRIVEN RELATIVE DISPLACEMENTS IN ROCKS.

Bloum, S.E., June 1981, 23p., ADA-101, 314, 15 refs 36-394 ROCK MECHANICS, EXPLOSION EFFECTS,

NUCLEAR EXPLOSIONS, SOIL MECHANICS, FORECASTING

Relative displacement data from high explosive, shallow-buried bursts in rock are combined with relative displacement data from the contained nuclear explosion MIGHTY EPIC data from the contained nuclear explosion MiOri FFE.
Analysis of these data yields a preliminary, semi-empirical
technique for predicting the location, direction sed magnitude
of relative displacements in rock from contained explosions.
This technique is used to make relative displacement predictions for the DIABLO HAWK nuclear blast.

CR #1-12

REVEGETATION AND SELECTED TERRAIN DISTURBANCES ALONG THE TRANS-ALASKA PIPELINE, 1975-1978.

Johnson, A.J., June 1981, 115p., ADA-138 426, 41

38.4413

REVEGETATION, SOIL EROSION, GRASSES, PIPELINES, ENV ENVIRONMENTAL IMPACT,

FOLAR REGIONS.

Revegetation techniques along the trans-Alaska pipeline as employed by Alyeska Pipeline Service Company during the 1975-1978 summers were observed. Objectives included determining the success of treatments, identifying problem areas, and noticing long-term implications. Observations and photographs at 60 sites located along the trans-Alaska pipeline indicated frequent occurrence of successful revegetation as well as frequent problems, such as erosion, slowly tion as well as frequent problems, such as erosion, slope instability, poor scheduling of seed application, occurrence of weed species, failure to optimally reuse topsoil and fine-grained soil, and low rates of native species reinvasion grained soil, and low rates of native species reinvasion Alyeska's visual impact engineering was observed to be very successful as shown by high first-season survival. However, a related program for establishing willow cuttings was unsuccessful in 1977 but appeared very promising in 1978 largely due to improved management and more favorable growing conditions. Terrain disturbances due to the construction of the fuel gas line, snowpads, and oil spills were examined to identify and describe related environmental impacts on natural vegetation. Proper construction and use of snowpads minimized the extent and severity of disturbance. Crude oil spills, although damaging to vegetation, did not cause total kill of vegetation, and certain types of spills may have only short-term effects. Results of restoration research by CRREL along the trans-Alaska pipeline are discussed.

CR \$1-13 VHF ELECTRICAL PROPERTIES OF FROZEN GROUND NEAR POINT BARROW, ALASKA. Arcone, S. A., et al, June 1981, 18p., ADA-103 735, 32

Delaney, A.J.

36-395 PERMAFROST PHYSICS, DIELECTRIC PROP-ERTIES, RADIO WAVES, FROZEN GROUND PHYSICS, SOIL COMPOSITION, WATER CON-TENT, ORGANIC SOILS.

TENT, ORGANIC SOILS.
Electrical properties of frozen ground were measured using radio frequency interferometry (RFI) in the very high frequency (VHF) radiowave band leerich organic silts and sands and gravels of variable see content were investigated during early April of both 1979 and 1980. Frequencies between 10 and 150 MHz were used with best results obtained between 40 and 100 MHz. Surface impedance and magnetic induction techniques were also used to obtain a separate control on vertical inhomogeneity. Soil samples were tested for organic and water content. The dielectric constants determined for the ice-rich organic sults stagged from 40 to 55 while those for the sands and gravels were about 51. Dielectric loss was due to d.c. enduction and was very low for the silts but significant for the sands and gravels were most likely due to the higher concentrations of salt that are reported to easist in the old beach ridges in this region. All the RFI measurements are believed to be indicative of only the first few meters of the ground although the radiowaves could penetrate to tens of meters.

CR \$1-14 WASTEWATER TREATMENT BY A PROTO-TYPE SLOW RATE LAND TREATMENT SYS-

Jenkins, T.F., et al. Aug. 1981, 44p., ADA-106 975. Refs p.37-39.

Palazzo, A J

36-1308

WASTE TREATMENT, WATER TREATMENT. CHEMICAL ANALYSIS, NUTRIENT CYCLE, EVAPOTRANSPIRATION, PLANTS (BOTANY). SOIL WATER.

CR #1-15 STATISTICAL EVALUATION OF SOIL AND CLIMATIC PARAMETERS AFFECTING THE CHANGE IN PAVEMENT DEFLECTION DUR-

ING THAWING OF SUBGRADES Chamberlain, E.J., July 1981, 10p., ADA-106-976, 7 refs.

PAVEMENTS, DEFORMATION, SEASONAL FREEZE THAW, SUBGRADE SOILS, LOADS (FORCES), CLIMATIC FACTORS, FROST PENE-TRATION, STATISTICAL ANALYSIS

This report analyzes the results of a field study previously reported by Seriyner et al (1969) for the National Cooperative

Highway Research Program These authors studied the seasonal pavement deflection characteristics of 24 test sites seasonal pavement deflection characteristics of 24 test sites on roads in service in regions with freezing indexes ranging from 100F-days to 2100F-days. They used the Dynaffect cyclic pavement loading device to determine the pavement system response. Of specific interest to the analysis was the increased pavement deflection after freezing and thawing and the time to recovery of normal deflection characteristics. These characteristics were related to soil and climatic factors using estatical techniques. The most using fact between using statistical techniques The most significant observa-tions of this statistical analysis are: 1) that the freezing index is not a significant parameter in determining the percent increase in pavement deflection during thawing, and 2) that of freezing. As was expected, the most significant variable affecting the increase in pavement deflection was the frost susceptibility classification. This observation reinforces the sity for careful selection of soil materials used in pavement systems.

CR 81-16 COLD REGIONS TESTING OF AN AIR-TRANS-PORTABLE SHELTER.

Flanders, S.N., Aug. 1981, 20p., ADA-107 131, 9 refs.

PORTABLE SHELTERS, TRANSPORTATION.
COLD WEATHER PERFORMANCE. AIR-PLANES, TESTS.

PLANES, TESTS.

An air-transportable shelter designed and built at CRREL for use in cold regions underwent testing in Hanover. New Hampshire, and Ft Greely, Alaska The shelter demonstrated some of its capabilities for mobility by being towed for more than 60 miles behind various vehicles and by being transported on a C-130 cargo airplane, a CH-47 helicopter, and a trailer truck. The shelter proved to be very easy for a crew of two to four to set up in all weather conditions including -40F cold However, the gasoline-powered generator, which was a source for space heat as well as electricity, functioned very poorly Overall, the prototype successfully demonstrated qualities of self-reliance, ease of operation and thermal efficiency

CR 81-17 SUBSEA TRENCHING IN THE ARCTIC. Mellor, M., Sep. 1981, 31p., ADA-108 341, 44 refs

40.4673

DREDGING, OCEAN BOTTOM, PIPE LAYING. ICE SCORING, ICE ACTION, EQUIPMENT, VELOCITY, ICEBERGS, PRESSURE RIDGES, PROTECTION

PROTECTION

Environmental conditions are described for the continental shelf of the western Arctic, and for the shelf of Labrador and Newfoundland Special emphasis is given to the gouging of bottom sediments by ice pressure ridges and recbergs, and an approach to systematic risk analysis is outlined Protection of subsea pipelines and cables by trenching and direct embedment is discussed, touching on burial depth, degree of protection, and environmental impact. Conventional land techniques can be adapted for trenching across the beach and through the shallows, but in deeper waster special equipment is required. The devices discussed include hydraulic dredges, submarine dredges, plows, rippers, water special equipment and shallows, but in deeper water special equipment is required. The devices discussed include hydraulic dredges, submarine dredges, plows, rippers, water special equipment and shallows, but in deeper water special equipment is required. The devices discussed include hydraulic dredges, submarine dredges, plows, rippers, water special equipment is required. The devices discussed include hydraulic dredges, and shell discussed include hydraulic dredges, submarine dredges, plows. Tippers, water special equipment is required. The devices discussed include hydraulic dredges, submarine dredges, plows. Tippers, water special equipment is required.

CR 81-18 CHENA RIVER LAKES PROJECT REVEGETA-TION STUDY-THREE-YEAR SUMMARY. Johnson, L.A., et al., Oct. 1981, 59p., ADA-108 909.

Rindge, S.D., Gaskin, D A. 36-2222

REVEGETATION, GRASSES, GROWTH, SOIL STABILIZATION, GRAVEL, VEGETATION, UNITED STATES—ALASKA FAIRBANKS.

DVITED STATES—ALASKA - FAREDANAS.

During the growing seasons of 1977, 1978 and 1979, revegetation techniques were studied on the Chena River Lakes
Project a flood control dam and levee near Fairbanks, Alaska,
to find an optimal treatment for establishing permanent vegetation cover on the gravel structures. The treatments tested Project a flood control dam and levee near Fairbanks, Alaska, to find an optimal treatment for establishing permanent vegetation cover on the gravel structures. The treatments tested on plots at the dam and/or levee involved three main variables. I) vegetation (grass and clover seed and or willow cuttings). 2) mulch, mulch blanket, and or sludge and 3) substrate (gravel or fine-grained soil over the gravel base). The mulches were hay, weed-cellulose-fiber, peat moss, and Conwed Hydro Mulch 2000, which is a wood-cellulose-fiber mulch with a polysacchande tackifier. A constant rate of fertilizer was applied to all plots except the control. A section of each plot was refertilized again in their third growing season to compare annual and bannual fertilization. The high fertilization rate produced above-average growth bescue, brome, and fostail were the most productive species on the dam, while alishe clover was the most productive on the wetter levee site. When grass seed and willow cuttings were planted at the same time, willow sursival and growth were reduced. Fertilization is required for at least two years to produce an acceptable permanent vegeta. and growth were reduced. Fertilization is required to at least two years to prosluce an acceptable permanent segetation cover, although fine grained soil or sludge reduces the amount of fertilizer needed in the second year. Third year fertilization may be necessary since the benefits of the second fertilization continue for at least two years. A sludge treatment refertilized during its second growing season produces the highest biomass recorded in this stads. Shadge

from the Fairbanks treatment plant poses little, if any, danger of contamination from heavy metals or pathogens year-old seedlings of willow and native woody species growing on the dam do not have deeply penetrating root systems and therefore don't appear to pose an early threat of leakage through the dam.

CR 81-19 GROUND-TRUTH OBSERVATIONS OF ICE-COVERED NORTH SLOPE LAKES IMAGES BY

Weeks, W.F., et al, Oct. 1981, 17p, ADA-108 342, 5 refe

Gow, A.J., Schertler, R.J. 38-4414

LAKE ICE, ICE COVER THICKNESS, RADAR ECHOES, ICEBOUND LAKES, ICE WATER IN-TERFACE, SIDE LOOKING RADAR, UNITED STATES—ALASKA—NORTH SLOPE.

STATES—ALASKA—NORTH SLOPE.
Field observations support the interpretation that differences in the strength of radar returns from the see covers of lakes on the North Slope of Alaska can be used to determine where the lake is frozen completely to the bottom. An acciffrozen soil interface is indicated by a weak return and an ice water interface by a strong return. The immediate value of this result is that SLAR (side-looking airborne radar) imagery can now be used to prepare maps of large areas of the North Slope showing when, the lakes are shallower or deeper than 1.7 m (the approximate draft of the lake ice at the time of the SLAR flights). The bathymetry of these shallow lakes is largely unknown and is not obvious from their sizes or outlines. Such information could be very useful, for example in finding suitable year-round water supplies. supplies

CR 81-20 SHALLOW SNOW MODEL FOR PREDICTING VEHICLE PERFORMANCE.

Harrison, W.L., Oct. 1981, 21p., ADA-108 343, 63

39-1261 SNOW ACCUMULATION, MOTOR VEHICLES, COLD WEATHER PERFORMANCE, TRACTION, SNOW COVER EFFECT, ICE COVER EFFECT, SLUSH, SNOW DEPTH, GROUND THAW-ING, FORECASTING, MODELS.

A historical review of research is presented to establish the state-of-the-art for analyzing the behavior of vehicles in shallow snow. From this review, the most comprehensive and promoting model is put together to establish a first-cut performance prediction model for vehicles operating in shallow snow, slush, ice and thawing soils.

CR 81-21 NEAR-INFRARED REFLECTANCE OF SNOW-COVERED SUBSTRATES.

O'Brien, H.W., et al. Nov. 1981, 17p., ADA-110 868,

Koh G 36-2431

SNOW COVER EFFECT, SOLAR RADIATION. REFLECTION, SUBSTRATES, ICE CRYSTAL OP-RADIOMETRY, METEOROLOGICAL

The reflection of solar radiation by a snow cover in situ and the apparent influence of selected substrates were examined in wavelength bands centered at 0.81, 1.04, 1.10, 1.30, 1.50 and 1.80 micrometers. Substrates included winter wheat. and 1 au microscers it into the property of "crusty" snow and ice Reasonable qualitative agreement between measurements and theoretical predictions was demonstrated. retween measurements and theoretical predictions as demonstrated, with indications of quantitative agreement in the definition of a "semi-infinite depth" of snow cover. It was concluded that ultimate quantitative agreement between theory and measurement will require that an "optically effective grain size" be defined in terms of physically measurable dimensions or meteoriologically predictable characteristics of the ice crystals composing the snow pack

CR 81-22 ICE DISTRIBUTION AND WINTER SURFACE CIRCULATION PATTERNS, KACHEMAK BAY, ALASKA

Gatto, I. W., Dec 1981, 43p., ADA-110 806, 20 refs. 36-2432

ICE CONDITIONS, SEA ICE DISTRIBUTION. OCEAN CURRENTS, SUSPENDED SEDI-MENTS, REMOTE SENSING, LANDSAT, UNIT-ED STATES ALASKA KACHEMAK BAY.

Development of the hydropower potential of Bradley Lake, Alaska, would nearly double winter freshwater discharge from Visaka, would nearly double winter freshwater discharge from the Bradles River into upper Kachemak Bay, and the Copys of Engineers is concerned about possible subsequent increased are formation and related ice-induced problems. The objectives of this investigation were to describe winter surface circulation in the bay and document ice distribution patterns for predicting where additional ice might be transported if forms. Fifts one Landau MSS hand S and T and RBV images with TOT cloud cover or less, taken between Society and the April cach year, were analyzed for the eight winters from 1972 to 1980 with standard photoniter pretation techniques. Results of this analysis showed that elast a softween the distance of the Sachemak Bay acts as a pretation techniques Results of this analysis showed that glavial sediment discharged into Kachemak Bas acts as a natural tracer in the water. Innet kachemak Bas circulation in the winter is predominantly counterclockwise, with

northeasterly nearshore currents along the south shore and southwesterly nearshore currents along the north shore Most of the ice in the inner bay forms at its northeast end and is ducharged by the Fox, Sheep and Bradley Rivers. Some ice becomes shorefast on the tidal flats at the head of the bay, while some moves southwestward along the north shore pushed by winds and currents.

CR 81-23

EVALUATION OF A COMPARTMENTAL MODEL FOR PREDICTION OF NITRATE LEACHING LOSSES.

Mehran, M., et al, Dec. 1981, 24p., ADA-111 560, 41

Tanii, K.K., Iskandar, I.K.

36-2284

WASTE TREATMENT, LEACHING, LAND REC-LAMATION, WATER FLOW, SOIL CHEMISTRY. MODELS

A model is presented that consists of a water flow submodel and a nitrogen flow submodel. Irrigation, precipitation, evapotranspiration, surface return flow, and deep percolation are considered in the water flow submodel. The processes of sitrification, dentification, mineralization, immobilization, plant uptake, and nitropen fisation are included in the nitrogen flow submodel. The model has been applied to two sets of experimental data obtained from 1) controlled test cells at U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, and 2) field plots of the University of California at Davis. Comparison between the experimental and model results indicates the potential expublishies of compartmental models in predicting nitrogen behavior in soil-water-plant systems under wastewater land treatment operations. This model is applicable to slow rate, rapid infiltration, and overland flow systems. A model is presented that consists of a water flow sul

CR 81-24

TRANSIENT ANALYSIS OF HEAT TRANSMIS-SION SYSTEMS.

Phetteplace, G., Dec. 1981, 53p., ADA-112 365, Refs. p.46-47.

HEAT LOSS, UNDERGROUND PIPELINES, HEATING, PUMPS, TEMPERATURE EFFECTS, ANALYSIS (MATHEMATICS, COST ANALYSIS, SOIL TEMPERATURE, COMPUTER PRO-TEMPERATURE. COMPUTER GRAMS.

This report develops a method of analysis for heat transmission systems operating under district heating load conditions.

The use of thermal energy storage systems is outlined and advantages are given. The method accounts for the effects stages are given. The method ac of heat source and load characteristics. The transmission model itself considers the following technical aspects. I) frictional pressure losses in piping systems, 2) pump characteristics, 3) pump driver characteristics, and 4) heat losses from the burned piping. The capital costs considered are the piping system and necessary pumps. Operation and maintenance costs include cost of heat loss and cost of pumping energy input. Allowances are also made for system maintenance and repair over the assumed lifetime. The heat transmission problem is formulated in the forms of a two-dimensional optimization problem. The decision variables are pipe diameter and supply temperature. The problem is solved by direct search techniques using a Hooke-Jeeves pattern search algorithm. Parametric results are presented along with suggestions for further work. The transe

CR 81-25

APPLICATION OF THE HEAT BALANCE INTE-GRAL TO CONDUCTION PHASE CHANGE PROBLEMS.

Lunardini, V.J., Dec. 1981, 14p., ADA-112 813, 15 refe

36-2669

THERMAL CONDUCTIVITY, PHASE TRANS-FORMATIONS, HEAT TRANSFER, FREEZE THAW CYCLES, FROZEN GROUND PHYSICS, STEFAN PROBLEM, HEAT FLUX, ANALYSIS (MATHEMATICS), COMPUTER APPLICA-TIONS, CONVECTION.

TIONS, CONVECTION.

The problem of heat conduction with phase change often called the Stefan problem—includes some of the most intractable mathematical areas of heat transfer—Exact solutions are extremely limited and approximate methods are widely used. This report discusses the collocation method for the heat balance integral approximation. The method is applied to some standard problems of phase change. Neumann's problem—and a new solution is presented for the case of surface convection for a semi-infinite body. Numeri call results are given for soil systems and also for materials. cal results are given for soil systems and also for materials of interest in latent heat thermal storage

CR 81-26

MECHANICS OF CUTTING AND BORING. PART 7: DYNAMICS AND ENERGETICS OF AXIAL ROTATION MACHINES.

Mellor, M., Dec. 1981, 38p., ADA-113-931, 10 refs 36-3110

PERMAFROST, ROCK DRILLING. EQUIPMENT, THERMAL EFFECTS, DRILLING FLUIDS, ANALYSIS (MATHEMATICS)

This report deals with force, torque, energy and power in machines such as drille and boring devices where the cutting head rotates about a central axis while penetrating parallel to that axis. Starting from a consideration of the forces

developed on individual cutting tools, or segments of cutters, the thrust and torque on a complete cutting head is assessed, and simple relationships between thrust and torque are derived Similarly, the energy and power needed to drive the cutting head are estimated and related to tool characteristics. Design characteristics of existing machines are compiled and analyzed to give indications of thrust, torque, power, effective tool forces, nominal thrust pressure, power density, and specific

SEDIMENTOLOGICAL CHARACTERISTICS AND CLASSIFICATION OF DEPOSITIONAL PROCESSES AND DEPOSITS IN THE GLACIAL ENVIRONMENT.

Lawson, D.E., Dec. 1981, 16p., ADA-113 261, 33 refs. 36-2754

GLACIAL DEPOSITS, GLACIOLOGY, SEDI-MENTATION, GLACIER OSCILLATION, PERI-GLACIAL PROCESSES, GLACIER FLOW, ENVI-RONMENTS CLASSIFICATIONS

Existing classifications for deposits in the glacial envir Ensting classifications for deposits in the glacial environment are inadequate and inconsistent. Deposits should be classified both descriptively and genetically, adequate descriptive classifications already exist. A major problem for previous genetic classifications has been that glacial deposition and the resulting deposits' properties were ponely understood. On the basis of these criteria—ediment source, uniqueness to the glacial environment, and preservation of glacier-derived properties—deposits in the glacial environment result from eather of these terms of preservation of these terms. properties—deposits in the glacial environment result from either of two groups of processes, primary or secondary. Primary processes release the debris of the glacier directly and form deposits that may bear properties related to the glacier and its mechanics. Their deposits are classified genetically as till and are the only deposits indicative of glaciation. In contrast, secondary processes mobility, rework, transport and resediment debris and deposits in the elacial environment. work, transport and resediment debris and deposits in the glacial environment. They develop new, nonglacial properties in their deposits, while destroying or substantially modifying glacier-derived properties. Interpretation of their properties may provide information on the depositional process and/or the local depositional avironment. Secondary deposits are resedimented and therefore not till. They are classified genetically according to the depositional process just as they are in other sedimentary environments. This genetic classification differs from previous classifications in that not all dismittons deposited in the glacial environment are classified as till, it is based strictly on process-related enteria. The origin of properties of glacial deposits in relation to glacier mechanics and environment must be recognized if the mechanisms and depositional processes of former glaciers are to be precisely understood.

CR \$2-01

ALASKA GOOD FRIDAY EARTHQUAKE OF 1964.

Swinzow, G K., Feb. 1982, 26p., ADA-113 800. 36-2838

EARTHQUAKES, **FROZEN** GROUND STRENGTH. DAMAGE. ICE SHEETS. ROCK MECHANICS, STRUCTURES, WATER WAVES, UNITED STATES—ALASKA—ANCHORAGE.

UNITED STATES—ALASKA—ANCHORAGE.
On 27 March 1964, a major earthquake struck Southern
Alaska. The city of Anchorage, which contained a large
part of Alaska's population, suffered loss of life and destruction
of property. The time of the day, the season, and ground
conditions were such that loss of life and property was
minimized. The frezen ground and the ice on fresh water
hodies responded to the carthquake shocks in a seldenobservable pattern, which was noted and recorded. Changes
of sea level and slides into the sea were responsible for
waterfront destruction. It is concluded that the main
factor that limited structural damage was the frozen state
of the ground. the ground

CR \$2-02

DEVELOPMENT OF A RATIONAL DESIGN PROCEDURE FOR OVERLAND FLOW SYS-

Martel, C.J., et al. Feb. 1982, 29p., ADA-113 762, 22 refs

Jenkins, T.F., Diener, C.J., Butler, P.I.

SEWAGE TREATMENT, WATER TREATMENT. WASTE TREATMENT, FLOODING, DESIGN

WASTE TREATMENT, PLOODING, DENGY This report describes the development of a new design proce-dure for overland flow systems that is based on hydraulic detention time, a familiar concept in wastewater treatment process design. A two-year study was conducted at Hann-yer, New Hampshire, on a full scale overland flow site to ser. New Hampshire, on a full wate overland flow site to obtain performance data in relation to detention time. Americal relationships were developed for removal of bon hemical oxygen demand, total suspended solids ammonia, and total phosphorus. Also an empirical relationship was developed to predict hydraulis detention time as a function of application rate, terrace length, and slope. These relationships were salidated using published data from other sixtims. An advantage of the new procedure, which should significantly reduce vite preparation soits, is that it alongs overland flow systems to be designed for a wide range of site conditions as long, as detention time requirements are one;

CR \$2-03
BREAKUP OF SOLID ICE COVERS DUE TO
RAPID WATER LEVEL VARIATIONS.

Billfalk, L., Feb. 1982, 17p., ADA-112 819, 19 refs. 36-2650

ICE BREAKUP, ICE COVER THICKNESS, RIVER ICE, WATER LEVEL, WATER WAVES, FLEXU-RAL STRENGTH, FREEZEUP, VARIATIONS, ICE FORMATION, TIME FACTOR, ICEBOUND RIVERS, ANALYSIS (MATHEMATICS).

The conditions that lead to initial breakup of a solid ice cover on a river due to rapid water level variations are analyzed. The analysis is based on the theory of beams on an elastic foundation. First cracking is assumed to occur when the bending moment induced in the ice cover by the wave exceeds the flexural strength of the ice cover.

SEA ICE DRAG LAWS AND SIMPLE BOUNDARY LAYER CONCEPTS, INCLUDING APPLICATION TO RAPID MELTING. McPhee, M.G., Feb. 1982, 17p., ADA-113 542, 24

refs 36-2839

SEA ICE, DRIFT, BOUNDARY LAYER, ICE MELTING, STRESSES, TURBULENT FLOW, VELOCITY, VISCOSITY, BUOYANCY, MATH-EMATICAL MODELS

EMATICAL MODELS.

Several proposed methods for treating the momentum flun between disting sea are and the underlying ocean are interpreted in terms of simple planetary-houndary-layer (PBL) turbulence theory. The classical two-layer approach, in which the solution for a thin surface layer is matched to an Elman solution for the outer layer, is used to derive several forms for the drag law. These forms range from linear (where stream is proportional to relative speed), through quadratic drag on geostrophic wind in the atmosphere. Only formulations which conform with Routhy-similarity scaling are consistent with free-dorld data from the 1975 AIDJEX drift station. ent with free-derit data from the 1975 AIDJEX draft station experiment. We show how a two-layer model, in thickness, provides an analytic solution for the steady-state PBL equation quite similar to recent numerical solutions. The theory is extended to include drag reduction due to biosynney from rapid melting and is shown to agree with atmospheric results for genetrophic drag under analogous conditions of radiotional cooling. The theory provides a bases for estimating trajectorics and melt rates of floes diriting into water warmer than the new meltions terminature.

CR 82-05

39-1263

ON THE TEMPERATURE DISTRIBUTION IN AN AIR-VENTILATED SNOW LAYER. Yen, Y.-C., Mar. 1982, 10p., ADA-115 598, 9 refs.

TEMPERATURE, HEAT TRANSFER, MASS TRANSFER. TEMPERATURE GRADI-ENTS. FLOW RATE, TEMPERATURE DISTRI-BUTION, DIURNAL VARIATIONS, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

The problem of simultaneous heat and main transfer in a homogeneous snow layer, with one side kept at its initial temperature and the other side with a step temperature increase, was solved for the case of constant through-flow conditions. An experimentally determined effective thermal conductivity function, i.e. Ke. 0.0014±0.58. G (where G is dry mass flow rate of air in g.cm2s), was employed in the solution. The computed nondimensional temperature distribution agreed quite well with experimental data taken under pseudo-steady state conditions with the exception of the temperature for the lowest flow rate used in the experiment. The pronounced nonlinearity of the temperature distribution. For the temperature for the lowest flow rate used in the experiment. The pronounced nonlinearity of the temperature distribution was found to be a strong function of the flow rate. For strussoidal variation of atmospheric pressure, the responding flow in the shoot medium was also found to be sommoded in conjunction with the desiral temperature change, this variation facilitated the process of repeated sublimination and condensation in alternate directions and thereby produced a surface layer of appearametely constant show density.

MEASUREMENT OF GROUND DIELECTRIC PROPERTIES USING WIDE-ANGLE REFLEC-TION AND REFRACTION

Arcone, S.A., et al, Mar. 1982, 11p., ADA-119 596, 11

Delaney, A J 40-4674

SOIL PHYSICS, DIELECTRIC PROPERTIES, RADAR ECHOES, GEOPHYSICAL SURVEYS, REFRACTION, EQUIPMENT, WAVE PROPA-

GATION

The interpretation of continuous radar profiles requires an alternative grouphysical means of obtaining ground defective information. Ground diefective properties were measured using wide angle reflection and refraction (WARR) soundings with a ground probing radar set that transmits pulses of a few nanoseconds duration. The investigations, cattred out over sands gravel in interior Alaska, provided defective data to about a 5 m depth. The WARR soundings were displayed as individual traces allowing interference between operatic circuit and dispersion to be observed, and the soundings were compared with continuous radar and resistivity profiles conducted concurrent's to extract the maximum

amount of dielectric information. The defectric constants, derived mainly from the direct ground waves projugating along the surface, ranged from 29 to 74. Dielectric values interpreted for one site predicted the possibility of a refracted event which may have occurred during one of sibility of se one of

CB \$2.67

CRARGED DISLOCATION IN ICE. 2. CON-TRIBUTION OF DIELECTRIC RELAXATION. Inguit, K., Mar. 1982, 15p., ADA-113 936, 18 refs., The results indicate that the charged dislocation process can produce the observed audio frequency dielectric relaxation as well as the distribution of spectra. 36-2840

ICE ELECTRICAL PROPERTIES, ICE RELAXA-TION, DISLOCATIONS (MATERIALS), ICE CRYSTALS, DIELECTRIC PROPERTIES, ELEC-TRIC CHARGE, RELAXATION (MECHANICS). ANALYSIS (MATHEMATICS), SPECTRA.

The contribution of electrically-charged dislocation motion to dielectric releasation was studied theoretically mentally obtained data on charge density, dislocation denote, and regenerat length and destribution described in Part I of this series were used to calculate dielectric relaxation

CR 82-86

EVALUATION OF METHODS FOR CALCULATING SOIL THERMAL CONDUCTIVITY.

uki, O., Mar. 1982, 90p. 24 refs 37-221

FROZEN GROUND PHYSICS, THERMAL CON-DUCTIVITY, PERMAFROST HEAT TRANSFER, SOIL COMPOSITION, SOIL WATER, COMPUT-ER PROGRAMS, TESTS.

FRUMENTAL 1 E-210.

Inited analysis of methods for calculating the thermal settivity of such is presented, and trends in the predictions are methods are compared. The influence of changes conductivity of sub-is presented, and trends in the predictions of those methods are compared. The influence of changes in the minimum content on the calculated thermal conductivity of a soil is shown, as is the sensitivity of this calculated value to changes in day density or in the soil solids' thermal conductivity. The methods are evaluated to determine the estent of agreement of their predictions with measured values obtained on soils of known composition and properties. The deviations of the predicted values are determined for anils that are influence for forces, course or fine, unsaturated, automated or dry. The applicability of each of the methods under various conditions is determined and recommendations are made on to the best method for each conditions. under various conditions is determined and recommend are made as to the best method for each conditi

CR 82-09 **IODEL STUDY OF PORT HURON ICE CON-**TROL STRUCTURE: WIND STRESS SIMULA-

TION. Sodhi, D.S., et al, Apr. 1982, 27p., ADA-115 417, 14

Colkins, D.J., Deck, D.S.

36-3111

ICE CONTROL, LAKE ICE, WATER PRESSURE, WIND PRESSURE, WATER FLOW, SHEAR STRESS, ICE NAVIGATION, PORTS, MODELS STRESS, ICE NAVIGATION, PORTS, MODELS This study deals with the distribution of forces along the converging boundaries of the Pert Histon, Mohagas, region where unconsolidated see in Lake Histon is held against wind and winer streams. An experimental basis was built used and winer streams. An experimental basis was built used modes uniform shear stress on the model see ever by flooring winter beneath the see. The boundary segments, which held the see ever in the region, were instrumented to measure force in the normal forces along the lowardary sea compared with a distribution derived by using a theoretical model. An see control structure (ICS) was installed in the huma and experiments were conducted to measure the forces on the ICS and the see release through the opening in the ICS during simulated shop passages. The experimental signalia are presented in a non-dimensional form. In addition the force per unit length on the ICS and the area of see released through its opening were estimated for the expected wind conditions at the Port Histon site.

CR 82-10 LABORATORY MEASUREMENTS OF SOIL **ELECTRIC PROPERTIES BETWEEN 0.1 AND 5** CH7.

Deloney, A.J., et al. Apr. 1982, 12p., ADA-115-126 Arcon c. S.A. 40-4675

PERMAPROST PHYSICS, SOIL PHYSICS, DIE-LECTRIC PROPERTIES, ELECTROMAGNETIC PROSPECTING, WAVE PROPAGATION, SOIL WATER, GROUND ICE, SANDS, SEDIMENTS, REFLECTION

nents have been performed on sat Districtive measurements have been performed on soit and samples from permatered areas using time domain relationships. The sample temperatures were varied from a 25°C to 42°C, and solumetric water content was varied between owneader and 0.5°G BEO or The data were processed for frequencies between 0.1 and 5°n GHz. The regards whom a constant h and a lon h for frequencies up to 1 GHz. A frequency dependence seen on the data above 2 GHz is probably the result of undratin adorbed matter. At mention arrively sear rate atom as all temperatures, sols have excellent propagation chara-id-probing radar operating below 0.5 fells

ace should be easily detectable in permafrior within a few degrees of 0 C.

CR 82-11

SHORELINE CONDITIONS AND BANK RECESSION ALONG THE U.S. SHORELINES OF THE ST. MARYS, ST. CLAIR, DETROIT AND ST. LAWRENCE RIVERS.

Gatto, L.W., May 1982, 75p., ADA-116 398, 31 refs. 39-1264

39-1284
BANKS (WATERWAYS), EROSION, SHORE-LINE MODIFICATION, RIVERS, ICE NAVIGA-TION, PHOTOINTERPRETATION, SOIL ERO-SION, SLIDING, CHARTS, AERIAL SURVEYS, SEASONAL VARIATIONS

SEASONAL VARIATIONS.
The purpose of this investigation was to provide data to be used in evaluating the effects of winter novigation on processes that cause bank erosons. The specific objectives were to document bank conditions and evolute along the rivers, to monitor and compare the amounts of winter and summer bank recession and change, and to estimate the amount of recession that occurred prior to winter novigation.

Shorehine conditions and bank recession were docution. Shoreline conditions and bank recessors were decommented during field surveys each spring and full. Bank, changes were evaluated by companion to observations from a previous survey. Acres! photointerpretation was done to estimate the anionat of bank recessors that occurred prior to winter navigation. Three hundred forty-free miles of river shoreline were sorveyed. Banks were ending along 215 miles (62%). The common types of bank failures were said falls (idengling) and block sloding and slumping. The erosion along approximately 15 miles (92%) of the 21.5 miles was occurring along reaches not bordering water necessors.

CR \$2-12

SENSIBLE AND LATENT HEAT FLUXES AND HUMIDITY PROFILES FOLLOWING A STEP CHANGE IN SURFACE MOISTURE.

Andreas, E.L., Apr. 1982, 18p., ADA-115 596, 42 refs.

HEAT FLUX, LATENT HEAT, SURFACE PROP-ERTIES, ANALYSIS (MATHEMATICS), HUMID-ITY, BOUNDARY LAYER, FRICTION, WIND FACTORS.

From a ligh-quality set of velocity, temperature, and hums profiles collected upwind and downwind of a step cla in surface roughness, temperature, and mouture, upwind downwind vidues of the heat finites and friction velo

CR \$2.13

NUMERICAL SOLUTIONS FOR A RIGID-ICE MODEL OF SECONDARY FROST HEAV O'Neil, K., et al. Apr. 1982, 11p., ADA-115 597, For another version see 36-54. 11 refs.

19.1264

FROST HEAVE, SOIL FREEZING, ICE MODELS. REGELATION, ICE FORMATION, GROUNDED ICE, HEAT TRANSFER, MASS TRANSFER, THERMODYNAMICS, ANALYSIS (MATH-

EMATICS).

In this paper, frost heave is analyzed for the common case in which some nee penetrates the soil. In this setuition, heave is due to the accumulation of soil-free nee paid within the frozen zone, behind a frozen fringe of finite thechaes. Heat and mans transport within and across that fringe are crucial processes in the dynamics of heave. This analysis concentrates on activity within the fringe, also connecting that activity to heat and mans flows in the more frozen and unfrient zones. Each component in a set of governing differential equations in developed from rational physics and thermodynamics, using previous experimental work. It differential equations is developed from rational physics and thermodynamics, using previous experimental work. It is assumed that the soil see grows through interconnected interstices, hence it constitutes and can move as a rigid holy. When this assumption it translated into mathematical terms, it completes the governing equations. The model resoliting from these considerations is a one-dimensional finite element computer program that solves the equations for arbitrary notical and boundary conditions. The model is need to simulate the heavy business of a hypothetical sol column frozen unadirectionally and subjected to a surcharge The results are grandings in that they predict qualitative fiber characteristics of assumerous laborators observations. Some questions about the completeness of the theory remains and strict verification of the model as any further experimentation and better parameter identification.

CR \$2-14

COMPARATIVE ANALYSIS OF THE USSR CONSTRUCTION CODES AND THE US ARMY TECHNICAL MANUAL FOR DESIGN OF FOUNDATIONS ON PERMAPROST.

Fish, A.M., May 1982, 20p., ADA-116-234, 2" refs 19-1267

PERMAFROST BENEATH STRUCTURES, FROZEN GROUND SETTLING, COLD WEATHER CONSTRUCTION, FOLNDATIONS, PILES, DESIGN CRITERIA, BUILDING CODES, FROZ EN GROUND STRENGTH, SAFFTY, USSR

A comparative study was made of design criteria and analytical methods for foreign and pile foundations on permatent

employed in U.S.S.R. Design Code SNIP 11-18-76 (1977) and U.S. Army Cold Regions Research and Engineering Laboratory Special Report 80-34 developed in the ently 1970's by the U.S. Army Corps of Engineers and published in 1980. The absence of adequate constitutive equations for frozen ands and of rigorous solutions of the boundary problems has made it necessary to incorporate (explicitly) or implicitly) various sofety factors in the foundation analyses. From the review it is concluded that the principal difference between these nevertoes is in the assessment and analyses. between these practices is in the ancomment and appl of appropriate values of selecy factors, which leads substantial discrepancy in the dimensions and cost of fo and pide foundations in permetrost.

CR \$2-15

RELATIONSHIP BETWEEN THE ICE AND UN-FROZEN WATER PHASES IN FROZEN SOIL AS DETERMINED BY PULSED NUCLEAR MAGNETIC RESONANCE AND PHYSICAL DE-SORPTION DATA

Tice, A.R., et al, June 1982, Sp., ADA-118 486, 14

Oliphant, J.L., Nakano, Y., Jenkins, T.F. 37-48

FROST HEAVE, GROUND WATER, FROZEN GROUND, NUCLEAR MAGNETIC RESO-NANCE, UNFROZEN WATER CONTENT, SOIL TEMPERATURE.

An experiment is described that demonstrates the balance between the ice and the unfrazen water in a frozen soil as water is removed. Nuclear inagnetic resonance (NMR) is used to monitor the unfrazen water content as the soil is used to monitor the unfrozen water content as the soil is dehydrated by a molecular neve material. Our results show that the infrozen water content of a Mori, clay soil remains constant until the total water content has been reduced to the point where no nee remains in the system. Once the see in depleted, the unfrozen water content determined by NMR corresponds to the toul water content of the soil determined by the weight of water remained by the molecular never material. Thus the validity of utilizing NMR is a seen and the soil determined by the weight of water remained by the molecular never material.

CR 82-16

APPLICATION OF A NUMERICAL SEA ICE MODEL TO THE EAST GREENLAND AREA. Tucker, W.B., Aug. 1982, 40p., ADA-120 659, For another version see 36-3254. 37 refs. 39-1261

ICE MODELS, DRIFT, SEA ICE, THERMODY-NAMICS, ICE STRENGTH, MATHEMATICAL MODELS, ICE COVER THICKNESS, ICE GROWTH, VELOCITY, HEAT FLUX, OCEAN CURRENTS, WIND FACTORS, GREENLAND.

CURRENTS, WIND FACTORS, GREENLAND. A dynamic-thermodynamic sea ice model which employs a viscoun-plantic constitutive law has been applied to the fast Greenland area. The model is run on a 40-km spotial scale at 14-day time steps for a 60-day period with forcing data beginning on I October 1979. Results tend to verify that the model products reasonable thicknesses and relacitors within the see margin. Thermodynamic recipionth produces excesses toe extent, however, probably due to inadequate parameterization of occasio heat flux. Lee velocities near the free see edge are also not well simulated, and preliminary investigational attribute this to an improper sum field in this area. A simulation with neglects see strength, effectively damping see interaction with staff and allowing in reinstance to defermation, produces excesses ace deep toward field in this area. A simulation produces receive technesses. A dynamics-only universities in exembles the feels, including a more realistic see extensi, but the need for proper thermodynamics is also apparent universities very the time of the model studies.

CR 82-17

SEISMIC SITE CHARACTERIZATION TECH-NIQUES APPLIED TO THE NATO RSG-11 TEST SITE IN MUNSTER NORD, FEDERAL REPUB-LIC OF GERMANY.

Athert, D.G., July 1982, 33p., ADA-119 390, 15 refs. 39-1269

SEISMIC REFRACTION, GFOLOGIC STRUC-TURES, WAVE PROPAGATION, SEISMOLOGY, VELOCITY

VELOCITY
Sensing P and SH wave refraction experiments at the NATO
RSG-11 test side in Minister Nord, Federal Republic of Germans, reveal the presence of a nearly homeostal, three-liner
velocity structure. The upper layer, composed of unconsolidated glacial till, is, in thick and has P compressionally and
SH (shear. orthograft) wave velocities of 200 and 165 in a.
The second layer made up of similar, more compacted material,
is 8.9 in thick, with a P wave velocity of 200 in a and an SH
wave velocity of 216 in s. The third layer interpreted in the
groundinator table, is leasted at a depth of 10.9 in and has a P
wave velocity of 1500 in s. The SH wave velocity of this layer
is controlled by the matrix material and is the same as that of
the second layer. A single, uncreased observation indicated
a femily layer at a depth of about 10 in, but the existence of this
layer remains secondinated. The observat fundamental mode
love is are dispersion in in agreement with the theoretical dispersion producted by the refraction velocities. Computed partic leave states of phase velocities with respect to show was

velocity show, for the frequencies observed, that the dispersion confirms the thicknesses and velocities of the two upper layers and is not affected by the deeper s. acture

CR 82-18

OPTIMIZING DEICING CHEMICAL APPLICA-TION RATES.

Minsk, L.D., Aug. 1982, 55p., ADA-119 681, 8 refs.

CHEMICAL ICE PREVENTION, ICE CONTROL, SALTING, ROAD ICING, SNOW REMOVAL, ICE REMOVAL, SAFETY, FRICTION, TRAFFICA-BILITY.

Snow and ice control on highways has come to rely heavily Snow and ice control on highways has come to rely heavily on the sodium, chloride to maintain a trafficable surface for unimpeded movement Empirical approaches have led to a wide range of application rates, some clearly excessive, but justified on the ground of safety and expediency. The combination of environmental degradation from the huge quantities of salt entering the environment, along with the increased cost of salt itself and the cost of its application have spurred the search for more precise knowledge of the have spurred the search for more precise knowledge of the proper amount of salt to apply to a pavement, considering a range of environmental, traffic and chemical parameters. Since controlled tests in the field are extremely difficult to make, a circular test track of three test pavements, densegraded asphalitic concrete (DGA), open-graded asphalitic concrete (OGA) and portland cement concrete (PCC), was constructed in a coldrom. Natural snow and ice were applied to the pavements and an instrumented slipping wheel was driven over the surfaces to generate frictional forces. These forces were measured and then used to evaluate the response to salt application with time for three test temperature oGA had the lowest friction values at a temperature near the freezing point, but higher initial values or more rapidly increasing values than DGA and PCC following salt application rate at the two lower temperatures. at the two lower temperatures Optimum application rate of salt on PCC and DGA lies between 100 and 300 lb/lane mile (LM), and a higher rate resulted in slight or no improvement in friction. DGA showed anomalous results lower friction for 300 lb/LM and higher friction for both 100 and 500 lb/LM.

CR 82-19

WASTEWATER APPLICATIONS IN FOREST ECOSYSTEMS.

McKim, H.L., et al, Aug 1982, 22p. ADA-119 994, 38 refs.

WASTE DISPOSAL, WASTE TREATMENT, WATER TREATMENT, FOREST ECOSYSTEMS, TREES (PLANTS), GROWTH, LAND RECLAMATION, REVEGETATION, WATER POLLUTION.

Under proper design and management, a forest ecosystem in the central United States should reprovate municipal wasin the central onlied states should renovate municipal was-tewater as long or longer than conventional agricultural sys-tems, especially when design limitations are hydraulic loading rate, heavy metals, P and N Forest systems require smaller buffer zones than agricultural systems and lower sprinkler pressures "munatur. forests are better wastewater renovators than mature fore. Is

CR 82-20

DECELERATION OF PROJECTILES IN SNOW. ..ibert, D.G., et al, Aug 1982, 29p, ADA-119 676, 11 refs.

Richmond, P.W.

SNOW DENSITY, PENETRATION TESTS, PRO-JECTILE PENETRATION, MILITARY SEARCH, VELOCITY, IMPACT STRENGTH

Instrumented M374 projectiles were launched into snow, nylon, and Styrofoam targets using a 16.7-m radius centrifuge. For snow of 410-kg/cu m density, the 31-kg test projectile experienced decelerations of approximately 220, 400, and 550 m/sq s (at a depth of 0.1 m) for initial impact velocities of 15, 30 and 46 m/s respectively. These values disagree with values predicted from a simple hydrodynamic drag force approximation. The decelerations measured for snow the approximation and a decertainties included to show the largets were always greater than those measured for nylon shaving targets (of density 120 kg/cu m) indicating that this material is not a good analog for snow of the density used in these tests

CR 82-21 ACOUSTIC EMISSIONS FROM POLYCRYS-TALLINE ICE.

St Lawrence, W F, et al, Aug 1982, 15p, ADA-119 632, 18 refs

Cole, D.M.

ICE CRYSTAL STRUCTURE, ICE ACOUSTICS, COMPRESSIVE PROPERTIES, STATIC LOADS, FRACTURING, STRESSES, STRAINS, TEMPER-ATURE EFFECTS, TIME FACTOR, TESTS

The acoustic emission response from fine-grained polycrystaline ice subjected to constant compressive loads was examined. A number of tests were conducted with the normal stress ranging from 0.8 to 3.67 MPa at a temperature of -5 C. The acoustic emission response was recorded and the data are presented with respect to time and strain. The source of acoustic emissions in ice is considered in terms of the formation of both microfractures and visible fractures that develop without catastrophic failure of the ice. A model of designed the acoustic emissions in the consideration is developed. describe the acoustic emission response is developed

CR 82-22 CONDUCTION PHASE CHANGE BENEATH INSULATED HEATED OR COOLED STRUC-THRES

Lunardini, V.J., Aug. 1982, 40p., ADA-119 595, 19

39-1746

PERMAFROST BENEATH STRUCTURES, PER MAFROST HEAT TRANSFER, FREEZE THAW CYCLES, CONDUCTION, HEAT TRANSFER, PHASE TRANSFORMATIONS, UNDER-PHASE TRANSFORMATIONS, GROUND PIPELINES, THERMAL TION, ANALYSIS (MATHEMATICS).

The problem of thaving beneath heated structures on perma-frost (or cooled structures in non-permafrost zones) must be addressed if safe engineering designs are to be conceived. In general there are no exact solutions to the problem of conduction heat transfer with phase change for practical conduction heat transfer with phase change for practical geometries. The quasi-steady approximation is used here to solve the conductive heat transfer problem with phase change for insulated geometries including infinite strips, rectangular buildings, circular storage tanks, and buried pipes. Analytical solutions are presented and graphed for a range of parameters of practical importance.

DIRECT FILTRATION OF STREAMBORNE GLACIAL SILT.

Ross, M.D., et al, Sep. 1982, 17p, ADA-120 751, 8

Lowman, R.A., Sletten, R.S.

SEDIMENTS, GLACIAL DEPOSITS, GLACIAL RIVERS, WATER TREATMENT, GEOLOGICAL SURVEYS, EQUIPMENT.

SURVEYS, EQUIPMENT.

A direct filtration, water treatment pilot plant was operated on the Kenai River at Soldotna, Alaska, during the summer of 1980. The purpose of the pilot plant operations was to determine the feasibility of the direct filtration process for removal of glacual silt. The major criterion used to determine feasibility was production of water containing less than 10 NTU of turbidity. For the range of raw water turbidities encountered (22-34 NTU), the pilot plant testing indicated that direct filtration was feasible and could be considered as an alternative to conventional water treatment plants containing sedimentation tanks. plants containing sedimentation tanks

CR 82-24

SUBSEA PERMAFROST IN HARRISON BAY, ALASKA: AN INTERPRETATION FROM SEIS-MIC DATA.

Neave, K.G., et al, Aug. 1982, 62p., ADA-121 020, 16 refs

Sellmann, P.V.

SUBSEA PERMAFROST, SEISMIC SURVEYS, BOTTOM SEDIMENT, SEISMIC REFRACTION, SEISMOLOGY, NATURAL RESOURCES, OCEAN BOTTOM, UNITED STATES—ALASKA—HARRISON BAY.

Velocity data derived from petroleum industry seismic records from Harrison Bay show that high-velocity material (>2km/s) interpreted to be ice-bonded permafrost is common in the eastern part of the bay, the depth to high velocity material increases and velocity decreases in an orderly manner material increases and velocity decreases in an orderly manner with increasing distance from shore until the layer is no longer apparent. The western part of the bay is less orderly, possibly reflecting a different geological and thermal history. This western part may be an inundated section of the low coastal plain characterized by the region north of Teshekpuk Lake, and could have contained deep thaw lakes, creating low velocity zones. Along some seismic lines, the high-velocity material extends approximately 25 km offshore.

CR 82-25 EXPERIMENTAL INVESTIGATION OF PO-TENTIAL ICING OF THE SPACE SHUTTLE EX-TERNAL TANK.

Ferrick, M.G., et al, Sep. 1982, 305p., ADA-121 330 Itagaki, K., Lemieux, G.E., Minas, S.E.

AIRCRAFT ICING, TANKS SPACECRAFT. PROTECTIVE COATINGS. THERMAL INSULATION, ICE FORMATION, COUNTERMEASURES, SURFACE TEMPERA-TURE, STATISTICAL ANALYSIS, EXPERIMEN-TATION.

The thermal protection system tiles on the space shuttle Orbiter are extremely sensitive to impact damage. Such impacts could be caused by ice particles dislodged from the outer surface of the external tank (Ef) during the launch the outer surface of the external tank (EI) during the launch. The ET, which contains the cryogenic propellant tanks, is covered with a spray-on foam insulation (SOFI) to minimize use formation. The objective of this investigation was to experimentally explore a range of environmental conditions for which significant using potential exists for the ET. Significant finding, which became evident early in the experimental program, was that computer models based upon the average SOFI thickness predicted panel surface temperatures that were considerably higher than those observed. For an assessment of icing, the important values to characterize

the SOFI are the minimum thickness and range of thickness. Dense ice formation occurred most readily when a small portion of the total surface area had a temperature below

CR 82-26

HYDROLOGY AND CLIMATOLOGY OF THE CARIBOU-POKER CREEKS RESEARCH WA-TERSHED, ALASKA.

Haugen, R.K., et al, Oct. 1982, 34p, ADA-122 402, Refs. p.25-28.

Slaughter, C.W., Howe, K.E., Dingman, S.L.

WATERSHEDS, DRAINAGE, PERMAFROST HYDROLOGY, CLIMATE, RUNOFF, STREAM FLOW, PRECIPITATION (METE/SROLOGY), SEASONAL VARIATIONS, UNITED STATES— ALASKA—CARIBOU CREEK.

ALASKA—CARIBOU CREEK.
The Carbou-Poker Creeks Research Watershed is a small drainage basin located 48 km northwest of Fairbanks, Alaska Elevations within the watershed range from 210 to 826 m, and approximately 28% of its area is underlain by permaferiors. Climatic differences between the watershed and Fairbanks Comparison between the watershed and Fairbanks are primarily due to the higher elevation of watershed. Generally the watershed climatic sites are warmer in winter and cooler in summer than Fairbanks. An analysis of annual streamflow data showed an inconsistency of baseflow recessions from year to year. The runoff-rainfall ratio for individual summer storms averaged 0.35 for Carbou Creek. Comparisons of spot discharge measurements of predominantly permafrost and non-permafrost subwatersheds showed that permafrost-dominated watersheds have a much "flashier" response to precipitation than non-permafrost watersheds. A comparison of the annual flow distribution of the watershed indicated that Carbou Creek has lower summer and higher winter discharges per unit area than the Chena or Salcha Rivers. The temporal variability of the flow of Caribou Creek is low compared with small- and moderate-sized streams in New England.

CR 82-27 LEAST LIFE-CYCLE COSTS FOR INSULATION

IN ALASKA. Flanders, S.N, et al, Oct 1982, 47p, ADA-122 806, 6 refs.

Coutts, H.J. 37-1482

THERMAL INSULATION, BUILDINGS, COST ANALYSIS, ECONOMIC ANALYSIS, CLIMATIC FACTORS, FUELS, MILITARY FACILITIES.

FACTORS, FUELS, MILITARY FACILITIES.

Recommendations for economical thicknesses for building insulation result from a study of fuel and construction costs of 12 military installations in Alaska. A comparison between the insulation thickness that a building owner might choose today and what he might choose in 20 years indicates a trend for much thicker insulation in the future of how much more expensive a building built today with the thickness that would be appropriate 20 years hence indicates only a small penalty in life-cycle costs for the additional insulation. Therefore, a minimum of R-32 walls and R-62 attics is recommended for most of Alaska

CR 82-28 EVALUATION OF VAISALA'S MICROCORA AUTOMATIC SOUNDING SYSTEM.

Andreas, E.L., et al. Oct. 1982, 17p., ADB-070 011L, 17 refs.

37-1529

MARINE METEOROLOGY, METEOROLOGI-CAL INSTRUMENTS, METEOROLOGICAL DATA, WIND (METEOROLOGY).

DATA, WIND (METEOROLOGY).

During the Weddell Polynya Expedition in the southern occan, over 60 upper-air soundings were made with a Vaisala MicroCORA Automatic Sounding System installed on the Soviet tecbreaker Mikhail Somov The MicroCORA system measures the wind vector by using the Omega navaid signals to track the balloon-borne radiosonde This windfinding the formula station, measures the wind vector by using the Omega navaid signals to track the balloon-borne radiosonde. This windfinding is thus unaffected by any motions of the ground station, the system is easy to use, and the data seem accurate Comparison launches, during which the Vassals radiosonde and the sonde of another manufact rer were carried on the same balloon, indicate that the MicroCORA pressure and temperature data are also of high quality. There were problems with the MicroCORA measurement of humidity however, because of an mordinate number of failures. were problems with the MicrocOKA measurement of number, however, because of an inordinate number of failures of the humidity sensor, the Humicap, which is prone to drift. After a unit-by-unit hardware evaluation of the components of the MicroCOKA system, its expected reliability for use at sea is judged only fair, several units were poorly packaged, and servicing and repair require a high degree of technical expectises. (Auth) of technical expertise (Auth.)

GROWTH OF FACETED CRYSTALS IN A SNOW COVER.

Colbeck, S.C., Oct. 1982, 19p., ADA-122 792, 45 refs 37-1722

SNOW CRYSTAL GROWTH, RECRYSTALLIZA TION, SNOW CRUST, DEPTH HOAR, HEAT FLUX, VAPOR TRANSFER, GRAIN SIZE, THER-MODYNAMICS, SNOW DENSITY, TEMPERA-URE EFFECTS, TEMPERATURE GRADIENTS. SNOW COVER.

lce grains in a snow cover with a low temperature gradient assume a well-rounded equilibrium form. However, at temperature gradients of 0 1 to 0.2C/cm (depending somewhat on temperature and snow density), the rounded grains recrystalize into a faceted kinetic growth form. The lar temperature gradient must play a decisive role in mover fast enough to sustain the rapid growth rate to the faceted growth form. Once the large gradient is removed, the grains recrystallize of the equilibrium form. The recrystallization occur in either direction without a change in bulk density. The growth of faceted crystals begins at the warmer base of the snow cover where the excess vapor pressure is largest. A transition between the overlying rounded grains moves upward in time. Faceted crystals also grow just below crusts of reduced permeability, where the increased vapor accumulation can sustain the excess vapor pressure needed for kinetic growth. The heat and vapor flows are described using a model based on thermodynamic equilibrium. The temperature distribution is shown to be quasi-linear at steady state in homogeneous snow. The recrystallization of the snow is modeled using the rounded grains as sources and the faceted grains as sinks. In the future this model should be extended to account for different temperatures among the sources and sinks.

CR 82-30

EQUATIONS FOR DETERMINING THE GAS AND BRINE VOLUMES IN SEA ICE SAMPLES. Cox, G.F.N., et al, Oct. 1982, 11p, ADA-122 779, 13

Weeks, W.F. 37-1723

37-1723 SEA ICE, BRINES, GAS INCLUSIONS, ICE DEN-SITY, ICE TEMPERATURE, ICE SALINITY, TEMPERATURE EFFECTS, COMPUTER AP-PLICATIONS, ANALYSIS (MATHEMATICS).

PLICATIONS, ANALYSIS (MATHEMATICS). Equations are developed that can be used to determine the amount of gas present in sea ice from measurements of the bulk ice density, salinity and temperature range of -2 to -30C. Conversely these relationsips can be used to give the density of sea ice as a function of its temperature and salinity, considering both the presence of gas and of solid salits in the ice. Equations are also given that sllow the calculation of the gas and brine volumes in the ice at temperatures other than that at which the bulk density was determined

CR 82-31 BERING STRAIT SEA ICE AND THE FAIRWAY ROCK ICEFOOT

Kovacs, A., et al, Oct. 1982, 40p, ADA-122 477, 45

Sodhi, D.S., Cox, G.F N.

39-1273

ICE CONDITIONS, SEA ICE, PRESSURE RIDGES, ICE PRESSURE, ICE FORMATION, OFFSHORE LANDFORMS, ICE LOADS, GROUNDED ICE, AERIAL SURVEYS, BERING

Information on sea ice conditions in the Bering Strait and the icefoot formation around Fairway Rock, located in the strait, is presented. Cross-sectional profiles of Fairway Rock and the relief of the icefoot are given along with theoretical analyses of the possible forces active during icefoot formation. It is shown that the ice cover most likely fails in flexure as opposed to crushing or buckling, as the former requires less force. Field observations reveal that the Fairway Rock icefoot is massive, with ridges up to 15 m high, a seward face only 20 deg from vertical, and interior ridge slopes averaging 33 deg. The icefoot is believed to be grounded and its width ranges from less than 10 to over 100 m. Information on sea ice conditions in the Bering Strait and

FLUID DYNAMIC ANALYSIS OF VOLCANIC TREMOR.

Ferrick, M.G, et al, Oct 1982, 12p, ADA-122 778, 28 refs.

Qamar, A., St Lawrence, W.F.

DYNAMICS SEISMOLOGY. FILLID CANOES, EARTHQUAKES, ICEQUAKES, GEO-MAGNETISM.

MAGNETISM.

Low-frequency (< 10 Hz) volcanic earthquakes originate at a wide range of depths and occur before, during, and after magmatic eruptions. The characteristics of these earthquakes suggest that they are not typical tectonic events. Physically analogous processes occur in hydraulic fracturing of rock formations, low-frequency lecquakes in temperate glaciers, and autoresonance in hydroelectric power stations. We propose that unsteady fluid flow in volcanic conduits is the common source mechanism of low-frequency locanic earthquakes (tremor). The fluid dynamic source mechanism explains low-frequency carthquakes of arbitrary duration, magnitude, and depth of origin, as unsteady flow is independent of physical properties of the fluid and conduit. Fluid transients occur in both low-isscotity gates and high-viscotity liquids. A fluid transients on the formulated as generally as its warranted by knowledge of the composition and physical properties of the fluid, material properties geometry and roughness of the conduit, and boundary conditions

CR 82-33 ON THE DIFFERENCES IN ABLATION SEA-SONS OF ARCTIC AND ANTARCTIC SEA ICE. Andreas, E.L., et al, Oct. 1982, 9p., ADA-122 454, 41 refs. For another source see 36-2836 (MP 1517). Ackley, S.F. 39-1728

SEA ICE, ICE MELTING, ABLATION, METEOROLOGICAL FACTORS, ICE CONDI-TIONS.

Arctic sea ice is freckled with melt ponds during the ablation season, Antarctic sea ice has few, if any On the basis of a simple surface heat budget, we investigate the meteorological conditions necessary for the onset of surface melting in an attempt to explain these observations. The low relative hund y associated with the relatively dry winds off the continent and an effective radiation parameter smaller than that characteristic of the Arctic are primally responsible. off the continent and an effective radiation parameter smaller than that characteristic of the Arctic are primarily responsible for the absence of melt features in the Antarctic Together these require a surface-layer air temperature above 0 C before Antarctic sea tee can melt A ratio of the bulk transfer coefficients C(H)/C(E) less than 1 also contributes to the dissimilarity in Arctic and Antarctic ablation seasons. The effects of wind speed and of the sea-ice roughness on the absolute values of C(H) and C(E) seem to moderate regional differences, but final assessment of this hypothesis awaits better data, especially from the Antarctic

HYDRAULIC MODEL STUDY OF PORT HURON ICE CONTROL STRUCTURE. Calkins, D J., et al, Nov. 1982, 59p., ADA-123 715, 8

Deck, D.S, Sodhi, DS.

ICE CONTROL, HYDRAULIC STRUCTURES, ICE NAVIGATION, ICE MECHANICS, FLOATING ICE, ARTIFICIAL ICE, ICE LOADS, ICE FLOES, DOPED ICE, PORTS, MODELS.

FLOES, DOPED ICE, PORTS, MODELS.

The tee discharge through an opening in an ice control structure was documented to be a function of the fibe size, tee type, ice floe conditions and vessel direction. The model data for the average ice discharge per vessel transit scaled to prototype values compared favorably with data taken at the St. Marys River ice control structure (ICS). The model results of the force measurements were also consistent with data taken at the St. Marys ICS. The dynamic loading conditions were independent of vessel direction. The dynamic loading to the structure using 3 types of ice (plastic, natural and urea-doped) showed a considerable difference in their means and standard deviations. The urea-doped ice was evaluated for dynamic loading conditions, and reasonable peak values of 3 to 5 times the mean load at each measuring position were recorded, independent of vessel direction. It appears that synthetic random ice floes may be used in model studies where ice discharge through an opening in a structure needs to be documented. This study shows the synthetic random ice floe discharge to fall reasonably within the values obtained for natural codischarge for both rafted and non-rafted ice fields above the ICS. However, the question of whether synthetic can be used for analyzing force distribution ref dynamic force loading criteria cannot be fully answered at this time because the load distributions of the synthetic and natural floes appear to differ

CLIMATE OF REMOTE AREAS IN NORTH-CENTRAL ALASKA: 1975-1979 SUMMARY.

Haugen, R K., Nov. 1982, 110p., ADA-123 719, 31

CLIMATE, SNOW ACCUMULATION, PRECIPI-TATION (METEOROLOGY), AIR TEMPERA-TURE, TEMPERATURE GRADIENTS, STATIS-TICAL ANALYSIS, TEMPERATURE TIONS, UNITED STATES -ALASKA

Air temperature, precipitation, and some ground surface temperatures predominantly from remote areas of central and northern Alaska are statistically and graphically summarized on a monthly basis for a five-year period (1975-79). The remote site data were obtained during the course of several CRRE. Investigations. To provide a more comprehensive coverage, these data are presented together with data obtained at National Weather Service stations (1) the area. The analysis is based on four climatic regions within the study area, the Continental Interior the Brooks Range the Arctic Foothills, and the Arctic Coastal Plain. A detailed analysis of coastal-inland summer air temperature gradients on the Arctic Coastal Plain is given. Station histories for the 1975-79 period and tabulated air and ground temperature statistics are included as appendices. Air temperature, precipitation, and some ground surface tem-

CR 82-36 LONG-TERM MODIFICATIONS OF PERENNI-ALLY FROZEN SEDIMENT AND TERRAIN AT EAST OUMALIK, NORTHERN ALASKA. Lawson, D.E., Nov. 1982, 33p, ADA-123 731, Refs.

PERMAFROST THERMAL PROPERTIES, DEG-RADATION, SOIL EROSION, SEDIMENTS, TUNDRA, ENVIRONMENTAL IMPACT, THER-MOKARST, ACTIVE LAYER, HUMAN FACTORS ENGINEERING, UNITED STATES—ALASKA—OUMALIK.

TORS ENGINEERING, UNITED STATES—
ALASKA—OUMALIK.
Camp construction and drilling activities in 1950 at the East Oumalik drill site in northern Alaska caused extensive degradation of see-rich, perennially frozen silt and irreversible modification of the upland terrain. In a study of the long-term degradational effects at this site, the near-surface geology was defined by drilling and coring 76 holes (maximum depth of 34 m) in disturbed areas and by laboratory analyses of these cores. Terrain disturbances, including buildozed roads and excavations, camp structures and off-road vehicle trails, were found to have severely disrupted the site's thermal regime. This led to a thickening of the active layer, melting of the ground ice, thaw subsidence and thaw consolidation of the sediments. Slumps, sediment gravity flows and collapse of materials on slopes bounding thaw depressions expanded the degradation latersily, with thermal and hydraulic recision removing material as the depressions widened and deepened with time. Degradational processes became less active after thawed sediments theckned sufficiently to slow the increase in the depth of thaw and permit slope stabilization. The site's terrain is now irregular and hummocky with numerous depressions. Seasonal thaw depths are deeper in disturbed areas than in undisturbed areas and reflect the new moisture conditions and morphology. The severity of disturbance is much greater at East Oumalik than at another and the procession of the season of the second of the second of the second of the conditions and morphology. turbed areas than in undisturbed areas and reflect the new monsture conditions and morpholopy. The severity of disturbance is much greater at East Oumalik than at another old drill site. Fish Creek The difference results primarily from differences in the physical properties of the sediments, including the quantity and distribution of ground ice. In areas similar to East Oumalik, the rentioval or severe compaction of the vegetative mat would caus, similar adverse physical changes to take place over two to three decades and should therefore be avoided

LANDSAT-ASSISTED ENVIRONMENTAL. MAPPING IN THE ARCTIC NATIONAL WILD-LIFE REFUGE, ALASKA.

Walker, D A., et al, Nov. 1982, 59p. + 2 maps, ADA-123 440, Refs. p 34-37. Acevedo, W, Everett, K.R, Gaydos, L, Brown, J., Webber, P.J.

TUNDRA, MAPPING, REMOTE SENSING, GEOBOTANICAL INTERPRETATION, ENVI-RONMENTS, SOILS, PATTERNED GROUND, VEGETATION, CLASSIFICATIONS, LANDSAT, UNITED STATES—ALASKA—ARCTIC NA-TIONAL WILDLIFE REFUGE.

This report presents a Landsat-derived land cover map of the northwest portion of the Arctic National Wildlife Refuge, Alaska The report is divided into two parts The the northwest portion of the Arctic National within Refuge, Alaska The report is divided into two parts. The first is devoted to the land cover map with detailed descriptions of the mapping methods and legend. The second part is a description of the study area. The classification system used for the maps is an improvement over existing methods of describing tundra vegetation. It is a comprehensive method of nomenclature that consistently applies the same entering for all vegetation units. It is applicable for largemethod of nomenclature that consistently applies the same criteria for all vegetation units. It is applicable for large-and small-scale mapping and is suitable for describing vegetation complexes, which are common in the patterned-ground terrain of the Alaskan Arctic. The system is applicable to Landsat-derived land cover classifications. The description of the study area focuses on five primary terrain types flat thaw-lake plains, hilly coastal plains, foothills, mountainous terrain, and river flood plains. Topography, landforms, soils and vegetation are described for each terrain type. The report also contains area summaries for the Landsaterised map categories. The area summaries are generated for the five terrain types and for the 89 townships within the study areas. Two land cover maps at 1 250,000 are included.

CR 82-38 WINDOW PERFORMANCE IN EXTREME COLD

Flanders, S N, et al, Dec. 1982, 21p, ADA-124 571, For another version see 35-2514. 10 refs Buska, J. Barrett, S 38-4415

JOINT WINDOWS, WEATHERPROOFING, MILITARY FACILITIES, THERMAL INSULATION, COLD WEATHER CONSTRUCTION, HEAT LOSS, AIR LEAKAGE, HUMIDITY, CONDENSATION, COUNTERMEASURES, COST

A streme cold causes heavy buildup of frost, ice and condensa-tion on many sundows. It also increases the incentive for improving the arrightness of sundows against heat loss. Our study shows that tightening specifications for Alaskan windows to perinit only 30° of the air leakage allowed by current American airtightness standards is economically

attractive. We also recommend triple glazing in much of Alaska to avoid window using in homes and barracks. We base our conclusions on a two-year field study of Alaskan military bases that included recording humidity and temperature data, observing moisture accumulation on windows and measuring airtightness with a fan pressurization device.

CR 82-39 BRINE ZONE IN THE MCMURDO ICE SHELF, ANTARCTICA.

Kovacs, A, et al, Dec. 1982, 28p., ADA-124 516, 29

A.J., Cragin, J.H., Morey, R.M. 37-3355

ICE SHELVES, BRINES, ICE SALINITY, AN-TARCTICA—MCMURDO ICE SHELF.

TARCTICA—MCMURDO ICE SHELF.

A 4.4-m-high brine step in McMurdo Ice Shelf has migrated about 1.2 km in 4 years. This migration is proof of the dynamic nature of the step, which is the leading edge of a brine wave that originated at the shelf edge after a major break-out of the McMurdo Ice Shelf. The inland boundary of brine benetration is characterized by a series of descending steps that are believed to represent terminal positions of separate intrusions of brine of similar origin The inland boundary of brine percolation is probably controlled largely by the depth at which brine encounters the firm/ice transition (43m). However, this boundary is not fixed by permeability considerations alone, since measurable movement of brine is still occurring at the inland boundary Freeze-fractionation of the seawater as it migrates through the ice shelf preferentially precipitates virtually all sodium sulfate, and concomitant removal of water by freezing in all pore spaces of the infiltrated firm produces residual brines approximately six times more concentrated than the original seawater. (Auth.) seawater. (Auth.)

CR 82-40 BREAKING ICE WITH EXPLOSIVES

Mellor, M., Dec. 1982, 64p., ADA-123 761, 25 refs.

ICE BREAKING, ICE BLASTING, EXPLOSIVES, EXPLOSION EFFECTS, UNDERWATER EXPLOSIONS, ICE COVER THICKNESS, STATISTICAL ANALYSIS, COMPUTER APPLICATIONS, ANALYSIS (MATHEMATICS), DESIGN.

ANALYSIS (MATHEMATICS), DESIGN.

The use of explosives to break floating ice sheets is described, and test data are used to develop curves that predict explosives effects as ice thickness, charge size, and charge depth vary Application of the curves to practical problems is illustrated by numerical examples

The general features of underwater explosions are reviewed and related to ice blasting

Quasistatic plate theory is considered, and is judged to be inapplicable to explosive cratering of ice plates

The specific energy for optimized ice blasting is found to compare quite favorably with the specific energy for optimized ice blasting is found to compare quite favorably with the specific energy of ice plated in appendices, together with details of the regression analyses from which the design curves are generated

CR 82-41

CR 82-41

EVALUATION OF PROCEDURES FOR DETER-MINING SELECTED AQUIFER PARAMETERS. Daly, C.J., Dec. 1982, 104p., ADA-125 437, Refs. p.93-104.

GROUND WATER, WATER FLOW, HYDROLO-GY, PERMEABILITY, WATER POLLUTION, POROSITY, TESTS.

Many of the important factors influencing the choice of appropriate aquifer test procedures are presented. The concepts of bias, accuracy and spatial variability are explained. The definitions of a number of aquifer parameters are developed. The definitions of a number of aquifer parameters are developed from basic principles demonstrating the underlying assumptions and limitations. The parameters considered are piezorietic head, hydraulic conductivity/intrinsic permeability, flow direction, specific discharge magnitude, transmissivity, volumetric flow rate, total porosity, effective potosity, average linear velocity, storage coefficient, specific yield, dispersion coefficient-aquifer dispersivity. For each parameter several techniques are described, evaluated and ranked in terms of persived pricatival acquiring simplicity and value to contaminant. ceived potential accuracy, simplicity and value to contaminant transport studies—It must be stressed, however, that the evaluations are based principally upon theoretical grounds, and not upon actual conduct of the destribed procedures CR 92.42

EFFECTS OF CONDUCTIVITY OF HIGH-RESO-LUTION IMPULSE RADAR SOUNDING, ROSS ICE SHELF, ANTARCTICA.

Morey, R.M, et al, Dec 1982, 12p., ADA-124 456, 16

Kovacs, A

RADAR ECHOES, ELECTRONIC EQUIPMENT. ICE COVER THICKNESS, OCEAN CURRENTS, ANTARCTICA—ROSS ICE SHELF

ANTARCTICA—ROSS ICE SHELP
The system was evaluated to detect sea ice on the bottom
of the Ross Ice Shelf, detect the preferred horizontal caxis virmuthal direction of the sea ice crystals and determine
the direction of the currents under an Antarctic ice shelf
Surface radar survey on the Ross Ice Shelf at Site I-9
and surface and airborne radar profiling on the McMurdo
Ice Shelf were made

The CRREL impulse radar system
was unable to detect the shelf bottom at Site I-9, which
drilling revealed to be 416 m below the snow surface
The
radar system was used to profile the McMurdo Ice Shelf

both from the snow surface and from the air, a shelf thickness of about 275 m was easily detected. The bulk conductivity of the ice shelf at Site J-9 was higher than originally anticipated. and this limited the radar sounding depth to about 405 m when operating at a frequency of 20 MHz (Auth. mod)

CR 82-44

CASE STUDY OF LAND TREATMENT IN A COLD CLIMATE—WEST DOVER, VERMONT.
Bouzoun, J.R., et al, Dec. 1982, 96p., ADA-125 438,
42 refs. Collection of two articles.

Meals, D.W., Cassell, E.A. 37-3494

ICE FORMATION, WASTE TREATMENT, WATER TREATMENT, SNOW ACCUMULATION, LAND RECLAMATION, COLD WEATHER PERFORMANCE, GROUND WATER, WATER PIPELINES, HYDROLOGY, NUTRIENT CYCLE, SURFACE WATER

CYCLE, SURFACE WATER

A slow rate land treatment system that operates throughout the year in a very cold climate is described in detail Information on the geology, soils, vegetation, wildlife and the climate at the site is also presented Winter operational problems such as ice formation on the elevated spray laterals, and freezing and plugging of the spray nozzles are discussed, as are their solutions The detailed results of a 1-year study to characterize the seasonal performance of the system, to develop N and P budgets for the system, to monitor specific hydrologic events on the spray field, to monitor shallow groundwater quality, to monitor the groundwater quality in off-site wells, and to monitor the groundwater quality in off-site wells, and to monitor the Recommendations for the design and operation of other slow rate land treatment systems to be constructed in cold climates are included. are included.

ANALYSIS OF ROOF SNOW LOAD CASE STUDIES; UNIFORM LOADS.
O'Rourke, M, et al, Jan 1983, 29p., ADA-126 330, 12

refs.

Koch, P., Redfield, R. 37-3351

ROOFS, BUILDING CODES, SLOPE ORIENTA-TION, DESIGN, STATISTICAL ANALYSIS

TION, DESIGN, STATISTICAL ANALYSIS.

Roof snow load case studies gathered throughout the United States over a three-year penod are analyzed. The objective of the analysis is to determine a relationship between the snow load on the ground and the corresponding uniform snow load on flat and sloped roofs. The main parameters considered are the thermal characterities of the roof, the roof slope and the exposure of the structure. Exposure has the strongest effect on the ratio of ground to roof snow loads. Comparisons are made with existing and proposed building codes and standards.

COMPUTER MODELING OF TIME-DEPEND-ENT RIME ICING IN THE ATMOSPHERE Lozowski, E.P., et al, Jan 1983, 74p., ADA-126 404, 19 refs.

Oleskiw, M.M. 37-3497

AIRCRAFT ICING, ICE ACCRETION, TIME FACTOR, ICE FORMATION, COMPUTERIZED SIMULATION, HELICOPTERS, MATHEMATICAL MODELS.

A numerical model of time ice accretion on an arbitrary two-dimensional airoit is presented. The physics of the model are described and results are presented that demonstrate, by comparison with other theoretical data and experimental data, that the model predictions are believable. Results are also presented that illustrate the capability of the model to handle time-dependent rime ice accretion, taking into account the feedback between the ice accretion and the sirflow and droplet trajectory fields

CR 83.03 ASSESSMENT OF THE TREATABILITY OF TOXIC ORGANICS BY OVERLAND FLOW. Jenkins, TF, et al, Jan. 1983, 47p, ADA-126 384, Refs. p 28-30.

Leggett, D.C., Parker, L V., Oliphant, J.L., Martel, C.J., Foley, B T., Diener, C.J.

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, TEMPERATURE EF-FECTS, SLOPES, WATER POLLUTION, AB-SORPTION, WATER FLOW

The removal efficiency for 13 trace organics in wastewater was studied on an outdoor, prototype overland flow land treatment system. The removal for each of these substances was greater that 94% at an application rate of 0.4 cm/hr. The percent removals declined as application rates were increased. The rate of removal from solution was described by the sum of two mass-transport limited, first-order rate coefficients representing solutions and sortion. coefficients representing volatilization and sorption. A model based on the two-film theory was developed, the observed removal rate coefficients were regressed against three properties of each substance the Henry's constant, the octanol water partition coefficient and the molecular weight. The dependence of the removal process on temperature was studied and is included along with average water.

depth in the model. The decrease in removal rate as temperature declined is supported by the known dependence of Henry's constant and diffusivity on temperature. The model was validated on a second overland flow system. The surface soil concentrations of the trace organics determined at the end of the experiment suggest that a secondary mechanism renews the surface activity rapidly enough so that contaminants do not build up on the surface, with the possible exception of PCB. Biodegradation is suggested as the predominant secondary mechanism rather than volatilization because substances less volatile than PCB were not found at the end of the experiment. at the end of the experiment

ICE GROWTH ON POST POND, 1973-1982. Gow, A.J., et al, Feb. 1983, 25p., ADA-126 334, 15

Govoni, J.W.

40-4676
ICE GROWTH, ICE DETERIORATION, PONDS,
SNOW ICE, ICE COVER THICKNESS,
METEOROLOGICAL FACTORS, SEASONAL
VARIATIONS, ICE MODELS, DEGREE DAYS,
STEFAN PROBLEM, UNITED STATES—NEW HAMPSHIRE-POST POND.

Measurements and analysis of seasonal ice growth and decay on Post Pond, New Hampshire, for the period 1973-1982 are presented Observations included ice thickness measureobservations included ice thickness measurements, examination of the various ice types contributing to the ice cover, and measurements of meteorological parameters for correlation with and modeling of the ice growth process. The overall nature of ice growth and decay (ice loss) on Post Pond has been ascertained, the seasonal variability in the timing of freeze-up and ice-out and the duration of the ice cover have been determined, and the elationation of ice growth to freeze-up adoptionally records evarelationship of ice growth to freezing-degree-day records eva-lusted on the basis of a Stefan conduction equation modified to deal with ice sheets covered with or free of snow. Ice growth occurs predominantly by the direct freezing of lake growth occurs predominantly by the direct freezing of lake water, but snow ice may compose as much as 50% of the ce cover in winters with higher than average snowfall. Freeze-up leading to the establishment of a stable ice cover occurs during the 4-week period from the end of November to the end of December. Maximum seasonal ice thicknesses were from 45 to 67 cm and are generally attained during the first two weeks of March, ice-out, marking the final disappearance of ice from Post Pond, usually occurs by the third week of April The overall rate of ice loss is three to four times that of ice growth, and is dominated initially by melting from the top. As much as 50% of the ice may be lost in this way before the oiset of any bottom melting Final dissipation of the ice cover is usually expedited by canding resulting from preferential melting and disintegration of the ice at crystal boundaries.

DYNAMIC ICE-STRUCTURE INTERACTION DURING CONTINUOUS CRUSHING, MEBILIBRICH, M., Feb 1983, 48p., ADA-126 349, 22

37-344

ICE SOLID INTERFACE, OFFSHORE STRUC-TURES, PILE STRUCTURES, ICE PRESSURE, DYNAMIC LOADS, ICE LOADS, VELOCITY, TESTS.

This report presents the results of dynamic ice-structure interaction model tests conducted at the CRREL Ice Engineer-Inis report presents the results of oynamic less-stucture metaction model tests conducted at the CRREL Ice Engineering Facility. A flexible, single-pile, bottom-founded offshore structure was simulated by a test pile with about a one-to-ten scale ratio. Urea (instead of sodium chloride) was used as dopant to scale down the ice properties, resulting in good model ice properties. Six ice fields were frozen and 18 tests carried out. In all cases distinctive dynamic ce-structure interaction obstations appeared, from which abundant data were collected. In tests with linear ice velocity sweep, sawtooth-shaped ice force fluctuations occurred first. With increasing velocity the natural in 4es of the test pile were excited, and shifts from one mode. I another occurred The maximum ice force values appeared mostly with low loading rates but high forces appeared randomly at high revelocities. As a general trend, ice force maximums, averages and st. ndard deviations decreased with increasing ice velocities. The aspect ratio effect of the ice force noninuous cruthing follows the same dependence as in static loadings. The frequency of observed ice forces is strongly dominated by the natural modes of the structure. Dynamically unstable natural modes of the structure. Dynamically unstable natural modes tend to make the develop-ing ice force frequencies the same as the natural frequencies

CHEMICAL FRACTIONATION OF BRINE IN THE MCMURDO ICE SHELF, ANTARCTICA. Cragin, J H, et al, Mar 1983, 16p., ADA-127 821, 23

Gow. A.J., Kovacs, A 38-688

ICE CORES, ICE SALINITY, ICE COMPOSITION, ICE SHELVES, ICE PHYSICS, ANTARCTICA MCMURDO SOUND

During the austral summers of 1976-77 and 1978-79, several accords were taken from the McMurdo Ice Shelf brine zone to investigate its thermal, physical and chemical properties. Chemical analyses of brine samples from the youngest (uppermost) brine wave show that it contains sea salts in normal seawater proportions. Further inland, deeper and older brine layers, though slightly highly saline (\$ > 200%), are severely depleted in (\$04)2-/Na+ ratio being an order of magnitude less than that of normal seawater of Na+, K+, Ca2+, Mg2+, (\$64)2- and Cl-, together with solubility and temperature considerations, show that the sulfate depletion is due to selective precipitation of mirrability, Na250410H2O. The location of the inland boundary of brine penetration is closely related to the depth at which the brine encounters the firn/ice transition. However, a small but measurable migration of brine is still occurring in otherwise impermeable ice, this is attributed to cutectuc dissolution of the ice by concentrated brine as it moves into deeper and warmer parts of the McMurdo Ice Shelf (Auth.)

ANALYSIS OF DIFFUSION WAVE FLOW ROUTING MODEL WITH APPLICATION TO FLOW IN TAILWATERS.

Ferrick, M.G., et al, Mar. 1983, 31p, ADA-128 142,

Bilmes, J., Long, S.E.

DAMS, WATER FLOW, WATER WAVES, HYDROLOGY, RIVER FLOW, FLOW MEASUREMENT, MATHEMATICAL MODELS, DIFFU-

Peak power generation with hydropower creates tailwater flow conditions characterized by high and low flows with abrupt transitions between these states Flows occurring abrupt transitions between these states Flows occurring in tailwaters typically form sharp-fronted, large-amplitude waves of relatively short period An understanding of the mechanics of downstream propagation of these waves is important both for direct application in studies of the tailwater and because of the similarity of these waves to those following a dam break An analysis of the dynamic equations of open channel flow is used to quantify the relative importance of each process is related to the relative importance of each process is related to the relative magnitude of terms in the dynamic equations, providing a physical basis for model formulation A one-dimensional diffusion wave flow routing model, modified for tailwaters, simulates the important physical processes affecting the flow and is straightforward to apply. The model is based upon a numerical solution of the kinematic wave equation wave equation

CR 83-08 PROPERTIES OF UREA-DOPED ICE IN THE CRREL TEST BASIN. Hirayama, K., Mar. 1983, 44p, ADA-128 219, 34 refs

DOPED ICE, UREA, ICE STRENGTH, ICE COVER THICKNESS, ICE MECHANICS, HY-DRAULICS, FLEXURAL STRENGTH, ICE MOD-ELS, AIR TEMPERATURE, TESTS.

ELS, AIR TEMPERATURE, TESTS.

In the course of model tests with urea-doped ice in the CRREL lee Engineering Facility test basin, the growth process and the physical and mechanical properties of the model ice were investigated. The parameters which were varied were: urea concentration in the tank water, air temperature during growth, growth duration, and tempering time. Uniformity of ice thickness and ice mechanical properties over the whole tank area were found to be satisfactory. The structure of the urea-doped ice was found to be similar to that of the ice except for a relatively thick incubation layer over a dendritie bottom layer. Empirical relationships were established between ice thickness and negative degree-hours, mechanical properties and growth temperature, urea concentration, and ice thickness, and reduction in mechanical properties and tempering time. The results of the study are presented in charts which permit reliable scheduling of model tests with required ice thickness and ice flexural strength. strength.

SHORE ICE RIDE-UP AND PILE-UP FEA-TURES. PART 1: ALASKA'S BEAUFORT SEA

Kovacs, A., Mar. 1983, 51p., ADA-127 198. 24 refs 38-394

FAST ICE, ICE PILEUP, ICE OVERRIDE, SEA ICE, SHORES, SHORELINE MODIFICATION, BEACHES, BEAUFORT SEA

BEACHES, BEAUFORT SEA
Recent observations of shore ice pile-up and ride-up along
the coast of the Alaska Beaufort Sea are presented. Information is given to show that sea ice movement on shore
has overridden steep coastal bluffe and has thrust inland
over 150 m, gouging into and pushing up mounds of beach
aand, gravel, boulders and peat and, inland, the tundra material
The resulting ice scar morphology was found to remain
for tens of years. Onshore ice movements up to 20
m are relatively common, but those over 100 m are very
infrequent. Spring is a dangerous time, when sea ice
melts away from the shore, allowing ice to move freely
Under this condition, driving stresses of less than 100 kPa
can push thick sea ice onto the land

CR 83-10

COMPUTER MODELS FOR TWO-DIMEN-SIONAL STEADY-STATE HEAT CONDUCTION. Albert, M.R., et al. Apr. 1983, 90p., ADA-128 793, 8

Phetteplace, G.

J8-343 PERMAFROST HEAT TRANSFER, PERMA-FROST PHYSICS, FROST ACTION, THERMAL CONDUCTIVITY, UNDERGROUND PIPE-LINES, BOUNDARY LAYER, COMPUTER PRO-GRAMS, MATHEMATICAL MODELS.

This report outlines the development and verification of two computer models of two-dimensional steady-state heat conduction including a variety of boundary conditions. One is a finite difference program and the other is a finite element program. The results of each program are compared to two analytic solutions, and to one another.

CR 83-11 RADAR PROFILING OF BURIED REFLECTORS AND THE GROUNDWATER TABLE. Sellmann, P.V., et al, Apr 1983, 16p., ADA-130 225,

17 refs Arcone, S A., Delaney, A.J.

38-544

RADAR ECHOES, SEASONAL FREEZE THAW, WATER TABLE, SUBSURFACE INVESTIGATIONS, PROFILES, GROUND WATER, SOIL FREEZING, GROUND THAWING.

Investigations of ground radar performance over thawed and seasonally frozen sitis, and sands and gravels containing artificial and natural reflectors were carried out in Alaska. The radar emitted 5-10 ns pulses, the center frequency of which was approximately 150 MHz. The artificial reflectors were metal sheets and discs and the natural reflectors were the groundwater table and interfaces between frozen and thawed material.

CR 93.12 COMPUTER MODELS FOR TWO-DIMEN-SIONAL TRANSIENT HEAT CONDUCTION. Albert, M.R., Apr. 1983, 66p., ADA-134 893, 9 refs. 38-877

HEAT TRANSFER, FREEZE THAW CYCLES, HEAT PIPES, HEATING, MATHEMATICAL MODELS, COMPUTERIZED SIMULATION. PHASE TRANSFORMATIONS.

PHASE TRANSFORMATIONS.

This paper documents the development and verification of two finite difference models that solve the general two-dimensional form of the heat conduction equation, using the alternative-direction insplicit method. Both can handle convective, constant flux, specified temperature and seminfinite boundaries. The conducting medium may be composed of many materials. The first program, ADI, solves for the case where no change of state occurs. ADIPC solves for the case where a freeze/thaw change of phase may occur, using the apparent heat capacity method. Both models are verified by comparison to analytical results

REVIEW OF THE PROPAGATION OF INELAS-TIC PRESSURE WAVES IN SNOW. Albert, D.G., Apr. 1983, 26p., ADA-128 714, 35 refs

SNOW ELASTICITY, EXPLOSIVES, WAVE PROPAGATION, PRESSURE, ELASTIC WAVES,

DETONATION WAVES, TESTS.

DETONATION WAVES, TESTS.

A review on past experimental and theoretical work indicates a need for additional experimentation to characterize the response of snow to inelastic pressure waves. Pressure data from previously conducted explosion tests are analyzed to estimate the elastic limit of snow of 400 kg/cu m density to be about 36 kPs. This pressure corresponds to a scaled distance of 16 m/kg exp 1/3 for charges fired beneath the surface of the snow, and to a scaled distance of 12 m/kg exp 1/3 for charges fired on the air. The effects of a snow cover on the method of clearing a minefield by using an explosive charge fired in the air above the snow surface are aired distance and recommendations are given for further work in this area. Explosive pressure data are used to estimate the maximum effective scaled actions for detonating buried mines at shallow depth to be 0.8 kg exp 1/3. Fuel-air explosive will increase this effective radius significantly because of the increase in the size of the source region. the source region

STUDY ON THE TENSILE STRENGTH OF ICE AS A FUNCTION OF GRAIN SIZE. Currier, J.H., et al., May 1983, 38p., ADA-134 889, 30

Schulson, E.M., St. Lawrence, W.F.

38-2189 ICE CRYSTAL STRUCTURE, TENSILE PROPER-TIES, ICE STRENGTH, ICE CRACKS, GRAIN SIZE, ICE DEFORMATION, COMPRESSIVE PROPERTIES, BRITTLENESS, FRACTURING

An analysis of ice fracture that incorporates dislocation mechanics and linear elastic fracture mechanics is discussed. The derived relationships predict a britle to ductile transition in polycrystalline ice under tension with a Hall-Petch type

dependence of brittle fracture strength on grain size. A uniaxial tensile testing technique, including specimen preparation and loading system design was developed and employed to verify the model. The tensile strength of ice in purely brittle fracture was found to vary with the square root of the recipitical of grain size, supporting the relationship that the theory suggests. The inherent strength of the ice lattice and the Hall-Petch slope are evaluated and findings discussed in relation to previous results. Monitoring of acoustic emissions was incorporated in the tests, providing insights into the process of microfracture during ice deformation.

CR 83-15 LAKE WATER INTAKES UNDER ICING CON-

Dean, A.M., Jr., May 1983, 7p, ADA-128 757, 52 refs.

WATER INTAKES, ICE CONDITIONS, ICE PRE-VENTION, LAKE WATER, ICE MECHANICS, DESIGN CRITERIA, ICING.

An intake may be restricted or clogged by active frazil, passive frazil brash, or a combination of these ice forms. The exact nature of the interactions among the intake structure, the ice and the hydraulic and meteorological conditions that lead to icing problems is extremely site-specific. The better these parameters are quantified, the more tailored and economical the solution A defense against these ice forms may cal the solution A defense against these ice forms may be formulated in four areas the origin of the ice, the transportation mechanics of the ice, the accumulation characteristics of the ice, and the form of the ice when it is in the area of influence of the intake. To produce a lake intake structure that minimizes or climinates icing problems, one may devise an unconstrained or a constrained design. To evaluate solutions to icing problems and/or to supplement incomplete data, a scale-model investigation is recommended. A universal, unconstrained solution would be extremely expensive. incomplete data, a scale-model investigation is fecommended.

A universal, unconstrained solution would be extremely expensive. The more data available through site monitoring and model studies, the better the problem (and therefore the solution) can be bracketed. This paper provides guidance for developing a site-specific solution.

DEVELOPING A MODEL FOR PREDICTING SNOWPACK PARAMETERS AFFECTING VEHI-CLE MOBILITY.

Berger, R.H., May 1983, 26p., ADA-134 878, Refs. p.23-26. 38-878

38-878
SNOW COVER EFFECT. TRAFFICABILITY, VEHICLES, SNOW DEPTH, SNOW DENSITY, VEHICLES, SNOW DEPTH, SNOW DENSITY, SNOW ACCUMULATION, ABLATION, TEMPERATURE EFFECTS, MODELS.

The presence of snow on the ground can impose limitations on the mobility of wheeled and tracked vehicles. Snow depth and density are the two most easily measured snow properties that can be related to mobility over snow Existing models of snowpack accumulation and ablation processes and my fels of internal snowpack structure were examined to determine if a model of the snowpack and be developed for use in predicting the snow parameters that affect mobility Simple models, such as temperature index models, do not provide sufficient snowpack details and the more detailed models required too many measured inputs. Components of the various models were selected from a basis of a snowpack model for predicting snow properties related to mobility model for predicting snow properties related to mobility over snow Methods of obtaining the input data for some components are suggested and areas where more development is needed are described

COMPARISON OF SEA ICE MODEL RESULTS USING THREE DIFFERENT WIND FORCING FIELDS

Tucker, W.B., June 1983, 11p., ADA-134 462, 11 refs. 38-879

ICE MODELS, SEA ICE, WIND PRESSURE, ICE MECHANICS, ATMOSPHERIC PRESSURE, ICE COVER THICKNESS

A sea ice model was applied to the East Greenland Sea to examine a 60-day ice advance period beginning i October 1979. This investigation compares model results using driving geostrophic wind fields derived from three sources winds calculated from sea-level pressures obtained from the National Weather Services operational analysis system resulted in strong selectures concentrated in a narrow band adjacent to the Greenland coast, with moderate selectures elsewhere. The model showed excessive ice transport and thickness build ups in the coastal region. The extreme pressure reduction procedure that was applied to the terrain-following agina coordinate system to obtain sea level pressure. Additional sea level pressure folds were obtained from an independent optimal interpolation unity is that merged EGCE buoys dirifting in the Victic basin with high latitude land stations. A sea ice model was applied to the East Greenland Sea drifting in the Victo basin with high latitude land stations and from manual digitization of the NWS hand-analyzed Sorthern Hemisphere Surface Charts Modeling results using winds derived from both of these fields agreed favorably

DETECTION OF CAVITIES UNDER CON-CRETE PAVEMENT

Kovacs, A., et al, July 1983, 41p., ADA-131 851, 10 refs.

Morey, R.M.

CONCRETE CONCRETE PAVEMENTS, CAVITATION, RADAR ECHOES, DETECTION, CRACKING (FRACTURING), PROFILES.

(FRACTURING), PROFILES.

An evaluation of an impulse radar system for detecting cavities under concrete pavement is discussed, and field results are presented. It was found that a dual antenna mode of surveying was ideal for void detection. In this mode one antenna operated in a transceive mode and a second, offset from the first, operated in a receive-only mode. This arrangement allowed a refraction-type profile survey to be performed, which enabled subpavement voids to be easily detected. Field trails were held at Plattsburgh Air Force Base, where 28 cavities were detected and mapped Drilling of holes verified that a cavity existed and allowed cavity depth to be measured. The cavities varied from 15 in, to 23 in in depth and were up to 20 ft long.

ICE FORCES ON MODEL BRIDGE PIERS. Haynes, F.D., et al, July 1983, 11p., ADA-133 082, 20

refs. Sodhi, D.S., Kato, K., Hirayama, K. 38-395

ICE PRESSURE, ICE LOADS, ICE SOLID INTER-FACE, ICE PUSH, ICE MECHANICS, BRIDGES, PIERS, ICE STRENGTH, MODELS, FLEXURAL STRENGTH, TESTS.

STRENGTH, TESTS.
Small-scale laboratory experiments were conducted on model bridge piers in the CREEL test basin. The experiments were performed by pushing model ice sheets against structures and monitoring the ice forces during the ice/structure interaction. The parameters, varied during the test program, were the geometry of the bridge piers and the velocity, thickness, and flexural strength of the ice. The results are presented in the form of ice forces on sloping and vertical structures with different geometries action on sloping structures, a phenomenon of transition of failure mode from bending to crushing was observed as the ice velocity was steadily increased.

CR 83-20 LAND TREATMENT RESEARCH AND DEVEL-OPMENT PROGRAM: SYNTHESIS OF RE-SEARCH RESULTS.

Iskandar, I K., et al, Aug. 1983, 144p., ADA-134 540, Refs. p.63-124.

Wright, E.A.

WASTE TREATMENT, WATER TREATMENT, SANITARY ENGINEERING, LAND RECLAMA-TION, DESIGN CRITERIA, RESEARCH PRO-

The major objective of the Corps of Engineers Land Treatment Research and Development Program was to provide, through research, definitive criteria and procedures to enable the cost-effective and environmentally safe use of land treatment of municipal wastewater

This research included longterm field experiments at different locations within the United States to establish design criteria, laboratory revearch to understand and solve fundamental problems, and evaluation understand and solve fundamental problems, and evaluation of existing land treatment systems to document long-term performance. The information gathered from the land treatment research program has been published in more than 240 technical publications on regional planning, site selection, design procedures, mechanisms of wastewater renovation, site management, site monitoring and environmental effects. During the land treatment program an active technology transfer effort was maintained to transmit research results directly to users. The LTRP clearly demonstrated that land treatment is an attractive alternative to other waste treatment practices. It was also shown that the direct benefits of the program, in terms of increased cost-effectiveness from improved design, were much greater than the program's cost.

CR 83-21 STATISTICAL ASPECTS OF ICE GOUGING ON THE ALASKAN SHELF OF THE BEAUFORT

Weeks, W.F., et al, Sep. 1983, 34p. + map. ADA-134

428, Refs. p 32-34.
Barnes, P.W., Rearic, D.M., Reimnitz, E

TOPOGRAPHY, OFFSHORE DRILLING, OFFSHORE STRUCTURES, SEA ICE, STATISTICAL ANALYSIS, BEAUFORT SEA.

ANALYSIS, BEAUFORT SEA.

The statistical characteristics of ice-produced gouges in the sea floor along a 190-km stretch of the Alaskan coast of the Beaufort Sea between Smith Bay and Camden Bay are studied, based on 1500 km of precision fathometry and side-looking sonar records that were obtained between 1972 and 1979 in water depths to 18 m. The probability density function of the gouge depths into the sediment is represented by a simple negative exponential over four decades of gouge frequency. The deepest gouge observed was 36 m, from a sample of 20,354 gouges that have depths greater than

or equal to 0.2 m. The dominant gouge orientations are usually unimodal and reasonably clustered, with the most frequent alignments roughly parallel to the general trend of the coastline. The value of the mean number of gouges are usually unimodal and reasonably clustered, with the most frequent alignments roughly parallel to the general trend of the coastline The value of the mean number of gouges (deeper than 0.2 m) per kilometer measured normal to the trend of the gouges, varies from 0.2 for protected lagoons to 80 in water between 20 and 38 m deep in unprotected offshore regions. The distribution of the spacings between gouges as measured along a sampling track is a negative exponential. The form of the frequency distribution of the mean number of gouges varies with water depth and is exponential for lagoons and shallow offshore areas, positively skewed for 10 to 20 m depths off the barrier islands, and near-normal for deeper water. As a Poisson distribution gives a reasonable fit to the mean number of gouges distributions for all water depths, it is suggested that gouging can be taken as approximating a Poisson process in both space and time. The distributions of the largest values per kilometer of gouge depths, gouge widths, and heights of the lateral embankments of sediments plowed from the gouges are also investigated. Limited data on gouging rates give an average of 5 gouges per kilometer per year. Examples are given of the application of the data set to hypothetical design problems associated with the production of oil from areas in the Alaskan portion of the Beaufort Sea.

CR 83-22 TRANSPORT OF WATER IN FROZEN SOIL. 1. EXPERIMENTAL DETERMINATION OF SOIL-WATER DIFFUSIVITY UNDER ISOTHERMAL CONDITIONS.

Nakano, Y., et al, Aug. 1983, 8p., ADA-135 419, For another source see 37-4218. 13 refs.
Tice A.R., Oliphant, J.L., Jenkins, T.F.

FROZEN GROUND MECHANICS, SOIL WATER FROZEN GROUND MECHANICS, SOIL WATER MIGRATION, FROST HEAVE, UNFROZEN WATER CONTENT, SOIL MECHANICS, WATER TRANSPORT, ANALYSIS (MATHEMATICS), EXPERIMENTATION.

A new experimental method for measuring the soil-water diffusivity of frozen soil under isothermal conditions is introduced. The theoretical justification of the method is presented and the feasibility of the method is demonstrated by experiments conducted using manne-deposited clay. The measured values of the soil-water diffusivity are found comparable to reported experimental data

STRESS MEASUREMENTS IN ICE. Cox, G.F.N., et al, Aug. 1983, 31p., ADA-133 906, 29

Johnson, J.B.

ICE PHYSICS, STRESSES, LOADS (FORCES), ICE CREEP, ICE ELASTICITY, MEASURING IN-STRUMENTS, ANALYSIS (MATHEMATICS),

TESTS.

The problems associated with measuring stresses in ice are reviewed. Theory and laboratory test results are then presented for a stiff cylindrical sensor made of steel that is designed to measure ice stresses in a biaxial stress field. Loading tests on freshwater and saline ice blocks containing the biaxial ice stress sensor indicate that the sensor has a resolution of 20 kPa and an accuracy of better than 15% under a variety of uniaxial and biaxial loading conditions. Principal stress directions can also be determined within 5 deg. The biaxial ice stress sensor is not significantly affected by variations in the ice elastic modulus, ice creep or differential thermal expansion between the ice and guage. The sensor also has a low temperature sensitivity (5 kPa degC). degC).

CR 83-24 SENSITIVITY OF PLANT COMMUNITIES AND SOIL FLORA TO SEAWATER PRUDHOE BAY, ALASKA.

Simmons, C.L., et al, Sep. 1983, 35p., ADA-136 619,

Everett, K.R., Walker, D.A., Linkins, A.E., Webber,

TUNDRA, VEGETATION, SEA WATER, POLLUTION, ENVIRONMENTAL IMPACT, WATER TREATMENT, SALT WATER, SOIL WATER, SOIL MICROBIOLOGY, ROOTS, DAMAGE

SOIL MICROBIOLOGY, ROOTS, DAMAGE
Secondary recovery of oil at Prudhoe Bay, Alaska, will involve transporting large quantities of seawater in elevated pipelines across tundra for injection into oil-bearing rock strata. The possibility of a pipeline rupure raises questions concerning the effects of seawater on tundra vegetation and soils. To evaluate the relative sensitivities of differential of the range of vegetation types along the pipeline route were treated with single, saturating applications of seawater during the summer of 1980. Live (green) bryophyte cover was markedly reduced in the moist experimental sites in 1981 Bryophytes in all but one of the well-site experimental plots were apparently unaffected by the seawater treatment. Two scies of foliose lichens treated with seawater showed marked deterioration in 1981. All other lichen taxa were apparently unaffected by the seawater treatment. On spill sites, microbial-related soil respiration and hydrolysis of cellulose and organic phosphorus were significantly reduced, as were soil

enzymes and viable microbial biomass, for up to one year after treatment. Ectomycorrhizal roots of Salix on the treated plots showed a significant reduction in viable biomass, number of mycorrhizal roots, and respiration rates of the

ICE ACTION ON PAIRS OF CYLINDRICAL AND CONICAL STRUCTURES.

Kato, K., et al, Sep. 1983, 35p., ADA-134 595, 22 refs. Sodhi, D.S. 38-881

BRIDGES. PIERS, ICE LOADS, OFFSHORE STRUCTURES, ICE PRESSURE, ICE SOLID IN-TERFACE, COMPRESSIVE PROPERTIES, FLEX-URAL STRENGTH, TESTS.

Ice action on two cylindrical and conical structures, located Ice action on two cylindrical and conical structures, located side by side, has been investigated in a small-scale experimental study to determine the interference effects on the ice forces generated during ice-structure interaction. The proximity of the two structures changes the mode of ice failure, the magnitude and direction of ice forces on the individual structure, and the dominant frequency of ice force variations. Interference effects were determined by comparing the experimental results of tests at different structure spacings.

CR 83-26

MECHANICAL ICE RELEASE PROCESSES. SELF-SHEDDING FROM HIGH-SPEED RO-

Itagaki, K., Oct. 1983, 8p., ADA-135 369, 19 refs.

ICE REMOVAL, PROPELLERS, ICING, ICE AC-CRETION, SUPERCOOLED FOG, ICE FORMA-TION, ICE ADHESION, ICE STRENGTH, ICE CONTROL, TENSILE PROPERTIES, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

Ice accreted on high-speed rotors operating in supercooled fog can be thrown off by centrifugal force, creating severe unbalance and dangerous projectiles. A simple force balance analysis indicates that the strength of accreted ice and its adhesive strength can be obtained by measuring the thickness of the accretion, the location of the separation, the rotor speed and the density. Such an analysis was applied to field and laboratory observations of self-shedding events. The results agree reasonably well with other observations.

DRIVING TRACTION ON ICE WITH ALL-SEA-SON AND MUD-AND-SNOW RADIAL TIRES. Blaisdell, G.L., Nov. 1983, 22p., ADA-136 115, 9 refs. 38-2555

RUBBER ICE FRICTION, TRACTION, TIRES, RUBBER SNOW FRICTION, ICE TEMPERATURE, ADHESION, DESIGN.

This study reports on a companson of the driving traction performance on ice of a selected group of all-season radial tires with mud-and-snow radial tires in addition to performance variation due to tread design, the effects of tire inflation ance variation due to tread design, the effects of tire inflation pressure and ice temperature are explored. The results indicate that no significant tractive advantage on ice can be attributed to tread design. The contribution of tire tread to traction on ice is completely overshadowed by adhesion between the ice and the compound which makes up the tire's contact surface. Based on adhesion, a slight favoring of all-season tires is found. Increasing ice temperature generally decreased the tractive capability of a specific tire. For several tires, however, the opposite was true. Reduced inflation pressure also caused a slight decrease in the tractive performance parameters calculated.

LONG-TERM PLANT PERSISTENCE AND RES-TORATION OF ACIDIC DREDGE SOILS WITH SEWAGE SLUDGE AND LIME. Palazzo, A.J., Dec. 1983, 11p., ADA-137 451, 31 refs.

DREDGING, SOIL CHEMISTRY, SEWAGE TREATMENT, REVEGETATION, LIMING, SLUDGES, LAND RECLAMATION, GRASSES.

SLUDGES, LAND RECLAMATION, GRASSES. A field study was conducted to determine whether sewage studge and lime could be useful as soil amendments on acidic (pH 2 4) and infertile dredged spoils and to evaluate grasses that may be suitable for restoring acidic dredged spoils. Applications of dolomitic limestone in combination with sewage sludge or commercial fertilizer and topsoil improved soil fertility and produced a better overall growth environment at the site. Metal concentrations resulting from sludge applications increased but not to excessive levels. Movement of metals below the 20-cm depth was noted for the extractible forms of zinc, copper and nickel. A total of 29 grass treatments, containing grasses seeded alone or in combinations and receiving the sludge/lime treatment, were evaluated over a seven-year period, and selected grasses were analyzed for mineral composition. All grass species showed good establishment on the amended acidic spoil.

CR 83-29 EROSION PERENNIALLY FROZEN OF STREAMBANKS.

Lawson, D.E., Dec. 1983, 22p., ADA-138 410, Refs. 38.4466

SHORE EROSION, PERMAFROST THERMAL PROPERTIES, BANKS (WATERWAYS), FROZEN GROUND STRENGTH, SOIL EROSION, STABILITY, GULLIES, SHORELINE MODIFICATION, STREAMS, TEMPERATURE EFFECTS,

HYDRAULICS

A literature review indicated that the effects of permafrost on streambank erodibility and stability are not yet understood because systematic and quantitative measurements are seriously lacking Consequently, general controversy exists as to whether perennially frozen ground inhibits lateral erosion and bankline recession, or whether it increases bank recession rates. Perennially frozen streambanks erode because of rates. Perennially frozen streambanks erode because of modification of the bank's thermal regime by exposure to air and water, and because of various erosional processes. Factors that determine rates and locations of erosion include physical, thermal and structural properties of bank sediments, stream hydraulics and climate Thermal and physical modification of streambanks may also induce accelerated erosion within permafrost terrain removed from the immediate river environment. Bankline or bluffline recession rates are highly usualshly examine from less than 1 m/sept to over 30 m/sept. environment. Bankine or bluttline recession rates are highly variable, ranging from less than 1 m/year to over 30 m/year and, exceptionally, to over 60 m/year. Long-term observations of the physical and thermal crosion processes and systematic ground surveys and measurements of bankline-bluffline recession rates are needed

ICE SHEET RETENTION STRUCTURES Perham, R.E., Dec. 1983, 33p., ADA-138 030, Refs.

ICE CONTROL, ICE BOOMS, STABILIZATION. ICE SHEETS, ICE COVER, FRAZIL ICE.

Ice sheets are formed and retained in several ways in nature, and an understanding of these factors is needed before most and an understanding of these factors is needed before most structures can be successfully applied. Many ice sheet retention structures float and are somewhat flexible; others are fixed and rapid or semirigid. An example of the former is the Lake Erie ice boom and of the latter, the Montreal ice control structure. Ice sheet retention technology is changing. The use of timber cribs is gradually but not totally gaving way to sheet steel pillings and concrete cells. New structures and applications are being tried but with caution. Ice-hydraulic analyses are helpful in predicting the effects of structures and channel modifications on ice cover formation and retention. Often, varying the flow rate in a raticular system at the proper time. on ice cover formation and retention. Often, varying the flow rate in a particular system at the proper time will make the difference between whether a structure will or will not retain ice. The structure, however, invariably adds reliability to the sheet ice retention process

CR 83-31 MECHANICS OF ICE JAM FORMATION IN

Ackermann, N.L., et al, Dec. 1983, 14p., ADA-138 371, For another version see 36-3281. 12 refs.

38.4468

ICE JAMS, ICE FORMATION, ICE MECHANICS. RIVER ICE, RIVER FLOW, HYDRAULICS, ICE CROSSINGS, COMPUTER PROGRAMS, MATH-EMATICAL MODELS.

A mathematical model is described that is used to determine A mathematical model is described that is used to determine the maximum ice conveyance capacity of a river channel. Based upon this model, computer programs were developed that enable the ice discharge to be calculated for steady-state flow conditions. For rivers that have uniform flow, the maximum ice-conveying capacity can be described with a simple function expressed in terms of the size of the ice fragments, channel geometry, and the flow of water in the river. For nonuniform flows, the computer program determines the elevation profile of the surface larger in addition in the fiver For nonuniform flows, the computer program determines the elevation profile of the surface layer in addition to other flow characteristics, such as the velocity and surface concentration of the ice fragments. The location along this surface profile where the ice conveyance capacity becomes less than the upstream supply is determined and is considered to be the position where a surface ice jam or ice bridge will be formed.

CR 83-32 ICE FORCE MEASUREMENTS ON A BRIDGE PIER IN THE OTTAUQUECHEE RIVER, VER-MONT.

Sodhi, D.S., et al, Dec. 1983, 6p., ADA-139 425, 2

Kato, K., Haynes, F.D.

ICE LOADS, ICE FLOES, PIERS, BRIDGES, ICE PRESSURE, RIVER ICE, WATER LEVEL, ICE STRENGTH, ICE MECHANICS.

lce forces on a bridge pier in the Ottauquechee River, in Quechee, Vermont, were measured by installing four panels—each capable of measuring forces in the normal and tangential direction—on both sides of a vertical V-shaped pier nose The measured forces are presented for a short period during an ice run. After the ice run, the thickness and sizes

of the ice floes were measured and the compressive strength of the ice was determined in the laboratory from the ice samples collected along the river banks. The water level measurements made at several locations along the river are also presented for the period of the ice run.

CR 83-33
THERMODYNAMIC MODEL OF CREEP AT
CONSTANT STRESSES AND CONSTANT
STRAIN RATES.

Fish, A.M., Dec. 1983, 18p., ADA-139 883, Refs. p.16-18. 38-4470

SOIL CREEP, FROZEN GROUND THERMODY-NAMICS, FROZEN GROUND MECHANICS, ICE MECHANICS, STRESSES, STRAINS, RHEOLO-GY, MATHEMATICAL MODELS.

MECHANICS, STRESSES, STREINS, KIEGLO-GY, MATHEMATICAL MODELS.

A thermodynamic model has been developed that for the first time describes the entire creep process, including primary, secondary, and tertuary creep, and failure for both constant streas (CS) tests and constant strain rate (CSR) tests, in the form of a unified constitutive equation and unified failure criteris. Deformation and failure are considered as a single thermoactivated process in which the dominant role belongs to the change of entropy. Failure occurs when the entropy change is zero. At the moment the strain rates in CS tests reach the minima and stress in CSR tests reaches the maximum (peak) values Families of creep and stress-strain curves, obtained from uniaxial compression CS and CSR tests of frozen soil, respectively (both presented in dimensionless coordinates), are plotted as straight lines and are superposed, confirming the unity of the deformation and failure process and the validity of the model. A method is developed for determining the parameters of the model, so that creep deformation and the stress-strain relationship of ductile materials such as soils can be predicted based upon information obtained from either type of test

TOWARD IN-SITU BUILDING R-VALUE MEASUREMENT.

Flanders, S.N., et al, Jan. 1984, 13p., ADA-139 917,

Marshall, S.I.

THERMAL CONDUCTIVITY, BUILDINGS, THERMAL INSULATION, WALLS, HEAT FLUX, TEMPERATURE MEASUREMENT, INFRARED PHOTOGRAPHY, ACCURACY.

PHOTOGRAPHY, ACCURACY.

A technique for measuring the thermal resistance (R-value) of large areas of building envelope is under development it employs infrared thermography to locate radiant temperature extremes on a building surface and to provide a map of normalized temperature values for interpolation between locations. Contact thermal sensors (thermocouples for temperature and thermopiles for heat flow) are used to calculate the R-value at specific locations by summing the output from each sensor until the ratio between temperature difference from inside to outside surface and heat flow converges to a constant value. R-value measurements of a wood frame insulated wall were within 13% of the expected theoretical value. Similar measurements of a masonry wall were 31 and 43% less than expected. Experimentation demonstrated that a large ratio between temperature difference was the single most important variable affecting accuracy and speed of convergence. Thermal guards around heat flow sensors were of little value, according to both experimentation and computer simulation. Attempts to match the absorptivity of sensors with their surroundings may have been insufficient to diminish about 10% of the remaining error in measurement to diminish about 10% of the remaining error in measurement to the standard of the convection of the problems for accuracy in the masonry construction. Currently, an investigator cannot rely on the literature for guidance massessing the limitations on accuracy for in-situ building R-value measurement. R-value measurement.

ELECTROMAGNETIC PROPERTIES OF SEA ICE.

Morey, R.M., et al. Jan. 1984, 32p., ADA-140 330, 26

Kovacs, A. Cox. G.F.N

ICE ELECTRICAL PROPERTIES, SEA ICE, ELECTROMAGNETIC PROPERTIES, DIELECTRIC PROPERTIES, ELECTRICAL RESISTIVITY, ICE SPECTROSCOPY, ICE CRYSTAL STRUCTURE, ANISOTROPY, BRINES

IURE, AMISOTROFT, DRIVED.

Investigations of the in situ complex dielectric constant of sea ice were made using time-domain spectroscopy. It was found that (1) for sea ice with a preferred horizontal crystal e-axis alignment, the anisotropy or polarizing properties of the ice increased with depth, (2) brine inclusion conductivity increased with decreasing temperature down to about -8. of the see increased with depth, (2) brine inclusion conductivity increased with decreasing temperature down to about -8. C, at which point the conductivity decreased with decreasing temperature. (3) the DC conductivity of sea ice increased with increasing brine volume. (4) the real part of the complex dielectric constant is strongly dependent upon brine volume but less dependent upon the brine inclusion orientation. (5) the imaginary part of the complex dielectric constant was strongly dependent upon brine inclusion orientation but much less dependent upon brine volume. Because the electromagnetic (EM) properties of sea ice are dependent upon the physical state of the ice, which is continually changing.

it appears that only trends in the relations ps between the EM properties of natural sea ice and its bine volume and brine inclusion microstructure can be established.

CR 84-03 MODEL TESTS ON TWO MODELS OF WTGB 140-POOT ICEBREAKER.

Tatinclaux, J.C., Jan. 1984, 17p., ADA-139 882, 10

ICEBREAKERS, ICE COVER STRENGTH, ICE CONDITIONS, ICE BREAKING, UREA, DOPED ICE, MODELS,

ICE, MODELS.

The results of resistance tests in level to, and broken ice channels are presented for two model, of the WTGB 140-ft tecbreaker at scales of 1 10 and 1 24, respectively. No scale effect on the resistance in level toe could be detected between the two models. From the test results an empirical predictor equation for the full scale toe resistance is derived. Predicted resistance is compared against, and found to be 25 to 40% larger than, available full-scale values estimated from thrust measurements during full-scale trials of the Great Lakes techreaker Katmas Bay.

CR 84-04 EFFECTIVENESS AND INFLUENCES OF THE NAVIGATION ICE BOOMS ON THE ST. MARYS

Perham, R.E., Jan 1984, 12p., ADA-139 908, 8 refs.

ICE NAVIGATION, ICE BOOMS, RIVER ICE, ICE BREAKING, ICE CONTROL, ICE BREAKUP, ICE MECHANICS, ICE COVER THICKNESS.

ICE BREAKING, ICE CONTROL, ICE BREAKUP, ICE MECHANICS, ICE COVER THICKNESS.

Ice problems developed in the Sault Ste. Marie, Michigan, portion of the St. Marys River because of winter navigation. Passing ships and natural influences moved ice from Soo Harbor into Little Rapids Cut in sufficient quantities to siam, cause high water in the harbor, and prevent further ship passage. After physical model and engineering studies, two ice booms with a total span of 1375 ft (419 m) with a 250-ft (76-m) navigation opening between were installed at the head of Little Rapids Cut in 1975 A modest field study program on the booms was conducted for the ensuing four winters to determine ice and boom interaction and the effects of ship passages on the system. Forces on some anchors were recorded and supplemental data were taken by local personnel. Several reports have been written about the booms' early operations. This paper presents a four-year summary of the main effects of the boom on ice and ship interaction and vice versa. Throughout the four winter seasons, the small quantities of ice lost over and between the booms were manageable. Ships usually passed through the boom without influencing the boom force levels, but at times they brought about large changes. One boom needed strengthening, and artificial islands were added for upstream ice stability. Coast Guard icebreakers were also a necessary part of winter navigation in this area.

CR 84-05 MORPHOLOGY AND ECOLOGY OF DIATOMS IN SEA ICE FROM THE WEDDELL SEA Clarke, D.B., et al, Feb. 1984, 41p., ADA-141 994,

Refs. p.12-14 Ackley, S.F., Kumai, M.

38-4501

ICE COMPOSITION, ALGAE, PACK ICE, SEA ICE, PLANKTON, ICE CORES, ICE COVER THICKNESS, ICE SALINITY, ECOLOGY, CLASSIFICATIONS, ANTARCTICA—WEDDELL SEA. SIFICATIONS, ANTARCTICA—WEDDELL SEA.
Diatom species composition and relative abundances were
determined for tee cores obtained from Weddell Sea pack
tice during the October-November 1981 Weddell Polynya
expedition (WEPOLEX) lee thickness and salinity indicate
that the ice was less than one year old. The predominant
tice type (70%) was frazil, which has the capacity to mechanically incorporate biological material through nucleation and
scavenging. Diatoms were found throughout the length
of the cores. Species showed down-core fluctuations in
abundance that appeared to be correlated with changes in
tice type. Pennate forms were more abundant than centrics,
the average ratio being 16.1 Diatom frustules with intact
organic material were more abundant (50 million cells/liter).
Differences in species abundances are attributed initially to
incorporation of algal cells from a temporally changing water
column and subsequently to diatom reproduction within the
ties. Scanning electron micrographs illustrating the morphologic characteristics of the predominant species are included.

CR 84-06

CR 84-06 AEROSOL GROWTH IN A COLD ENVIRON-

Yen, Y-C., Feb 1984, 21p., ADA-139 907, 4 refs.

AEROSOLS, GROWTH, HEAT TRANSFER, MASS TRANSFER, VAPOR DIFFUSION, COLD WEATHER TESTS, ANALYSIS (MATHEMATICS), DROPS (LIQUIDS), TEMPERATURE EF-

An expression relating acrosol growth to cold environmental An expression relating acrossol grown to cold environmental conditions was developed. This was accomplished by solving the diffusion equation with the method of Laplace transformation. The series solution was expressed in terms of the ratio of vapor deneity over displict surface to droplet density, ratio of environmental vapor density at time zero to vapor density over droplet surface, and ratio of product of diffusion coefficient and time to square of initial radius of condensation nucleus. To take into account the variation of the vapor density over the surface of an acidic condensation nucleus due to the continuous dilution of the droplet, the solution was obtained by assuming various levels of constant vapor

CR 84-07 FORCE DISTRIBUTION IN A FRAGMENTED ICE COVER.

Stewart, D.M., et al, Mar. 1984, 16p., ADA-142 100, 10 refs

Daly, S.F. 38-4476

ICE FLOES, SHEAR STRESS, FLOATING ICE, LOADS (FORCES), ICE BOOMS, ICE LOADS, RIVER ICE, ICE COVER THICKNESS, SHORES, EXPERIMENTATION.

EXPERIMENTATION.

Experiments were conducted in CRREL's refingerated flume facility to examine the two-dimensional force distribution of a floating, fragmented ice cover restrained by a boom in a simulated river channel. To determine the force distribution, a vertically walled channel, instrumented for measuring normal and tangential forces, and an instrumented restraining boom were installed in a 400-by 1.3-m flume Two sizes of polyetylene blocks and two similar sizes of freshwater ice blocks were tested using water velocities ranging from 10 to 30 cm/s. The forces measured at the instrumented boom leveled off with increasing cover length. The contribution of the increasing shear forces developed along the shorelines to this leveling off in the data was clearly evident. The shear coefficients of the polyethylene blocks averaged 0.43, and the freshwater ice averaged 0.044. The normal force measured along the instrumented shortline could not be related simply by a K coefficient to the longitudinal force; another expression was required, with a term being a function of the cover thickness and independent of the undercover shear stress or cover length. By adding this term, good agreement was then found between the measured and predicted values of the boom forces and the shoreline normal and shear forces

CR 84-08 MECHANICAL PROPERTIES ('F MULTI-YEAR SEA ICE. TESTING TECHNIQUES.
Mellor, M, et al, Apr. 1984, 39p., ADA-144 431, 17

Cox, G.F.N., Bosworth, H.

39-382

ICE MECHANICS, SEA ICE, STATIC LOADS, COMPRESSIVE PROPERTIES, TENSILE PROP-ERTIES, EQUIPMENT, ICE SAMPLING, TESTS. ERTIES, EQUIPMENT, ICE SAMPLING, TESIS.

This report describes the equipment and procedures that were used for acquiring, preparing and testing samples of multi-year sea acc. Techniques and procedures are discussed for testing ice samples in compression and tension at constant strain rates and constant loads, as well as in a conventional traxial cell. A detailed account is given of the application and measurement of forces and displacements on the ice test specimens under these different loading conditions

MECHANICAL PROPERTIES OF MULTI-YEAR

SEA ICE. PHASE 1: TEST RESULTS.
Cox, G.F.N, et al, Apr. 1984, 105p., ADA-144 132, 21 refs.

Richter-Menge, J.A., Weeks, W.F., Mellor, M., Bosworth, H.

ICE MECHANICS, SEA ICE, PRESSURE RIDGES, ICE STRENGTH, COMPRESSIVE PROPERTIES, TENSILE PROPERTIES, STATIC LOADS, ICE PHYSICS, ICE SAMPLING, ICE FLOES, STATISTICAL ANALYSIS.

This report presents the results of the first phase of a test program designed to obtain a con prehensive understanding of the mechanical properties of multi-year sea ice from the Alaskan Beaufort Sea In Phase I, 222 constant-train-rate uniaxial compression tests were performed on ice samples rate uniaxual compression tests were performed on ice samples from ten multi-year pressure ridges to examine the magnitude and variation of ice strength within and between pressure ridges. A limited number of constant-istrain-rate compression and tension tests, constant-load compression tests, and conventional triaxual tests were also performed on ice samples from a multi-year flot to provide preliminary data for developing ice yield unteria and constitutive laws for multi-year sea ice. Data are presented on the strength fultire strain sea ice. Data are presented on the strength, failure strain, and modulus of multi-year sea ice under different loading conditions. The statistical variation of ice strength within conditions. The statistical variation of ice strength within and between pressure ridges is examined, as well as the effects of the temperature, porosity, structure strain rate and confining pressure on the mechanical properties of multiCR 84-10

MODELING TWO-DIMENSIONAL FREEZING USING TRANSFINITE MAPPINGS AND A MOVING-MESH FINITE ELEMENT TECH-NIQUE.

Albert, M.R., May 1984, 45p., ADA-144 131, 29 refs.

FREEZING, PHASE TRANSFORMATIONS, HEAT TRANSFER, BOUNDARY VALUE PROB-LEMS, MATHEMATICAL MODELS, LATENT HEAT.

Freezing phase change problems in conduction heat transfer represent a set of me ing boundary problems for which much interest currently "xists". In the work presented here, two-dimensional freezing is modeled by incorporating the use of transfinite mappings with a moving-mesh finite element technique. The use of transfinite mapping in governing interior mesh motion is shown to provide very acceptable results and is demonstrated to be the most efficient. acceptable results and is demonstrated to be the most efficient general computational technique used to date. The model developed is capable of using either Cartesian or (r,z) cylindrical coordinates. Both frozen and unfrozen phases may be modeled when conduction governs behavior in both In the case of freezing of a fluid as it flows through a pipe the usefulness of always having the phase boundary coincident with element boundaries is demonstrated. Results of the with element boundaries is demonstrated. Results of the model are shown to compare well with analytical and experimental results. A von Neumann stability analysis is performed for the numerical solution and tends to support the observation that the occurrence of a high Peclet number in the moving-mesh model of heat conduction may produce distortions of the numerical solution

CD 84-11 SEA ICE DATA BUOYS IN THE WEDDELL SEA. Ackley, S.F., et al, May 1984, 18p, ADA-144 953, 6

Holt, ET.

SEA ICE DISTRIBUTION, PACK ICE, DRIFT, WEATHER OBSERVATIONS, DRIFT STATIONS, ATMOSPHERIC PRESSURE, AIR TEMPERA-TURE, ANTARCTICA—WEDDELL SEA.

ATMOSPHERIC PRESSURE, AIR TEMPERA-TURE, ANTARCTICA—WEDDELL SEA.

Data obtained from two sets of data buoys either air-dropped or deployed by ship onto the Weddell Sea pack ice during the period from Dec 1978 to Nov 1980 are presented. The buoy data include position, pressure and temperature information and to date represent the most complete combined weather and pack ice drift records for the ice-covered southern ocean regions. The buoys tended to drift north initially and then to turn cast generally between latitudes 62 S and 64 S. Buoy 1433 turned east farther south at approximately 67 S but at about the same time as buoy 0527, implying that the westerly wind belt was farther south than usual in 1979. The range of air pressures—from about 950 mb to about 1020 mb—is typical of the circumpolar low pressure trough in the Southern Hemisphere. All buoys were equipped with an internal or compartment temperature sensor. The buoys also contained an external air temperature sensor in a ventilated, shielded can at 1-m height. Although differences of 10 C or more between recorded air and compartment temperatures are higher probably because the buoy is radiationally heaved. We found that subtracting 3 C from the average daily compartment temperature yielded a good estimate of the average were temperature yielded a good estimate of the average air temperature for any given day. This technique can be used to construct average daily air temperature records for the 1979 buoys which only contained the internal or compartment temperature sensor.

ICING RATE ON STATIONARY STRUCTURES UNDER MARINE CONDITIONS.

Itagaki, K., June 1984, 9p., ADA-145 797, 7 refs 39-385

ICING, OFFSHORE STRUCTURES, ICE FORMA-TION, OFFSHORE DRILLING, SHIP ICING, SEA SPRAY, WIND VELOCITY, ANALYSIS (MATH-EMATICS).

The rate of ice accumulation on stationary structures was calculated using published data. The results were compared with icing measured on board ships. Although the general trend of this calculation indicated parallelism with the onboard measurements, the measured ice accumulation rate on ships needed a 5 to 8 m/s higher windspeed to correspond with the calculated rate for stationary structures

NITROGEN REMOVAL IN WASTEWATER PONDS.

Reed, S.C., June 1984, 26p., ADA-144 971, 26 refs

39-386
WASTE TREATMENT, ICE COVER EFFECT.
WATER TREATMENT, SANITARY ENGINEER-ING. PONDS, CHEMICAL ANALYSIS, MATH-EMATICAL MODELS

EMATICAL MODIFIES

Nittogen removal from wastewater can be required in a number of situations, and many military facilities have been or will be retrofitted for this purpose. Treatment lagoons and holding or storage ponds are a common treatment method or a common component in many systems. Qualitative observations over several decades document nitrogen losses.

from these systems due to a variety of possible biochemical interactions. This analysis is based on an extensive body of quantitative data recently published by the U.S. EPA. A mathematical model was developed and validated that indicated that nitrogen removal from pond systems is dependent on pH, temperature, and detention time. The specific biochemical factors could not be isolated, but the analysis suggests that volatilization of ammonia is the major pathway for nitrogen loss. The model can be used as a design equation for new facilities, for retrofits, and for land treatment systems with storage ponds, since nitrogen is a critical design parameter in these cases.

CR 84-14 EFFECTS OF LOW TEMPERATURES ON THE GROWTH AND UNFROZEN WATER CONTENT OF AN AQUATIC PLANT.

Palazzo, A.J., et al, June 1984, 8p., ADA-147 107, 24

Tice, A.R., Oliphant, J.L., Graham, J.M.

PLANT TISSUES, TEMPERATURE EFFECTS, UNFROZEN WATER CONTENT, COLD TULER-ANCE, LOW TEMPERATURE TESTS, G. OWTH, DAMAGE, NUCLEAR MAGNETIC NANCE, AQUATIC PLANTS.

DAMAGE, NUCLEAR MAGNETIC RESONANCE, AQUATIC PLANTS.

Two laboratory studies were performed to investigate the effects of low temperatures on the aquatic plant Ceratophyllum dimersum L. Whole plants were subjected to low-temperature treatments of +4.0 and -6C for 48 hours, and regrowth was compared to an untreated control. The control and +4C-treated plants gained weight, while visible injury and reductions in plant biomass were noted 30 days after treatment at the two lower temperatures. The -6C treatment killed the plants, while the 0C treatment injured them to some degree in another phase of this study, nuclear magnetic resonance (NMR) analysis of plant buds, leaves and stems showed that lowering temperatures caused the plants' unifrozen water content to drop rapidly as the temperature approached -5C, then slowly as temperatures sporoached -13C. From -13C to -22C there was little change in unfrozen water content. The results show that ice in this plant causes injury that affects subsequent regrowth; temperatures of -6C or below can actually kill them This killing temperature was also near the point where frozen water content increased only slightly with lower temperatures. NMR analysis could be one way of determining plant tolerance to cold. It appears from this study that this weedy species is susceptible to low-temperature injury, and subjecting this plant to cold may be a promising method of weed control in northern lakes.

CR 84-15 BASELINE ACIDITY OF ANCIENT PRECIPITA-TION FROM THE SOUTH POLE

Cragin, J.H., et al, June 1984, 7p, ADA-145 007, 33

Giovinetto, M.B., Gow, A.J. 39-387

ICE COMPOSITION, ICE CORES, DRILL CORE ANALYSIS, PRECIPITATION (METEOROLO-GY), CHEMICAL PROPERTIES, FIRN, PALEO-CLIMATOLOGY, ANTARCTICA—AMUNDS-EN-SCOTT STATION.

Measurements of meliwater pH from annual layers of South Pole firn and ice samples ranging in age from 40 to 2000 years BP show that precipitation at this remote site has a higher natural acidity than that expected from atmospheric equilibrium with CO2 The average pH of desertated (CO2a higher natural aendity than that expected from atmospheric equilibrium with CO2. The average pH of deaerated (CO2-free) samples was 5 64, while air-equilibrated samples averaged 5 37, a pH that is about a factor of two more acidic than the expected background pH of 5 65.

The observed "excess" acidity can be accounted for by natural SO4 and NO3 ion levels in the samples probably originating from non-anthropogenic H2SO4 and HNO3. Because of the presence of these naturally occurring acids in South Pole precipitation, a pH of 5 4 is considered a more representative baseline reference pH for acid precipitation studies.

CR 84-16 EFFECTS OF SOLUBLE SALTS ON THE UN-FROZEN WATER CONTENTS OF THE LANZ-HOU, P.R.C., SILT. Tice, AR, et al, June 1984, 18p, ADA-152 825, 24

Zhu, Y. Oliphant, J.L. 39-2916

UNFROZEN WATER CONTENT, SALINE SOILS, LOESS, SOIL WATER, SOLUBILITY, TEMPERATURE EFFECTS, ELECTRICAL RESISTIVITY

RESISTIVITY

Phase composition curves are presented for a typical saline silt from Lanzhou, P.R.C., and compared to some s.lts from Alaska. The unfrozen water content of the Chinese silt is much higher than that of the Alaskan wits due to the large amount of soluble salits present in the silts from China, which are not present in silt from interior Alaska. When the salt is removed, the unfrozen water content is then similar for both the Chinese and Alaskan silt. Here, we introduce a technique for correcting the unfrozen water content of partially fiven soils due to high salt concentrations. We calculate the equivalent molality of the salts in the unfrozen water at various temperatures from a measurement of the clevincal ecoductivity of the extract from saturated parte.

CR 84-17

PULSE TRANSMISSION THROUGH PROZEN

Arcone, S.A., July 1984, 9p., ADA-147 108, 19 refs

FROZEN GROUND PHYSICS, RADIO WAVES, WAVE PROPAGATION, PERMAFROST PHYSICS, RADAR, TEMPFRATURE EFFECTS.

SICS, RADAR, TEMPFRATURE EFFECTS.
VHF-band radiowave short pulses were transmitted within the permafrost tunnt at Fox, Alaska, over distances between 2.2 and 10.5 m. The propagation medium was a frozen silt containing both disseminated and massive ice with temperatures varying from -7C near the transmitter to probably -2C near the center of the tunnel overburden pulses underwent practically no dispersion in the coldest zones but did disperse and refract through the warmer overburden, as suggested by calculations of the effective dielectric constant. Most significantly the measured frequency content decreased as the effective dielectric constant increased. The results indicate that deep, cross-borchole pulse transmissions over distances greater than 10 m might be possible, especially when the ground is no warmer than -4C. The information thus gained could be used for identifying major subsurface variations, including ground ice features.

FRAZIL ICE FORMATION.

Ettema, R., et al, July 1984, 44p., ADA-147 425, 34

Karim, M.F., Kennedy, J.F.

FRAZIL ICE, ICE FORMATION, HEAT FRANSFER, PARTICLE SIZE DISTRIBUTION MATHEMATICAL MODELS, TESTS, TUBULENT FLOW, WATER TEMPERATURE, COMPUTER PROGRAMS, SUPERCOOLING.

PROGRAMS, SUPERCOOLING.
This report investigates the influences of turbulence and water temperature on frazil ice formation
the quantity of frazil ice formed in a specified volume of supercooled water increasing water temperature of turbulence intensity on the rate of frazil ice formation, however, is more pronounced for larger initial supercooling. The turbulence characteristics of a flow affect the rate of frazil ice formation by governing the temperature to which the flow can be supercooled by influencing heat transfer from the frazil ice to surrounding water, and by promoting collision nucleation, particle and floc rupture and increasing the number of nucleation sites

Larger frazil ice particles collision nucleation, particle and floc rupture and increasing the number of nucleation sites. Larger frazil ice particles formed in water supercooled to lower temperatures. The particles usually were disks, with diameters several orders greater than their thickness. Particle size generally decreased with increasing turbulence intensity. This report develops an analytical model, in which the ice formation is related to temperature rise of a turbulent volume of water from the release of latent heat of fusion of liquid water to ice. Experiments conducted in a turbulence jar with a heated, vertically oscillating grid served both to guide and to calibrate the analytical model as well sate afford insights into frazil ice formation. The formation of frazil ice was studied for temperatures of supercooled water ranging from -0.9 to -0.05 C

CR 84-19

FORECASTING WATER TEMPERATURE DE-CLINE AND FREEZE-UP IN RIVERS.

Shen, H.T, et al, July 1984, 17p, ADA-147 068, 14 refs

Foltyn, E.P. Daly, S.F.

ICE FORMATION, RIVER ICE. WATER TEM-PERATURE, FREEZEUP, LONG RANGE FORE-CASTING, COMPUTER PROGRAMS

In this study a method for making long-range forecasts of freeze-up dates in rivers is developed. The method requires the initial water temperature at an upstream station. requires the initial water temperature at an upstream station, the long-range art temperature forecast, the predicted mean flow velocity in the river reach, and water temperature response parameters. The water temperature response parameters can be either estimated from the surface heat exchange coefficient and the average flow depth or determined empirically from recorded air and water temperature data. The method is applied to the St. Lawrence River between Kingston, Ontario, and Massena. New York, and is shown to be capable of accurately foresting forecast. of accurately forecasting freeze-up

CR 84-20 CHANGE IN ORIENTATION OF ARTILLERY-DELIVERED ANTI-TANK MINES IN SNOW. Bigl, S.R., Aug 1984. 20p., ADA-090 946, 5 refs.

MILITARY OPERATION, TANKS (COMBAT VEHICLES), SNOW COVER EFFECT, ORIENTA-TION, TEMPERATURE EFFECTS, TESTS.

TION, TEMPERATURE EFFECTS, TESTS.
The Remote Anti Armor Mine System (RAAMS) employs scatterable mines that are delivered by ejection from a projectife during flight. A problem with delivery of RAAMS mines in anow arises because a percentage of them are equipped with an anti-disturbance mechanism. The natural disturbance or tilling of the mines while melting into the smooth on a warm or sunny day may cause them to detonate Five tests lasting 3 hours to 5 days were conducted at CRREL to study change in orientation of RAAMS mines after landing in snow. Mines were set in the snow at

various repose angles and their operatations were recorded periodically. The tests indicated that a critical angle of approximately 65 deg from horizor all divides the settlement patterns of the mines. Those with initial repose angles below 65 deg will tend towards 5 deg, while more steeply dipping mines will most often come to rest fin a vertical position. Angular change rates during midday hours (0900–1500) ranged from 0 deg to 10 deg (er hour. On sunny days with near-freezing temperaturing, most mines had a total oite-day change of 10 deg to 2 deg. From these tests, it appears that many of the mines would have detonated if they had been equipped with an anti-disturbance mechanism.

CR 84-21 IMPACT OF DREDGING ON WATER QUALITY AT KEWAUNEE HARBOR, WISCONSIN. Iskandar, I.K., et al, Aug. 1984, 16p., ADA-148 321,

Cragin, J.H., Parker, L.V., Jenkins, T.F 40-3546

DREDGING, SEDIMENTS, WASTE DISPOSAL, WATER POLLUTION, LACUSTRINE DEPOSITS, WATER CHEMISTRY, PORTS, UNITED STATES WISCONSIN-KEWAUNEE.

Six sediments and four water samples were collected from Kewaunee, Wisconsin. in 1981, prior to dredging of this Lake Michigan harbor. A modified clutrate test was used Kewainee, Wisconsin, in 1981, pror to dredging of this Lake Michigan harbor. A modified clutrate test was used to estimate potential impact on water quality upon harbor dredging and disposal of the sediments in a confined facility. The modification of the test included a comparison between containment release under aerated vs unaerated conditions and filtered vs unfiltered clutrates. Statistical analysis showed that the differences in the chemical characteristics between the filtered and unfiltered samples were significant for soluble reactive P and all the tested metals except Cu Significant but low amounts of heavy metals (Cd. Pb. Zn. Ni, Fe. Mn) and soluble reartive P will be released to the water if the effluent is not filtered. Under aerated conditions, COD in both the filtered and unfiltered samples was higher than under unaerated conditions. In contrast, total organic carbon was much higher under the unaerated condition than under aerated conditions. The study concluded that sediment and containmant releases from the confined disposal facility (CDF) to the harbor water were less than those from the Kewainer River input. Also, retention of effluent in the CDF for about four days decreased the suspended solids in the effluent to about 40 to 50 mg/L, which is similar to the concentration in the lake water. The use of sand filters should not be for routine operation but rather for emergency cases when there is not enough time for effluent retention in this CDF.

CR 84-22 REGIONAL AND SEASONAL VARIATIONS IN SNOW-COVER DENSITY IN THE U.S.S.R. Bilello, M.A., Aug. 1984, 70p, ADA-148 429, Refs.

39.1140 39-1140
SNOW COVER DISTRIBUTION, SNOW DENSITY, SNOW SURVEYS, SNOW DEPTH, TOPO-GRAPHIC EFFECTS, GEOGRAPHY, SEASONAL VARIATIONS, WIND VELOCITY, FOREST CANOPY, MAPPING, USSR.

CANOPY, MAPPING, USSR.
Regional and seasonal variations in snow-cover density (SCD) in the USSR were determined through the analysis of data obtained from all available Soviet literature. A relationship found between observed winter wind speeds and SCD values recorded from November through March made it possible to develop a snow-density map of the USSR. The map was divided into five general categories of SCD, ranging from values less than or equal to 0.21 g/cu cm at interior stations with very light winds to values greater than or equal to 0.31 g/cu cm at artic locations with strong winds. Since this literature survey indicated that the reported Soviet SCD values were incorrect due to instrumental errors, adjustments to the data in this study were required. Month-to-month investigation of the SCD data revealed a gradual increase in density from November to March and that the SCD values under forest canopies averaged from 4 to 14% lower than those recorded in open areas Also included in this report are 1) a compilation of pertinent passages in the Soviet literature on SCD. 2) a map showing the location of SCD measurements, and 3) an average winter wind speed chart for the USSR.

CR 84-23 EFFECT OF SNOW ON VEHICLE-GENERATED SEISMIC SIGNATURES

Albert, D G, Aug 1984, 24P, ADB-090 976, 10 refs.

MILITARY OPERATION, SNOW COVER EF-FECT. SEISMOLOGY, DETECTION, VEHICLES, ATTENUATION, ACOUSTICS. SEASONAL VARIATIONS.

Vehicle-generated sessingiams recorded under summer and uniter conditions at Fort Devens. Massachusetts, are analyzed and compared. The data were recorded using three-component geophones located just beneath the ground surface and microphones mounted on tripods 0.3 in tall. Winter data were recorded when a 0.7-m thick snow cover was present. The filtering effect of this snow cover on the seismic data was striking. The appearance and frequency content of the recorded ground motion changed dramatically from summer to winter because snow attenuates the acoustic-to-seismic coupled energy. These changes were verified by magnitude-squared coherence analysis and by a simple Wiener prediction. Vehicle-generated seismograms recorded under summer and

model. Automatic vehicle classification algorithms will have to account for these effects if the algorithms are to operate successfully in the presence of snow

CR 84-24

CRYSTALLINE STRUCTURE OF UREA ICE SHEETS USED IN MODELING EXPERIMENTS IN THE CRREL TEST BASIN.

Gow, A.J., Sep. 1984, 48p., ADA-146 434, 29 refs.

ICE CRYSTAL STRUCTURE, UREA, SEA ICE, ICE MECHANICS, GRAIN SIZE, ICE MODELS,

ICE MECHANICS, GRAIN SIZE, ICE MODELS, ICE SHEETS, TESTS.
This report describes the growth characteristics and crystalline textures of urea ice sheets which are now used extensively in the CRREL test basin for modeling sea ice. The aims of the report are to describe the different kinds of crystalline texture encountered in urea ice sheets and to show that even small variations in texture can drastically influence the mechanical behavior of urea ice sheets. Standard petrographic techniques for studying microstructure in thin sections were used on 24 urea ice sheets. These investigations entailed observations of the crystalline texture of the ice (including details of the subgrain structure), grain size measurements, and studies of the nature and extent of urea entrapment and drainage patterns in the ice. Increased knowledge of the factors controlling the crystalline characteristics of urea ice sheets has progressed to the point where test basin researchers at CRREL are now able to fabricate ice sheets with prescribed structures leading to fabricate ice sheets with prescribed structures leading to predictable mechanical properties

CR 84-25 REVIEW OF ANTITANK OBSTACLES FOR WINTER USE.

Richmond, P.W., Sep 1984, 12p., ADB-100 767L, 24 refs.

TANKS (COMBAT VEHICLES), DETONATION WAVES, MILITARY OPERATION, SNOW COVER EFFECT, ICE COVER EFFECT, BORE-HOLES, MODELS, DRILLING, AUGERS.

HOLES, MODELS, DRILLING, AUGERS.
This report is a review of information, equipment and procedures related to the use of antitank obstacles in winter. Demolition and construction of expedient and existing obstacles are discussed. Obstacle performance models are identified and their methodology is discussed. Five tasks are identified as areas requiring further research. 1) investigation of the use of light-weight augers for drilling bore holes in frozen soil, 2) investigation of the effectiveness of Soviet-style snow obstacles, 3) development of a model of vehicle performance on snow-covered slopes. 4) development of a design procedure and performance model for step-type obstacles when snow covered, and 5) development of construction procedures for creating ties slopes. procedures for creating ice slopes

CR 84-26

SHORE ICE RIDE-UP AND PILE-UP FEA-TURES. PART 2: ALASKA'S BEAUFORT SEA COAST—1983 AND 1984.

Kovacs, A., Sep. 1984, 28p. + map, ADA-148 428, 16 refs

ICE OVERRIDE, ICE PILEUP, SEA ICE DISTRIBUTION, ICE MECHANICS, FAST ICE, BEACHES, SHORES, BEAUFORT SEA. ARCTIC OCEAN.

Observations of shore ice pile-up and ride-up along the Alaska Beaufort Sea coast in 1983 and 1984 are presented. New information on historical accounts of onshore ice movement, uncovered since publication of Part 1 in this series, reported An account is given of ice overtopping a acrete caisson exploration island in the Canadian Beaufort

CR 84-27
RADAR INVESTIGATIONS ABOVE THE
TRANS-ALASKA PIPELINE NEAR FAIR-BANKS

Arcone, S.A. et al, Oct. 1984, 15p., ADA-150 303, 15

Delancy, A J.

39-2098

RADAR ECHOES, UNDERGROUND PIPE-LINES, REMOTE SENSING, FREEZE THAW CY-CLES, WATER TABLE, WATER CONTENT, RE-**FRACTION** UNITED STATES—ALASKA FAIRBANKS.

FAIRBANKS.
Radar and wide-angle reflection and refraction (WARR) profiles were obtained across three buried sections of the trans-Alaska pipeline near Fairbanks in late April 1983. A broad-band, pulsed radar operating in the VHF (seep high frequency) range was used. The surficial geology at the three sites consisted of gravel (dredge tailings) silt and alluvium, respectively, and the sites we e-marginally frozen or completely thawed. At the gravel set the pipe (approximately 2 m deep) and an underlying water table were easily sible. There was no radar signature of the pipe at the silt site the WARR profiles verified the high absorption of the material. The response was marginal at the alluvium tie. High absorption due to thawing or marginal freezing conditions about the pipe makes radar a generally poor choice for mapping freeze-thaw boundaries but a good choice for estimating material state and moisture content. estimating material state and moisture content

POLYETHYLENE GLYCOL AS AN ICE CONTROL COATING.

Itagaki, K., Dec. 1984, 11p., ADA-150 466, 13 refs 40.3577

40-3577
PROTECTIVE COATINGS, ICE CONTROL, ICE PREVENTION, RESINS, MELTING POINTS, SNOW ACCUMULATION, ICE ACCRETION, COUNTERMEASURES, TESTS.

The properties of polyethylene glycol (PEG) as a sacrificial ice control coating are discussed PEG is effective longer than many single component coatings, and it has low toxicity and a high flash point. The results of preliminary experiments on PEG's ability to control snow accumulation on panel and ice accumulation on a cryogenic tank are also

CR 84-29

REVERSE PHASE HPLC METHOD FOR ANAL-YSIS OF TNT, RDX, HMX AND 2,4-DNT IN MUNITIONS WASTEWATER.

Jenkins, T.F., et al, Dec. 1984, 95p., ADA-155 983, Refs. p.36-38.

Bauer, C.F., Leggett, D.C., Grant, C.L.

40-3578

WATER POLLUTION, WASTE DISPOSAL, EX-PLOSIVES, CHEMICAL ANALYSIS, DETEC-TION, TESTS, MILITARY FACILITIES, STATIS-TICAL ANALYSIS.

An analytical method was developed to determine the concentrations of HMX, RDX, TNT and 2,4-DNT in munitions wastewater The method involves dilution of an aqueous wastewater The method involves dilution of an aqueous sam he with an civil volume of methanol-acetonitrile solvent mixture, iditation is ough a 0.4 micron polycarbonate membrane and analysis of a 100 microl subsample by Reversephase, high-performance liquid christography using an LC 8 column tension times of these four analytes, their degradation products, and impurities expected in wastewater matrices were determined for two eluent composition

eluent of 50% water, 38% methanol and 12% acctonutrie successfully separated HMX, RDX and TNT from each other and the potential interferents. The method provided linear calibration curves over a wide range of concentrations.

CR 84.30

IMPACT OF SLOW-RATE LAND TREATMENT ON GROUNDWATER QUALITY: TOXIC OR-GANICS.

Parker, L.V., et al, Dec 1984, 36p., ADA-153 253, Refs. p 19-21.

Jenkins, T.F., Foley, B.T.

GROUND WATER, WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION. SEEPAGE, ORGANIC NUCLEI, ENVIRONMEN TAL IMPACT.

The removal efficiency for 16 organic substances ii. wastewater was studied on an outdoor, prototype slow-infiltration system. The initial concentration of each of these substances in the wastewater was approximately 50 microgram/L. Removal was via volatilization during spray application and subsequent adsorption in the soil. The percent removal during spraying could be estimated from the liquid-phase transfer coefficient, losses were up to 70% for the most volatile components. The total percent removal for the system, based on the concentration in the percolate, was more than 98% for all substances. Only chloroform, which has a low octanol-water coefficient and according to the iterature is not degradable aerobically, was continuously detected in the percolate. The major final removal mechanisms are believed to be volatilization and biodegradation-internation from the percolate. The major final removal mechanisms are believed to be volatilization and biodegradation early spring as a result of application during the colder months was also observed. The two substances that were most persistent in the soil were PCBs and dethylphthelate. The removal efficiency for 16 organic substances in wastewater months was also observed. The two substances that were most persistent in the soil were PCBs and dethylphthalate PCBs were apparently slowly lost from the system, probably by volatilization. The behavior of diethylphthalate was different in the two soils tested but was more recalcitant. than expected

CR 84-31 DETECTION OF BURIED UTILITIES. VIEW OF AVAILABLE METHODS AND A COM-PARATIVE FIELD STUDY.

Bigl, S.R., et al. Dec 1984, 36p. ADB-090 068L. 21

Henry, K.S., Arcone, S.A. 39-2918

UNDERGROUND FACILITIES, UTILITIES, DETECTION, FROST PENETRATION, MAGNETIC SURVEYS, GEOPHYSICAL SURVEYS, EARTH-

Locating buried utilities is often necessary for repair, servicing or prevention of damage when earthwork is to be conducted in a particular area. Of the many methods available for detection of buried utilities, those in most wide-spread use are magnetic induction, magnetometry, and radiofrequency tracking. Comparative field tests of 11 locators using these three operating methods were conducted in Hanoster New Hampshire and eight of these were further tested at the U.S. Military Academy, West Point, New York, and the Stewart Army Subport Newburgh, New York. At West Point and Newburgh, the nine sites included a variety of utility types including iron and steel pipe cable, sitreous

tile and plastic, as well as different terraln and groundcover tile and plastic, as well as different terrain and groundcover characteristics. Tests with the radiofrequency tracking locators were insufficient to evaluate their ability to locate nonmetallic pipe or to judge if one locator was superior to the other. Although not statistically different, slightly more accurate average readings were obtained with the magnetic induction and magnetometer instruments over cable than over pipe. Shallow utilities (<.3.5 ft) were located slightly more accurately than deeper ones. In general, the low-to mid-priced magnetic induction locators appeared to be most cost effective. Problems with accuracy in utility location occurred mainly at sites with steep topography or where utilities were in very close proximity. Successful where utilities were in very close proximity Successful operation of the instruments required only a small amount of training

CR 84-32 SHORELINE EROSION PROCESSES: ORWELL

LAKE, MINNESOTA.
Reid, J.R., Dec. 1984, 101p., ADA-152 952, Refs. 40.3545

WATER, BANKS (WATERWAYS), GROUND THAWING, SEDIMENT TRANSPORT, WATER WAVES, RESERVOIRS, SHORELINE MODIFICATION, RAIN. SEASONAL VARIABLES SHORE EROSION, SLOPE PROCESSES, LAKE CATION, RAIN, SEASONAL METEOROLOGICAL FACTORS.

METEOROLOGICAL FACTORS.

Orwell Lake, in west-central Minnesota, is a flood-control, water-management reservoir first impounded in 1953 Subsequent erosion of the shoreline and a lack of knowledge of slope erosion processes in this region prompted this study to identify and quantify the processes there The processes were measured at selected sites between June 1980 and June 1983 Erosion of the banks is primarily caused by three processes rain, frost thaw, and waves. The first two processes tend to move sediment to the base of the steen slopes forming a relatively eartify surface of accumulafirst two processes tend to move sediment to the base of the steep slopes, forming a relatively gentle surface of accumulation. Wave action then tends to move this sediment into the lake. Analysis of the data collected over three years has confirmed that wave action is the dominant crossion process, providing almost 7° c of the erosion during the 1981-82 study year. During the 1981 high pool level, 2,089 Mg of sediment, morely colluvium, was removed from the lower slopes by wave action rinking the 162 km of circling shoreline. More than 2,300 Mg was croded by waves accompanying the higher pool levels of 1982

ICE FORCES ON RIGID, VERTICAL, CYLINDRICAL STRUCTURES.
Sodhi, D.S., et al, Dec. 1984, 36p., ADA-151 393, 32

refe

Morris, C.E. 39-2515

39-2515
ICE PRESSURE, ICE LOADS, OFFSHORE
STRUCTURES, COLD WEATHER CONSTRUCTION, PILES, ICE BREAKING, ICE SOLID INTERFACE, ICE COVER THICKNESS, FLEXURAL STRENGTH, COMPRESSIVE PROPERTIES, VELOCITY, EXPERIMENTATION.

A small-scale experimental study was conducted to characterize A small-scale experimental study was conducted to characterize the magnitude and nature of ice forces during continuous crushing of ice against a rigid, vertical, cylindrical structure. The diameter of the structure was varied from 50 to 500 mm, the relative velocity from 10 to 210 mm/s, and the ice thickness from 50 to 80 mm. The ice tended to fail repetitively, with the frequency of failure termed the characteristic frequency. The characteristic frequency varied linerally with velocity and to a small extent with structure diameter. The size of the damage zone was 10 to 50% of the ice thickness, with an average value of 30%. The maximum and mean normalized ice forces were strongly decendent on the aspect ratio (structure diameter/ice thickdependent on the aspect ratio (structure diameter/ice thick-ness). The forces increased significantly with decreasing aspect ratio but were constant for large aspect ratios. The maximum normalized forces appeared to be independent

PROTOTYPE DRILL FOR CORE SAMPLING FINE-GRAINED PERENNIALLY FROZEN

GROUND Brockett, B.E., et al. Jan. 1985, 29p., ADA-152 388.

11 refs. Lawson, DE

40-3579 40-35/9
DRILLS, AUGERS, PERMAFROST THERMAL
PROPERTIES, FROZEN GROUND TEMPERAIURE, CORING, SAMPLING, GROUND ICE,
GRAIN SIZE, TEMPERATURE EFFECTS, COST ANALYSIS

ANALYSIS

An inexpensive drill has been modified to provide researchers with the ability to auget an open hole of to acquire continuous undisturbed "6-min-diam core samples of a variety of perennially forzen materials that are suitable for chemical and petrographic analysis. It was developed by field testing in support of research from 1930 to 1933. Operation of the drill is hased mainly on using a minimum of power to cut chrough forzen ground with tungsten carbide cutters on a CRR11 coting auger. The nec content, temperature and grain size of the frozen sediments are important satiables determining the sampling depth. Perennially forzen sediments with temperatures in the range of 0.5.0 to 3.5.

Drilling C have been continuously cored with this drill. Drilling and sampling are most efficiently conducted when ambient air temperatures are below freezing and the active layer air temperatures are below freezing and the active layer is frozen. The self-contained lightweight drill is readily anisportable off-road by helicopter or tracked vehicle, or by towing over roads. It is locally self-mobile by use of a winch. Total cost of the drill and modifications is estimated at approximately \$10,000

EFFECT OF NONUNIFORM SIZE ON INTER-NAL STRESSES IN A RAPID, SIMPLE SHEAR PLOW OF GRANULAR MATERIALS. PART 1. TWO GRAIN SIZES

Shen, H H., Feb. 1985, 18p., ADA-154 045, 18 refs.

SHEAR FLOW, PARTICLE SIZE DISTRIBUTION, MICROSTRUCTURE, MATERIALS, STRESSES, STRAINS, AVALANCHE MECHANICS, MATH-**EMATICAL MODELS**

Existing theories that predict the stress-strain rate relationship Existing theories that predict the stress-strain fate relationship in a rapidly sheared granular flow can only treat macerials that are made of single-size particles. However, granular flows usually involve materials of mixed sizes. It has been observed in many laboratory studies that size distribution has a significant effect on the flow of a granular material. Despite its importance, no quantitative theory has been devised that can explain the effect of size distribution. An analytical model is deviated by the research in my first the discrete in a my first. that can explain the effect of size distribution. An analytical model is developed here to quantify the stresses in a mixture of spheres with two different sizes and identical material properties. Binary collisions between adjacent particles are considered as the dominating stress-generating mechanism. Comparisons between the theoretical results and the existing laboratory data show good agreement.

EFFECT OF NONUNIFORM SIZE ON INTER-NAL STRESSES IN A RAPID, SIMPL). SHEAP FLOW OF GRANULAR MATERIALS. PART 2. MULTIPLE GRAIN SIZES.

Shen, H.H., Feb. 1985, 20p., ADA-154 046, 19 refs.

SHEAR FLOW PARTICLE SIZE DISTRIBUTION. MICROSTRUCTURE, STRESSES, MATERIALS, SHEAR STRESS.

In the past all theoretical analyses for rapidly sheared granular flows assumed that the granular solids are either disks or spheres and are uniform in size. However, natural materials that create these granular flows are in general irregular in shape and have various spectra of sizes. The stress and rate of energy dissipation levels in granular flows are significantly influenced by the size distribution. In part 1 of this report series (see 40-38, CR 85-2) the formulation of the report series (see 40-38, CR 85-2) the formulation of the constitutive equations considering a two-size granular mixture is presented, where the ratio of the two sizes is nearly one. Here, in part 2, the constitutive equations for a two-size mixture are extended to include a general size ratio. In addition, a complete spectrum of size distribution is incorporated, which allows the quantification of the size distribution effect in the most general way. In analyzing the stresses, intergranular collision is assumed to be the is incorporated, which allows the quantification of the size distribution effect in the most general way. In analyzing the stresses, intergranular collision is assumed to be the major dynamic activity at the microscopic level. Because of the present limited knowledge of treating shape effects, the analysis is confined to the flow of either disks or epheres. The result of this work provides necessary information for a more realistic analysis of natural and industrial granular flow.

CR 85-04

flows

PROPULSION TESTS IN LEVEL ICE ON A MODEL OF A 140-FT WTGB ICEBREAKER. Tatinclaux, J.C., Mar. 1985, 13p., ADA-154 075, 6

30.3056

ICEBREAKERS, ICE CONDITIONS, ICE STRENGTH, ICE BREAKING, ICE COVER THICKNESS, LAKE ICE, FLEXURAL STRENGTH, VELOCITY, 1ESTS, MODELS

STRENGTH, VELOCITY, TESTS. MODELS
Results of propulson tests in level (co on a model of the
WTGB 140-ft Great Lakes (cobreaker are presented and
compared to available full-scal- data. In spite of the
difficulties in exactly modeling full scale conditions, the predictions based on the model test results of the ship performance
compared (ca. onably) well to those measured during fullscale trists. Several possible sources of errors are identified
in particular hipheation at the model scale of the ship
hull's (ce friction coefficient is considered to be entical
in determining the (ce resistance and the corresponding propulsion characteristics, namely propeller speed thrust and torque

CR 85-05

NUMERICAL MODELING OF SEA ICE DY-NUMERICAL MODELING OF SEA ICE DYNAMICS AND ICE THICKNESS CHARACTERISTICS. A FINAL REPORT.
Hibler, W.D., III, Mar. 1985, 50p., ADA-154, 600, Refs. p.35-38

40.3362

ICE MECHANICS, DRIFT, SEA ICE, ICE COVER THICKNESS, ICE EDGE, MATHEMATICAL MODELS, HEAT BALANCE

A dynamic thermodynamic sea are model as extended to include a full thermodynamic code and a complete multilest ce thickness distribution. The sariable thickness formula tion includes a more realistic parameterization of ice religing

than used in previous models. easonal simulations have ben performed using this model and the results have been enalyzed with puricular emphasis of the ridge behidup results off the Canadian Archipelago and off the North Slope. This report presents a complete description of this model and discusses progress made on examining and testing the variable thickness extensions

CR 45.06

KINETIC FRICTION COEFFICIENT OF ICE. Forland, K.A., et al, Mar. 1985, 46p., AL 4-155 035,

Tatinclaux J.C.

39-3957

ICE SOLID INTERFACE, ICE FRICTION, ICE HARDNESS, SURFACE ROUGHNESS, ENGINEERING, VELOCITY, TESTS.

NEERING, VELOCITY, TESTS.

This study investigates the relative influence of various parameters on the kinetic friction coefficient between ice and different surfaces. Friction tests were performed with urea-doped, columnar ice, studying the parameters of normal prissure, velocity, type of material roughness, ice orientation, ice hardness and test configuration. Tests were conducted by pulling a sample of ice over a sheet of material and by pulling a sample of material over an ice sheet. An ambient temperature of -1.5 was maintained throughout, and the ce surface hardness was measured usin, a specially designed apparatus. The results of the friction tests revealed that the behavior of kinetic friction coefficient with varying velocity was significantly influenced by the test configuration and material roughness. The magnitude of the kinetic friction cuefficient was also affected by varying normal pessure, surface roughness and ice hardness. Additional guidelines for standardized ice friction tests and future investigations are recommended. are recommended.

CD 95.07

MEASURING THERMAL PERFORMANCE OF BUILDING ENVELOPES: NINE CASE STUD-IFC

Flanders, S.N., Mar. 1985, 36p., ADA-155 083, 13

30_3058

THERMAL INSULATION, BUILDINGS, HEAT

THERMAL INSULATION, BUILDINGS, HEAT FLUX, THERMAL MEASUREMENTS, THERMOCOUPLES, COMPUTER APPLICATIONS, COST ANALYSIS, WIND FACTORS.

Nine buildings at Ft Devens were the object of a study employing heat flux sensors, thermocouples, a computer-controlled data acquisition system and infrared thermography The purpose was to measure the R-values of those buildings to determine their economic potential for improved insulation. The sample included four frame buildings, two masonry buildings, and three frame buildings with brick facing. The technique for measuring R-values proved repeatable and accurate within 15% Sampling a small representative sample sufficiently characterizes the entire strick of buildings. Measurement is more important for poorly insulated buildings since the beginning R-value has a drastic impact on the buildings of the provided of the cost-effective reinsulation project. A Covernment of the provided of the provided of the provided of the provided of about 1.4.

CR \$5-08

ICE FOG AS AN ELECTRO-OPTICAL OBSCU-

Koh, G., Mar. 1985. 11p., ADA-155 059, 2 167. 39-3959

ICE FOG, INFRARED RADIATION, LIGHT (VIS-IBLE RADIATION), RADIATION # 85* (PTION, SCATTERING, ELECTROMAGNETIC PROPER-TIES OPTICS. ICE CRYSTAL ANALYSIS (MATHEMATICS)

(MATHEMATICS)

The extinction of visible light and infrared radiation (at wavelengths of 3.5 and 10.6 micron) by ice fog is considered utilizing theoretical concepts and historical experimental data. The reliability of the spherical approximation of ice fog for Mic calculations is examined and judges adequate for forward scatter situations but limited for side and backscatter applications. The reliative efficacy in penetrating ice fog as a function of size distribution is evaluated for the wavelengths considered. considered.

CR 85-09

THERMAL CONVECTION IN SNOW.

Powers, D.J., et al. May 1985, 61p., ADA-157 577. Refs. p.40-48.

Colbeck, S.C., O'Neill, K.

40-1009
SNOW THERMAL PROPERTIES, SNOW HEAT
FLUX, HEAT TRANSFER, WATER VAPOR,
TEMPERATURE GRADIENTS, POROUS
MATERIALS, THERMAL CONDICTIVITY,
CONVECTION, MATHEMATICAL MODELS,
LATENT HEAT, EXPERIMENTATION,
METAMORPHISM (SNOW)

METAMORPHISM (SNOW)

Large temperature gradients applied to a snow over drive water vapor upwards and result in rapid recrystallication of snow crystals. The same temperature gradients create gradients of air density that can cause flows of air through the snow cover. The formalism necessary to describe these flows is developed here in an ifort to include the convention of vapor in the understanding of snow metamorphism. The theory of convection through purous media

is extended to include the transport of water vapor, which is important because of its latent heat. Results are presented in terms of a Lewis number, defined as the ratio of thermal mass difficulties For Lewis numbers greater than to mass diffusivities. For Lewis numbers greater than 16, phase change intensifies convection, and for Lewis numbers less than 1.0, phase change retards convection. Two boundary conditions of special interest in the study of snow, 2 constant heat flux bottom and a permeable top, are investigated. ed.

REVIEW OF METHODS FOR GENFRATING SYNTHETIC SEISMOGRAMS.

Peck, L., June 1985, 39p., ADA-159 128, Refs. p.36-

40-1587

SOIL MECHANICS, SEISMOLOGY, GEOPHYSI-CAL SURVEYS, WAVE PROPAGATION, COM-PUTER APPLICATIONS, ANALYSIS (MATH-

EMATICS)

Various methods of generating synthetic seismograms are reviewed and examples of recent applications of the methods are cited. Body waves, surface waves, and normal modes are considered. The analytical methods reviewed include geometric ray theory, generalized ray theory (Cagniard-de Hoop method), asymptotic ray theory, reflectivity method, full wave theory, and hybrid methods combining ray theory and mode theory. Two numerical methods, those of finite differences with asymptotic ray theory are described from the differences with asymptotic ray theory are described. finite differences with asymptotic ray theory are described Limitations on the application of validity of the various methods are stated

RECONNAISSANCE OBSERVATIONS OF LONG-TERM NATURAL VEGETATION RECOV-ERY IN THE CAPE THOMPSON REGION, ALASKA, AND ADDITIONS TO THE CHECKL-IST OF FLORA. Everett & P.

Everett, K R., et al, June 1985, 75p.. ADA-158 724, Refs. p.44 48.

Murray, B.M., Murray, D.F., Johnson, A.W., Linkins, A.E., Webber, P.J.

40-440

REVEGETATION. TUNDRA. SOIL EROSION, ENVIRONMENTAL PROTEC-TION, ACTIVE LAYER, VEGETATION, FROST ACTION, CLASSIFICATIONS, LANDFORMS, ENVIRONMENTAL IMPACT.

ENVIRONMENTAL IMPACT.
The or-ersity of disturbance types, landforms, vegetation and soils, together with the large, well-documented flors, makes Cape Thompson an ideal site to study long-term (20-year) environmental adjustments after impact. Mancaused disturbances there between 1958 and 1962 fall into a cettegories: runways, excavations and off-road vehicle rails. In addition, natural disturbance by frost action creates scars. Reestablished vegetation after 20 years consisted of species found in adjacent undisturbed landscapes.

CR 85-12

ANALYSIS OF RIVER WAVE TYPES.

Ferrick, M.G., June 1985, 17p., ADA-158 683, For another source see 39-3098. 20 refs. 40-1050

WATER WAVES, RIVER FLOW, RIVER ICE. DAMS, UNSTEADY FLOW, ICE JAMS, RUNOFF, FRICTION, MATHEMATICAL MODELS.

FRICTION, MATHEMATICAL MODELS.
In this paper we consider long-period, shallow-water river waves that are a consequence of unsteady flow "vive, waves result from hydroelectric power generation or flow control at a dam, the breach of a dam, the fination or release of an ice jam, and rainfall/runnoff process. The Saint-Venant equations are generally used to dei the more waves. Dynamic, gravity, diffusion, and kinematic inversals have been defined, each corresponding to different is not subset of the overall range of river hydraulic properties and time scales of wave motion. However, the parameter and a corresponding to each wave description are not well defined, and the transitions between wave types have not been explored. This paper is an investigation into these areas, which are fundamental to river wave modeling. The analysis is based on the concept that river wave behavior is determined by the halance between friction and inertia.

ELECTROMAGNETIC MEASUREMENTS OF MULTI-YEAR SEA ICE USING IMPULSE RA-DAR.

Kovaes, A. et al. Sep. 1985, 26p. ADA-160 737, 11

refs Morey, R M

40-1544

SEA ICE, ELECTROMAGNETIC PROPERTIES. ICE BOTTOM SURFACE, MARINE GEOLOGY, GEOPHYSICAL SURVEYS, ELECTRICAL RESIS-TIVITY, BRINES, DIELECTRIC PROPERTIES

Sounding of multi-year sea u.e. using impulse radar operating in the 80- to 800 MHz frequency band, has revealed that the bottom of this rice cannot always be detected. This paper diseases a field program aimed at finding out why this is so, and at determining the electromagnetic (but his properties of multi-year sea use. It was found that the

bottom of the ice could not be detected when the ice structure had a high brine content Because of brine's high conductivi-ty, brine volume dominates the loss mechanism in first year sea ice, and the same was found true for multi-year year sea ice, and the same was found true for multi-year ice. A two-phase dielectric mixing formula, used by the authors to describe the EM properties of first-year sea ice, was modified to include the effects of the gas pockets found in the multi-year sea ree

VEGETATION AND ENVIRONMENTAL GRADIENTS OF THE PRUDHOE BAY REGION,

ALASKA. Walker, D.A., Sep. 1985, 239p., ADA-162 022, Refs.

TUNDRA, VEGETATION, TEMPERATURE GRADIENTS, PLANTS (BOTANY), COASTAL TOPOGRAPHIC FEATURES, ICE WEDGES, SNOW DEPTH, TEMPERATURE EFFECTS, LOESS, HUMMOCKS, SOIL WATER, UNITED STATES-ALASKA,

STATES—ALASKA.

The Prudhoe Bay region is a particularly interesting area of tundra because of its well-defined and steep environmental gradients, the combination of which has not been described elsewhere in the Arctic. It is a region of wet coastal tundra that has a inque substrate pH gradient, due in part to its coastal location. The prevailing northeast winds distribute loess from the Sagavanirktok River over most of the region. Areas downwind from the river have alkaline tundra with a gradient of declining soil pH values away from the river the northwest portion of the region is not downwind from the river and consequently has acidic tundra. The coastal temperature gradient is among the steepest in the Arctic. Three of Youngs (1971) four floristic zones, which are based on the amount of 'otal summer warmth, are present within the region. The effects of the temperature gradient can be seen in the increase of the total number of plants in the flora and the increased plant productivity, particularly of shrubs, as one moves inland. The predominantly wet landscape also creates steep vegetation gradients within elevation changes of a few centimeters. Small hummocks and higher microsites associated with ice wedge polygon relief may be elevated only 10-25 cm above the level of saturated soils but can support rich mesic tundra plant communities.

CD 97.15

TNT, RDX AND HMX EXPLOSIVES IN SOILS AND SEDIMENTS. ANALYSIS TECHNIQUES AND DRYING LOSSES. Cragin, J.H., et al. Oct. 1985, 11p., 13 refs.

Leggett, D'..., Foley, B T., Schumacher, P.W. 40.3363

EXPLOSIVES, FREEZE DRYING, SOIL POLLU-T ON, SEDIMENTS, CHEMICAL ANALYSIS, COUNTERMEASURES, DRYING, ADSORPTION, ABSORPTION, TESTS

TION, ABSORPTION, TESTS

A method fe, the analysis of TNT, RDX and HMX explosives it solts and sediments has been developed. It consists of methanol extraction followed by reversed-phase high performance liquid chromatography using 10% acctometric 40% methanol 50% water as the cluant. This method was used to study the effect of various drying techniques upon the recovery of TNT. RDX and HMX from soil and sediment samples contaminated with high (%) and low (interogram g) levels of these explosives. For highly contaminated samples, complete recovery of TNT and RDX was oblained using fiveze drying while air drying at room temperature resulted in greater toxin, such as onen drying at 105C, oven drying at 45C, microwave oven drying, and drying under infrared lamps all resulted in greater loxes, with TNT and RDX recoveries ranging from 76 to 90%. Drying losses were not due to simple volatilization but rather to chemical reaction and or sorption. For soil and sediment samples containing low levels of TNT, RDX and HMX recoveries of all three explosives were quantitative for all of the above drying techniques. technique

MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE. PHASE 2: TEST RESULTS. Cox, G F N., et al. Oct. 1985, 81p., ADA-166 333, 10

Richter-Menge, J.A., Weeks, W.F., Bosworth, H., Per-ron, N., Mellor, M., Durell, G. 10. 1161

40-304
ICE MECHANICS, ICE STRENGTH, SEA ICE, STRAINS, COMPRESSIVE PROPERTIES, ICE PHYSICS, PRESSURE RIDGES, FENSILE PROPERTIES, LOADS (FORCES)

ERTIES, LOADS (FORCES). This report presents the results of the second phase of a test program designed to obtain a comprehensive understanding of the mechanical properties of multi-sert sea i.e. from the Alaskan Beaufort Sea. In Phase II 62 constant-structumaxial compression feets were performed on horizontal and sertical ice samples from multi-sear pressure ridges to examine the effect of sample orientation on ice strength. Also conducted were 16 constant stransiate tension tests, 55 conventional triaxial tests and 135 constant load compression tests on multi-sear pressure rules samples to provide data. tests on multi-scar pressure ridge samples to provide data for developing ne sield criteria in 1 construince raw. Data are presented on the strength frame strain and modulus

of mylti-year sea ice under different loading conditions. The effects of ice temperature, porosity, structure, strain rate, confining pressure and sample orientation on the mechanical properties of multi-year sea ice are examined.

CR 85-17

FIELD TESTS OF THE KINETIC FRICTION CO-EFFICIENT OF SEA ICE.

Tatinclaux, J.C., et al, Oct. 1985, 20p., ADA-163 170. 4 refs

Murdey, D. 40-3365

ICE FRICTION, SEA ICE, SURFACE PROPER-TIES, STEEL STRUCTURES, SHIPS, ICE CRYS-TAL STRUCTURE, PRESSURE, ICE STRENGTH, VELOCITY, TESTS.

This report presents the results of tests of the ice friction coefficient carried out during the May 1984 expedition of the F.S. Polarstern off the coast of Labrador. The test surfaces were Inerta-160-coated steel plates and bare steel plates, hand roughened and sandblasted. The main findings of the studies were: 1) columnar and granular sea ice showed no significant differences in friction coefficient; 2) for columnar ice ficient coefficient was independent of use critical coinstant. of the studies were: 1) consumed to specific the studies were: 1) consumer to significant differences in friction coefficient; 2) for columnar ice, friction coefficient was independent of ice crystal orientation with respect to test surface, 3) friction coefficient was independent of normal pressure applied on ice sample; 4) friction coefficient initially decreased with increasing relative velocity between the ice sample and the test surface and reached a steady value at higher speeds; 5) friction coefficient increased with increasing surface roughness; 6) a wetting surface exhibited a higher friction coefficient than a non-wetting surface of the same or even higher roughness average.

SORPTION OF MILITARY EXPLOSIVE CON-TAMINANTS ON BENTONITE DRILLING

Leggett, D.C., Nov. 1985, 33p., ADA-163 231, Refs. p.14-16. 40-3366

40-300
EXPLOSIVES, DRILLING FLUIDS, MILITARY OPERATION, POLLUTION, MUD, CHEMICAL COMPOSITION, ENVIRONMENTAL PROTECTION, ADSORPTION, ABSORPTION, ANALYSIS (MATHEMATICS).

YSIS (MATHEMATICS).

Concern over the environmental fate of explosives has brought about development of sensitive analytical methods for measuring them in groundwater. In turn this concern has been extended to validating the sampling procedures for groundwater. This report addresses the potential effects of residual drilling muds on the analysis for explosive contaminants (TNT, DNT, RDX and HMX) in monitoring wells. The approach was to determine sorption isotherms for each contaminant. Sorption appeared to be independent of solids concentration. Linear isotherms were obtained for RDX and HMX over a range of analytic concentrations, therefore, a single constant can be used to estimate the amount sorbed when the solution concentration is known. Isotherms for TNT and DNT were not linear, however. Scatchard analysis suggested that the isotherms for these analytes could be resolved into two predominant components: a linear component suggested that the isotherms for these analytes could be resolved into two predominant components: a linear component above a certain sorbed quantity and a Langmur-type component below this quantity. The experimental data were fitted by regression analysis using the appropriate model. The equations developed can be used to predict the sorbed fraction (analytical bas) for any combination of solids and analyte concentration. The amounts of bentonite found in some existing wells do not appear to be sufficient to cause significant buss in analyses for these explosive contaminants

CR \$5-19

MODEL STUDIES OF SURFACE NOISE IN-TERFERENCE IN GROUND-PROBING RADAR. Arcone, S.A, et al, Nov. 1985, 23p., ADA-163 208, 12

Delaney, A.J.

41-447

RADAR ECHOES, NOISE (SOUND), POLARIZA-TION (WAVES), COUNTERMEASURES, ELEC-TRICAL PROPERTIES, ANTENNAS, TESTS, MODELS.

MODELS.
Ground-probing radar can be an effective tool for exploring the top 10 to 20 m of ground, especially in cold regions where the freezing of water decreases signal absorption. However, the large electrical variability of the surface, combined with the short wavelengths used, can often cause severe ground clutter that can mask a desired, deeper return in this study a model facility was constructed consisting of a metallic reflector covered by sand. Troughs of saturated sand were emplaced at the surface to vary surface electrical properties and to act as a noise source to interfere with the bottom reflections. Antenna polarization and height, and signal stacking in both static (antennas stationary) and dynamic (antennas moving) modes were then investigated as methods for reducing the surface clutter parallel to the profile direction (perpendicular to the troughs' axes) gave profiles superior to the perpendicular case because of the directional sensitivity of the antenna radiation

CR 85-20

CONSTITUTIVE RELATIONS FOR A PLANAR. SIMPLE SHEAR FLOW OF ROUGH DISKS Shen, H.H., et al, Dec. 1985, 17p., ADA-163 147, 10 refs.

Hopkins, M.A 40-3367

SHEAR FLOW, SURFACE ROUGHNESS, FLOW RATE, FRICTION, STRESSES, AVALANCHES, COMPUTER APPLICATIONS, TESTS.

COMPUTER APPLICATIONS, TESTS.

Stresses developed in a rapid, simple shear flow of disks are quantified. Collisional momentum transfer is considered to be the dominant stress generating mechanism. The disks are inelastic and frictional. The restitution coefficient and the coefficient of friction together determine the transfer of momentum and dissipation of energy during a collision. The frictional coefficient generates and maintains a rotational motion of disks. The total fluctuation motion of disks consists of two translational modes and one rotational mode. The rotational mode is found to depend on both the restitution and friction coefficient. Equipartitions of energy among all modes of motion is absent. The mean rotation, however, depends only on the mean flow gradient. The analysis assumes a constant magnitude for all fluctuation modes. Comparison with a computer simulated disk flow shows good agreement. This implies that the distribution of stresses.

CR 85-21

ICE-CORING AUGERS FOR SHALLOW DEPTH

Rand, J.H., et al, Dec. 1985, 22p., ADA-166 630. 12

Mellot, M. 40-3273

AUGERS, ICE CORING DRILLS, PERMAFROST, FROZEN GROUND, ICE SAMPLING, DRILL-ING. EQUIPMENT.

ING, EQUIPMENT.

The development of lightweight coring augers for ice is reviewed. Emphasis is on equipment designed by the Cold Regions Research and Engineering Laboratory and its predecessor organizations for sampling to depths less than 20 m or so. Design and operation of the ACFEL/SI-PRE/CRREL 3-in-ID corer is discussed, and modifications of the basic design for powered operation and for drilling in frozen soil are outlined. Recent replacements for the traditional coring auger are described, and details are given for the construction and operation of the new 4 1/4-in-ID coring equipment. A powered 12-in-ID drill for shallow-depth coring is also described

CR 85-22

LEVEL ICE BREAKING BY A SIMPLE WEDGE. Tatii claux, J.C., Dec. 1985, 46p., ADA-166 629, 6 refs

40-3274

ICE BREAKING, ICEBREAKERS, ICE FLOES, ICE FRICTION, ICE LOADS, LOADS (FORCES), ICE MODELS, ICE PHYSICS, TESTS.

ICE MODELS, ICE PHYSICS, TESTS.

Tests in level ice on an idealized icebreaker bow in the shape of a simple wedge were conducted in the test basin. The horizontal and vertical forces on the wedge were measured, and floe size distribution in the wake of the wedge was observed. From the force measurements, the ice wedge/hull friction factor was calculated and in general agreement with the friction factor measured in separate friction tests. The ice floe length and ice floe area measured in the current study followed log-normal probability distributions defined by the length average and area average and corresponding standard deviations S(L) and S(A)

CR 86-01

MODEL STUDIES OF ICE INTERACTION WITH THE U.S. ARMY RIBBON BRIDGE. Coutermarsh, B.A., Apr. 1986, 18p., ADA-166 360,

43-4592

PONTOON BRIDGES, ICE SOLID INTERFACE, MILITARY OPERATION. ICE JAMS, ICE MOD-ELS.

ELS.
The performance of the U.S. Army's floating Ribbon Bridge in an ice-filled waterway is investigated in a model study Conditions when ice-blocks could be expected to jam behind the bridge are outlined using available instability theories It is shown that current theories do not accurately describe block instability throughout the range of expected block thicknesses. Bridge deployment doctrine is outlined as it relates to the winter environment. Ice forces on the bridge are discussed along with ways to minimize the chance of ice buildup behind the bridge.

CR 86-02

BRITTLENESS OF REINFORCED CONCRETE STRUCTURES UNDER ARCTIC CONDITIONS. Kivekis, L., et al. May 1986, 20p., ADA-170 792, 9

Korbonen, C

41-213 REINFORCEL CONCRETES, BRITTLENESS, CONCRETE STRUCTURES, TRANSPORTATION, COLD WEATHER TESTS, CRACKING (FRACTURING)

The behavior of reinforced and unreinforced concrete beam The behavior of reinforced and unreinforced concrete beams was studied under impact loading at low temperatures, and the results were compared to the behavior of reinforcing steel (rebar) in Charpy-V impact tests. Transition temperatures as low as -30 C were obtained for the rebars in the Charpy-V tests, whereas no brittle failures occurred in the rebars in the reinforced concrete beams at temperatures as low as -60 C, even in beams where the rebars were intentionally notched. The impact strength of unreinforced concrete increases considerably at lower temperatures, thus reducing cracking of reinforced concrete structures and significantly increasing the safety of lightly reinforced structures.

EXPERIMENTAL DETERMINATION OF HEAT TRANSFER COEFFICIENTS IN WATER FLOW-ING OVER A HORIZONTAL ICE SHEET. Lunardini, V.J., et al, June 1986, 81p., ADA-170 427,

32 refs.

Zisson, J.R., Yen, Y.-C.

215301, J.R., 141, 1.4C.
40-4709
HEAT TRANSFER, WATER TEMPERATURE,
WATER FLOW, ICE COVER EFFECT, ICE
MELTING, ICE SURFACE, TESTS, VELOCITY,
COMPUTER APPLICATIONS, TURBULENT FLOW.

FLOW.

Experiments to study the melting of a horizontal ice sheet with a flow of water above it were conducted in a 35-m-long refrigerated flume, with a cross section of 1.2x1.2 m. Water depth, temperature, and velocity were varied as well as the temperature and initial surface profile of the ice sheet. The heat transfer regimes were found to consist of forced turbulent flow at high Reynolds numbers with a transition to free convection heat transfer. There was no convincing evidence of a forced laminar regime. The data were correlated for each of the regimes, with the Reynolds number, Re, or the Grashof number combined with the Reynolds number.

CP RG.GA

RESILIENT MODULUS OF FREEZE-THAW AF-FECTED GRANULAR SOILS FOR PAVEMENT DESIGN AND EVALUATION. PART 1. LABORATORY TESTS ON SOILS FROM WIN-CHENDON, MASSACHUSETTS, TEST SEC-TIONS

Cole, D.M., et al, July 1986, 70p., ADA-171 541, 15

Bentley, D.L., Durell, G., Johnson, T.C.

ROADS, FROZEN GROUND STRENGTH, FREEZE THAW CYCLES, GROUND THAWING, PAVEMENTS, SOIL STRENGTH, SUBGRADE SOILS, LOADS (FORCES), UNFROZEN WATER CONTENT, STRESSES, SOIL WATER.

This work is the first of a series of four reports about laboratory and field testing of various granular road and artifeld subgrades and analysis of six soils from a test site in Winchendon, Massachusetts. Repeat load triaxial tests were done on fozen and thawed soils to characterize the variations in frozen and thawed soils to characterize the variations in their resilient properties throughout the seasons. Linear regression yielded empirical equations relating the resilient modulus to applied stress, unfrozen water content (for frozen soils), moisture tension (for thawed soils) and density. Equipment and test procedures (given in detail) were developed that allowed simulation in the laboratory of the gradual recovery of stiffness that occurs in the field after thawing. The resilient moduli were strongly dependent on soil state, dropping at least two orders of magnitude upon thawing.

CR 86-05 EFFECT OF GRAIN SIZE ON THE INTERNAL FRACTURING OF POLYCRYSTALLINE ICI Cole, D.M., July 1986, 71p., ADA-171 571, Refs.

p.49-51. 41-3479 ICE CRACKS, ICE CRYSTAL STRUCTURE, FRACTURING, GRAIN SIZE, ICE CREEP, PHO-

TOGRAPHY, STRESSES.

FRACIONING. GRAIN SIZE, ICE CREEP, PHOTOGRAPHY, STRESSES.

This work presents the results of a study to examine the effects of grain size on the number and size of internal interofractures in polycrystalline ice.

Laboratory-prepared specimens were tested under uniaxial, constant-load creep conditions at -5 C. Grain size ranged from 15 to 60 mm. This range of grain size, under an initial creep stress of 20 MPa, led to a significant change in the character of deformation. The finest-grained material displayed no internal cracking and typically experienced strains of 1/100 at the minimum creep rate. The coarse-grained material experienced severe cracking and a drop in the strain at the minimum creep rate to approximately 4/100. Extensive post test optical analysis sillowed estimation of the size distribution and number of microcracks in the tested material. These data led to the development of a relationship between the average crack size distribution, when normalized to the first indicate that the average crack size is approximately one half the average grain diameter over the stated grain size range. A dislocation pileup model is found to adequately predict the onset of internal cracking. The work employed acoustic emission shed light on the time and strain at which

the fracturing began and when the peak fracturing rate oc-curred. Other topics covered in this report include creep behavior, crack healing, the effect of stress level on fracture size and the orientation of cracked grains. Theoretical aspects of the grain size effect on material behavior are also given.

CR BLAK

SHORT-PULSE RADAR INVESTIGATIONS OF PRESHWATER ICE SHEETS AND BRASH ICE. Arcone, S.A., et al, July 1986, 10p., ADA-172 578, 5

Delaney, A.J., Perham, R.E. 41-594

ICE COVER THICKNESS, RADAR ECHOES, LAKE ICE, ICE SHEETS, ANTENNAS.

LAKE ICE, ICE SHEETS, ANTENNAS.
Short-pulse radar profiles and waveform traces were recorded over natural, freshwater ice sheets and an artificially made, 1.6-m-diameter column of brash ice. The purpose was to study the feasibility of this type of radar to detect ice thickness, determine ice properties and distinguish ice forms The radar utilized two antennas, one with a spectrum centered mear 900 MHz and a second more powerful one near 700 MHz. Distinct top and bottom reflections from several ice sheets were produced by both antennas, but the value of dielectric permittivity calculated from the time delay of the reflections varied between sheets as one ice sheet was ready to candle and contained free water. The brash ice distorted signals and allowed no discernible bottom return

NITROGEN CONTROL IN WASTEWATER TREATMENT SYSTEMS FOR MILITARY FACILITIES IN COLD REGIONS.

Reed, S.C., Aug. 1986, 23p., ADA-173 724, 25 refs. 41-859

41-899
MILITARY FACILITIES, WASTE TREATMENT,
WATER TREATMENT, CHEMICAL ANALYSIS,
SEWAGE TREATMENT, WATER POLLUTION,
CLIMATIC FACTORS, FILTERS, SLUDGES

CLIMATIC FACTORS, FILTERS, SLUDGES
Nitrogen control in the form of ammonia removal or conversion is required, or will be required, for a significant number of military wastewater treatment systems. This report presents a summary of engineering criteria for those processes in most common use at military facilities in the cold regions. These processes include: trickling filters, treatment ponds, rotating biological contactors (RBC) and activated sludge. A design example is presented for each case. All four processes can achieve significant levels of ammonia memoval or conversion. If ammonia discharge limits are 0.5 mg/L or less it may be necessary to use the activated sludge process. Trickling filters or RBC units are recommended for higher (> 1 mg/L) discharge limits. Pond systems are suitable for seasonal ammonia removal in cold climates.

APPLICATIONS OF THE FINITE-ELEMENT METHOD TO THE PROBLEM OF HEAT TRANSFER IN A FREEZING SHAFT WALL. Liandi, F., Aug. 1986, 24p., ADA-172 552, 12 refs.

41-595 SOIL FREEZING, SHAFTS (EXCAVATIONS), HEAT TRANSFER, TUNNELS, WALLS, LATENT HEAT, HEAT CAPACITY, ANALYSIS (MATH-EMATICS).

EMATICS).

In this work, numerical computations of heat transfer for freezing a shaft wall have been conducted. Both fixed mesh and deforming mesh finite-element methods are used in the fixed mesh method, latent heat effects are accounted for through a delta function in the apparent heat capacity. In the deforming mesh method, an automatic mesh-generation technique with transfinite mappings is used, and in this method two different approaches are taken to evaluate the movement of the interface. The freeze-pipes are considered as point sources with irregular distribution. The advancement of the inner and outer boundaries of the frozen wall is found to be in agreement with the previously computed results.

CR 86-09
THEORY FOR THE SCALAR ROUGHNESS
AND THE SCALAR TRANSFER COEFFICIENTS
OVER SNOW AND SEA ICE.
Andreas, E.L., Sep. 1986, 19p., ADA-174 089, Refs.

p.17-19. 41-1263

SNOW SURFACE, SEA ICE, HEAT TRANSFER,

MOISTURE TRANSFER, SURFACE ROUGH-NESS, TURBULENT FLOW, MODELS, WIND VELOCITY, LATENT HEAT

VELOCITY, LATENT HEAT

The bulk aerodynamic transfer coefficients for sensible, C(H)
and latent, C(E), heat over snow and sea ice surfaces are
necessary for accurately modeling the surface energy budget
but are very difficult to measure This report therefore
presents a theory that predicts C(H) and C(E) as functions
of the wind speed and a surface roughness parameter. The
crux of the model is establishing the interfacial sublayer
profiles of the scalars, temperature and water sapor, over
aerodynamically smooth and rough surfaces. These interfaciall sublayer profiles are derived from a surface-renewal
model in which turbulent eddies continually sweep down
to the surface, transfer scalar containmants across the interface
by molecular diffusion, and then burst away. Matching
the interfacial sublayer profiles with the usual semilogarithmic

inertial sublayer profiles yields the roughness lengths for temperature and water vapor. With these and a model for the drag coefficient over snow and sea ice based on actual measurements, the transfer coefficients are predicted. C(E) is always a few percent larger than C(H). Both decrease monotonically with increasing wind speed for speeds above 1 m/s, and both increase at all wind speeds as the

CR 86-10 NATURAL ROTOR ICING ON MOUNT WASH-INGTON. NEW HAMPSHIRE.

Itagaki, K., et al, Sep. 1986, 62p., ADA-170 583, 21

Lemieux, G.E., Bosworth, H.W.

AIRCRAFT ICING, PROPELLERS, WIND TUN-NELS, WIND VELOCITY, UNFROZEN WATER CONTENT, WATER VAPOR, ICE FOG

CONTENT, WATER VAPOR, ICE FOG leing of a four-bladed rotor was studied under natural conditions at the top of Mt. Washington, N.H. The rotor had two cylindrical blades and two airfoil blades. The results were compared with studies conducted in icing wind tunnels. Considerable differences in icing regimes were observed. For instance, with comparable liquid water contemperature was up to 10 C higher under natural conditions than in the wind tunnel studies. Results of other studies made under natural conditions were close to those of the present study, indicating that wind tunnel conditions are significantly different from natural conditions. Close examination of the conditions indicated that supersaturation of water vapor existing in most of the wind tunnel studies is the most probable cause of the differences

CR 86-11 MORPHOLOGY, HYDRAULICS AND SEDI-MENT TRANSPORT OF AN ICE-COVERED RIVER. FIELD TECHNIQUES AND INITIAL DATA.

Lawson, D.E., et al., Oct., 1986, 37p., ADA-177 196, 33

Chacho, E.F., Brockett, B.E., Wuebben, J.L., Collins, C.M., Arcone, S.A., Delaney, A.J.

ICEBOUND RIVERS, RIVER FLOW, ICE COVER EFFECT, SEDIMENT TRANSPORT, ICE CONDI-

EFFECT, SEDIMENT TRANSPORT, ICE CONDITIONS, ICE COVER THICKNESS, SAMPLING, WATER LEVEL, FRAZIL ICE, WATER TEMPERATURE, TESTS, HYDRAULICS, UNITED STATES—ALASKA—TANANA RIVER.
This initial study of the ice-covered Tanana River, near Fairbanks, Alaska, attempted to 1) establish field methods for systematic and repetitive quantitative analyses of an ice-covered merés regime, 2) evaluate the instruments and equipment for sampling, and 3) obtain the initial data of a long-term study of uce cover effects on the morphology, hydraulics and sediment transport of a braided river. A methodology was established, and detailed measurements and samplings, uncluding profiling by geophysical techniques, were conducted including profiling by geophysical techniques, were conducted along cross sections of the river

CR 86-12 RESILIENT MODULUS OF FREEZE-THAW AF-FECTED GRANULAR SOILS FOR PAVEMENT DESIGN AND EVALUATION. PART 2. FIELD VALIDATION TESTS AT WINCHENDON, MASSACHUSETTS, TEST SECTIONS.

Johnson, T.C., et al, Oct. 1986, 62p., ADA-175 708,

Bentley, D L. Cole, D.M. 41-2613

SOIL FREEZING, BITUMINOUS CONCRETES, FREEZE THAW CYCLES, PAVEMENTS, SOIL STRUCTURE, STRESSES, DESIGN, TESTS.

STRUCTURE, STRESSES, DESIGN, TESTS.

Stress-deformation data for six granular soils ranging from sandy silt to dense-graded crushed stone were obtained from in-situ tests and laboratory tests. Surface deflections were measured in the in-situ tests. Surface deflections were measured in the in-situ tests. With repeated-load plate-bearing and falling-weight deflectionneter equipment, when the six granular soils were frozen, thawed, and at various stages of recovery from thaw weakening. The measured deflections were used to judge the validity of procedures developed for laboratory triaxial tests to determine nonlinear resilient moduli, ospecimens in the frozen, thawed, and recovering states. The validity of the nonlinear resilient moduli, expressed as functions of externally applied stress and moisture tension, was confirmed by using the expressions to calculate surface deflections that were found to compare well with deflections measured in the in-stru tests. The tests on specimens at various stages of recovery are especially significant because they show a strong dependence of the resilient modulus on moisture tension leading to the conclusion that predictions or in situ measurements of moisture tension can be used to evaluate expected seasonal variation in the revisent modulus of granular soils. modulus of granular soils

CR 86-13

RESILIENT MODULUS OF FREEZE-THAW AF-FECTED GRANULAR SOILS FOR PAVEMENT DESIGN AND EVALUATION.

Johnson, T.C., et al, Oct. 1986, 138p, ADA-175 924, 10 refs.

Crowe, A., Erickson, M., Cole, D.M.

41-2549
PAVEMENTS, FREEZE THAW CYCLES, AIR-PORTS, THAW WEAKENING, BITUMINOUS CONCRETES, SUBGRADE SOILS, DEFORMATION, ROADS, SURFACE PROPERTIES, DESIGN.

SIGN.

Stress-deformation data for unbound base, subbase, and silty sand subgrade soils in two airfield pavements were obtained from in situ tests and laboratory tests. Surface deflections were measured in the in situ tests, with a falling-weight deflectometer, when the soils were frozen, thawed, and at various stages of recovery from thaw weakening. The measured deflections were used to judge the validity of procedures developed for laboratory traxial tests to determine nonlinear resilient moduli of specimens in the frozen, thawed and recovering states. The validity of the nonlinear resilient moduli, expressed as functions of externally applied stress and mossture tension, was confirmed by using the expressions to calculate surface deflections that were found to compare well with deflections measured in the in situ tests. The tests on specimens at various stages of recovery are especially significant because they show a strong dependence of the resilient modulus on moisture tension, leading to the conclusion that predictions or in situ measurements of moisture tension can be used to evaluate expected seasonal variation in the resilient modulus of granular soils.

CR-86-14

EVALUATION OF SELECTED FROST-SUSCEP-TIBILITY TEST METHODS.

Chamberlain, E.J., Dec. 1986, 51p., ADA-176 125, 17 refs.

41-2614 SOIL FREEZING, FROST RESISTANCE, FROST HEAVE, SOIL MECHANICS, SOIL CLASSIFICA-TION, SOIL WATER, FREEZE THAW TESTS.

TION, SOIL WATER, FREEZE THAW TESTS.

Three methods for determining the frost susceptibility of soils are evaluated in this report. These methods are the U.S. Army Corps of Engineers frost design soil classification system, a moisture-tension/hydraulic-conductivity test, and a laboratory freeze-thaw test. The Corps method, which is based on particle size, soil classification, and a laboratory freezing test, was found to be useful for identifying frost-susceptible soils. However, it cannot be used with confidence for determining the degree of frost susceptibility. The moisture-tension/hydraulic-conductivity test was found to be unacceptable because it required too much time and its results correlated poorly with field observations. The freeze-thaw test was determined to be the most accurate of the methods studied, including the freeze-thaw test that is a part of the Corps method. The freeze-thaw test is thoroughly described. It includes indexes of both frost-have susceptibility (heave rate) and thaw-weakening susceptibility (CBR after thawing). It also accounts for the effects of freeze-thaw eyeling and is completely automated to improve the repeatability of the test results.

It is suggested that the Corps freezing test.

CR 86-15 EFFECT AND DISPOSITION OF THE IN A TER-RESTRIAL PLANT AND VALIDATION OF ANALYTICAL METHODS.

Palazzo, A.J., et al. Dec. 1986, 17p. ADA-199 546, For another version see 40-3708. 30 refs.

Leggett, D.C.

PLANTS (BOTANY). SOIL POLLUTION. PLANT PHYSIOLOGY, WASTE DISPOSAL, CHEMICAL ANALYSIS, TESTS, GROWTH, ROOTS

PHYSIOLOGY, WASTE DISPOSAL, CHEMICAL ANALYSIS, TESTS, GROWTH, ROOTS
Little is known about the response of terrestrial plants to 2.4.6-trinitrotolisene (TNT) The objectives of this study were to develop and test a method for measuring the amounts of TNT and its metabolites in plant tissue and to assess their effects in yellow nucleage (Cyperus esculentus L). The method eveloped was tested for its precision and accuracy for measuring TNT and its metabolites. The minimum detection limits of the method were 0.4. 0.6 and 0.9 mg/kg for TNT, 4-ADNT and 2-ADNT, respectively. Homogenization of plant tissue prior to analysis did not improve precision or recovery of naturally incorporated residues. Spake recoveries ranged from 46°- to 101°- Two plant growth and uptake studies were conducted by growing nutsedge in hydroponic cultures containing TNT concentrations ranging from 0 to 20 mg. L. The greatest changes in physiological growth of 20 mg. L. The greatest changes in physiological activity occurred between solution concentrations of 0.5 and 50 mg. L. The greatest changes in physiological effects from TNT may occur at levels below 0.5 mg. L. Root growth was affected most, followed by rhyromes and leaves: TNT and metabolites were found throughout the plant. Since TNT was the only compound present in the cultures, the metabolites must have been formed within the plant. Increasing the TNT concentrations of all 1 compounds were greatest in the roots, while the thiromes contained the greatest of the roots, while the thiromes contained the greatest of the roots, while the thiromes contained the greatest of the roots, while the thiromes contained the greatest of the roots, while the thiromes contained the greatest of the roots, while the thiromes contained the greatest of the roots while the thiromes contained the greatest of the roots while the thiromes contained the greatest of the roots of the concentrations of all 1 compounds were greatest in the roots, while the thiromes contained the greatest

TRIAXIAL TESTING OF FIRST-YEAR SEA ICE. Richter-Menge, J.A., et al, Dec. 1986, 41p., ADA-178

Cox, G.F.N., Perron, N., Durell, G., Bosworth, H.W.

ICE STRENGTH, ICE MECHANICS, ICE CRYS-

TAL STRUCTURE, SEA ICE, YOUNG ICE, COM-PRESSIVE PROPERTIES, STRAIN TESTS, LOADS (FORCES), TEMPERATURE EFFECTS This report presents the first series of conventional trianal tests carried out on columnar first-year sea ice samples obtained from the field and tested under controlled laboratory obtained from the field and tested under controlled laboratory conditions using a large-capacity test machine. A total of 110 horizontal ice samples from Prudhoe Bay, Alaska, were tested on a closed-loop electro-hydraulic test machine at -10 C in unconfined and confined constanti-strain-rate compression. The confined tests were conducted in a conventional triaxial cell that maintained a constant ratio between the radial and axial stress to simulate in situ loading conditions. The load ratios used were 0.25, 0.50 and 0.75. The strain rate of each test was constant at 1/100, or 1/100.000 per sec Data are presented on the strength, failure strain and initial tangent modulus of the first-year sea ice under these loading conditions. The effects of confining pressure, strain rate and ice structure on the mechanical properties of the ice are examined.

ATMOSPHERIC ICING ON COMMUNICA-TION MASTS IN NEW ENGLAND.

Mulherin, N., Dec. 1986, 46p., ADA-178 347, 34 refs. 41-3142

ANTENNAS, ICING, TOWERS, ICE FORMATION, PRECIPITATION (METEOROLOGY). COST ANALYSIS.

Rime seing and freezing precipitation are of concern to the radio and television broadcasting industry. This report contains the results of a study seeking to document the severity and extent of transmitter tower using and related problems in the northeastern United States Information problems in the northeastern United States Information was obtained via mail questionnaire and telephone interviews with 85 station owners and engineers concerning 118 different stations. Results show that television and Fab broadcasters are seriously impacted by tower scing, however, AM operators are usually not affected by expected New England scing levels. Combined annual costs for scing protection and icing-related repairs averaged \$121, \$402 and \$3066 for AM. FM and TV stations respectively. None of the AM stations polled employ any icing protection measures whereas all the TV stations do. The percentage of FM stations having scing protection in the three northern states averaged \$0%, indicating a significant concern for scing in that region. In contrast, the percentage of FM stations with icing protection was 63.5% for the southern New England states. The usage of guyed versus non-guyed towers was a poor indicator of icing costs. However, the factors of increasing mast height and mast top clevation are significant to increasing mast height and mast top clevation are significant to increasing costs.

CR 86-18

FROST ACTION PREDICTIVE TECHNIQUES FOR ROADS AND AIRFIELDS. A COMPRE-HENSIVE SURVEY OF RESEARCH FINDINGS. Johnson, T.C., et al. Dec. 1986, 45p., ADA-178 243,

Berg, R.L., Chamberlain, E.J., Cole, D.M. 41-3143

FROST HEAVE, ROADS, AIRPORTS, FREEZE THAW CYCLES, FROST RESISTANCE, FROST PENETRATION, PAVEMENTS, SUBGRADE PENETRATION, PAVEMENTS, SUBGRADE SOILS, DESIGN, MATHEMATICAL MODE! S FROST ACTION

FROST ACTION
Findings from a sur-year field and laboratory program of frost-action research in four areas are summarized. Research on the first topic, frost-susceptibility index tests, led to selection of the Corps of Engineers frost design soil classification system as a useful method at the simplest level of testing. At a much more complex level, a new freezing test combined with a CBR test after thawing is recommended as an index of susceptibility to both frost heave and thaw weakening. Under the second topic, a soil column and dual gamma system were developed and applied to obtain soil data used in improving and validating a mathematical model of frost heave, the objective of the third topic. The model was effectively improved, a probabilistic component was added, and it was successfully tested against field and laboratory measurements of frost heave. A thaw consolidation all gorithm was added which was shown to be useful in predicting the seasonal variation in resilient medium of granular soils. gottom was asset which was shown to be useful in peracting the seasonal variation in festilent medulus of granular soils, the objective of the fourth topic. A laboratory testing procedure was developed for assessing the resilient modulus of thawed soil at various stages of the recovers process, as a function of the applied stress and the soil mostitute tension, which increases as the soil gradually desaturates during recovery. The procedure was salidated by analyzing testing the soil graduality desaturates. deflections measured on pavements by a falling weight deflec-tometer. Frameworks for implementing findings from the principal research topics are outlined.

CR 87-01

RIME METEOROLOGY IN THE GREEN MOUNTAINS.

Ryerson, C C., Jan. 1987, 46p , ADA-178 358, 33 refs.

ICING, HOARFROST, ANTENNAS, ICE DETECTION, SYNOPTIC METEOROLOGY, METEOROLOGICAL FACTORS, MOUNTAINS, VARIATIONS.

Rime icing is a frequent and severe problem in high: clevations of the Green Mountains because it impacts radio and television antennas and ski lifts and could affect high elevation wind machine performance. Rime meteorology, measuring equipment performance, and variation with elevation were analyzed statistically on Mt. Mansfield and Madonian Peak, Vermont, during the winters of 1982-83 and 1983-84. Weather conditions were measured from surface weather observations, from rawinsonde 850 mt records, and from synoptic weather maps. Rime intensity with time was measured with a Rosemount antenna decing system on Mt. Mansfield, and time accretion was measured from collectors installed from 643 to 1227 m on the two peaks. Most rime events in the Green Mountains are of low intensity, with greatest intensities found in warmer, subfreezing air within 5 C of the dew point. Rime was usually most intensic within deep low pressure systems, and was associated with 9- to 10-tenths cloud cover and light precipitation. Rime was variefly associated with high pressure. Most rime events occurred within cold and occluded fronts in southerly to westerly winds. Rime icing is a frequent and severe problem in higher elevations

CR 87-02

RESILIENT MODULUS OF FREEZE-THAW EF-FECTED GRANULAR SOILS FOR PAVEMENT DESIGN AND EVALUATION. PART 3. ABORATORY TESTS ON SOILS FROM ALBA-NY COUNTY AIRPORT.
Cole, D.M., et al, Feb 1987, 36p., ADA-179 253, 6

Bentley, D.L., Durell, G., Johnson, T.C.

PAVEMENTS. FREEZE THAW TESTS, SUB-GRADE SOILS, AIRPORTS, ROADS, UNFROZ-EN WATER CONTENT, SOIL WATER, TEMPER-ATURE EFFECTS.

ATURE EFFECTS.

This is the third in a series of four reports on the laboratory and field testing of a number of road and airfield subgrades, covering the laboratory repeated-load transal testing of five soils in the frozen and thawed states and analysis of the resulting resilient medulus measurements. The laboratory testing procedures allow simulation of the gradual increase in stiffness found in frost-susceptible soils after thawing. The resilient modulus is expressed in a nonlinear model in terms of the applied stresses, the soil mosture tension level (for unfrozen soil), the unfrozen water content (for frozen soil) and the dry density. The resilient modulus about 10 GPa for the frozen material at temperatures in the range of -5 to -8 C. The decrease in modulus with increasing temperature was well-modeled in terms of the unfrozen water content. Upon thaw, the modulus dropped to about 100 MPa and generally increasing principal stress ratio. The modulus also increased with increasing principal stress ratio. The modulus also increased with the soil mosture tension level. The resilient Possion ratio did not appear to be a systematic function of any of the test variables.

MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE. PHASE I: ICE STRUCTURE ANAL-

Richter-Menge, J.A., et al., Mar. 1987, 30p., ADA-181 205, 19 refs.

Cox. G F N . Petron, N

41.4143

ICE MECHANICS, ICE STRUCTURE, SEA ICE. PRESSURE RIDGES, ICE FLOES, TESTS,

PRESSURE RIDGES, ICE FLOES, TESTS.

This report describes the structural analysis of multi-year sea ice samples that were tested in the first phase of a program designed to obtain a comprehensive understanding of the mechanical properties of malti-year sea ice from the Alaskan Beaufort. Sea — Each test specimen is classified into one of three major ice testure categories, granular, columnar, or a mixture of columnar and granular see. The crystallographic orientation, percent columnar ice, and grain are are then evaluated for the granular and or columnar ice in the sample. Test results are interpreted with respect to these parameters. The overall composition of multi-year ridges is also considered, based on the extensive field sampling that was done in the program.

CRYSTAL STRUCTURE AND SALINITY OF SEA ICE IN HEBRON FIORD AND VICINITY, LAB-

Gow, A.J., Mar. 1987, 18p., ADA-180 930, 15 refs

ICE CRYSTAL STRUCTURE, ICE SALINITY, SEA ICE, MELTWATER, OCEAN CURRENTS, BRINES, PHOTOGRAPHY, CANADA LABRA-HEBRON FIORD

Resorts of measurements of the crisitalline structure and salin to characteristics of sea ice in Hebron Front and society

are presented. Structurally, the fiord see was entirely first-year and composed predominantly of congelation, columnar-type crystals. At most of the sampling sites the see exhibited moderately to atrongly aligned c-axes consistent with the inferred direction of near-surface currents in the fiord. Generally diminished values of bulk salinity at five separate locations reflect the warm ice conditions encountered at the time of sampling (late May), and the effect of meltwater flushing in promoting loss of brine, vertically, from the ice sheet. Observations outside Hebron Fiord indicated the presence of only minor amounts of multiyear ice during the latter part of May.

CR 87-05

VEGETATION AND A LANDSAT-DERIVED LAND COVER MAP OF THE BEECHEY POINT QUADRANGLE, ARCTIC COASTAL PLAIN, ALASKA.

Walker, D A., et al, Apr. 1987, 63p, ADA-180 931, Refs. p.51-54.

Acevedo, W.

TUNDRA, VEGETATION, GEOBOTANICAL IN-TERPRETATION, MAPPING, REMOTE SENS-ING, LANDSAT, LANDSCAPES, PATTERNED GROUND, CLASSIFICATIONS, UNITED STATES-ALASKA-BEECHEY POINT.

STATES—ALASKA—BEECHEY POINT.
This report presents a Landisat-derived land cover classification of the Beechey Point, Alaska, 1 250,000-scale quadrangle with descriptions of the major vegetation units Eight Landisat-level units derived from multispectral scanner data, eleven photo-interpreted units, and eight common vegetation complexes are described and illustrated. Procedures of Landisat analysis, field methods, and cartographic methods are described. The region is divided into four landiscape units flat thaw-lake plains, gently rolling thaw-lake plains, hills, and flood plains. Area analysis of the quadrangle was done according to tomiships and mine small study areas. The map uses a modified version of the herarchical tundra mapping classification of Walker (1983). Area-measurement data from geobotanical maps at cight study sites are compared mapping classification of Walker (1983) — Area-measurement data from geobotanical maps at eight study sites are compared with similar data from Landsat maps of the same sites. The results indicate that Landsat maps yield area measurements corresponding to broad geobotanical categories.

CR \$7-06

ELECTROMAGNETIC PROPERTY TRENDS IN SEA ICE, PART 1. Kovacs, A., et al. Apr. 1987, 45p., ADA-180 929, 34

Morey, R.M., Cox, G.F.N., Valleau, N.C. 41-4368

ICE ELECTRICAL PROPERTIES, ELECTRO-MAGNETIC PROPERTIES, SEA ICE, REMOTE SENSING, DIELECTRIC PROPERTIES, BRINES, ICE SALINITY, ICE COVER THICKNESS, TEM PERATURE EFFECTS, ANALYSIS (MATH-EMATICS).

EMATICS).

Two-phase dielectric mixing model results are presented showing the electromagnetic (EM) properties of sea ice versus depth. The modeled data are compared with field measurements and show comparable results. It is also shown how the model date can be used in support of impulse radar and authorine electromagnetic (AFM) remote sensing of sea ice. Examples of the remote measurement of sea ice thickness using impulse radar operating in the 80- to 100-MHz frequency hand and low-frequency (500 to 30,000 Hz) sounding techniques are presented and discussed.

CR 27-07

DEVELOPMENT OF AN ANALYTICAL METH-OD FOR EXPLOSIVE RESIDUES IN SOIL. Jenkins, T.F., et al., bine 1987, 51p., ADA-183-738, Refs. p 19-21

Walsh, M.E. 42-20

EXPLOSIVES, SOIL POLITION, MILITARY OPERATION, MEASURING INSTRUMENTS, OPERATION, MEAS EXPERIMENTATION

EXPERIMENTATION
An analytical method was developed to determine the concentrations of HWX RDA, INR DNR Tetrst. TN1 and 2.4. DN1 in soil. The method involves extracting a 2 g sample with 50 ml. of acctionir e-using an ultrasons that percedure for 18 hr. A 10 ml. portion of the extract is disuted with 10 ml. of water officered through a 0.45 microm Miles SR 6 tere and analyzed by RP HPLC coing a fixed 254 nm UV detector. Separations were obtained on an IC-18 column clutted with 50.50 water methanol. Retention intro-were 255–382, SIR, 6.25, T04, 6.45 and 10.15 min for HMX, RDX, INR, DNR, Territ, TNL and 2.4 DNL respectively. Confirmation of analyte identities is recommended by RP HPLC on an IC CN column using 50.50 water methanol. Renet is told ex-using naturally contaminated soil indicated than equipher, in was achieved within 24 by for the massive of work and analytes studied.

CR 27.46

USE OF LANDSAT DIGITAL DATA FOR SNOW USB UF LANUSAT DIGITAL DATA FOR SNOW COVER MAPPING IN THE UPPER SAINT JOHN RIVER BASIN, MAINE. Merry, C.J., et al, June 1987, 68p., ADA-183 213, Refs. p.52-57.

Miller, M.S. 42-21

SNOW COVER DISTRIBUTION, SNOW DEPTH, REMOTE SENSING, SNOW WATER EQUIVA-LENT, MAPPING, LANDSAT, COMPUTER AP-PLICATIONS, FOREST LAND.

PLICATIONS, FOREST LAND.

Measurements of snow depth and its water equivalent were obtained at 11 snow courtes in the Allagash. Maine, area in conjunction with the acquaistant of five Landast-2 and -3 images during the 1977-78 and 1978-79 winters. To test a hypothesis that Landast reflected radionce values on a regional scale do change, histograms of the Landast MSS band 7 reflected radionce values for a 300 x 300 pixel (420 sq km) area near Allagash were evaluated to quantify the change. A statistical description (skewness and kurton) of the histogram for each scene was developed and then correlated with ground measurements of snow depth. A new index based on skewness and model population was found to carrelate well with snow depth. Following these initial results, the Landast data were re-examined and corrections were made for solar elevation and MSS sensor calibration. The reflected radiance from open areas showed a consistent increase in intensity with increasing snow depth. The forested land cover classes did not change with snow depth.

CR 87-09

FACTORS AFFECTING WATER MIGRATION

IN PROZEN SOILS.

Xu, X., et al, July 1987, 16p., ADA-184 796, 20 refs.

Oliphant, J.L., Tice, A.R.

Oliphoet, J.L., Tice, A.R.
42-463
SOIL WATER MIGRATION, UNFROZEN
WATER CONTENT, FROZEN GROUND PHYSICS, TESTS, NUCLEAR MAGNETIC R2SONANCE, TEMPERATURE GRADIENTS,
WATER CHEMISTRY, DENSITY (MASS/VOLUME), TEMPERATURE EFFECTS.

VOLUME), TEMPERATURE EFFECTS.
Soli-moter potential was measured on three soils and influencing factors, including water content, soil tenture, dey density and temperature, were investigated. The soil-water potential in unsaturated, unfrozen soils decreases with decreasing soil tenture content and soil dispersion, and increases with increasing temperature and dry density. Unfrozen water contents at a given temperature were investigated. Of these three factors, only increasing the salt concentration caused a large change in the unfrozen water versus temperature curves. Water migration in an unsaturated frozen soil (Morin clay) was determined in horizontally closed soil columns under temperature gradients. The flux of water migration was calculated from the water distribution curves before and after testing. The flux is directly proportional to the square rost of the test dwaston, and decreases with decreasing temperature and soil dry density.

CREEP AND STRENGTH BEHAVIOR OF FROZEN SILT IN UNIAXIAL COMPRESSION.

Zhu, Y., et al, July 1987, 67p., ADA-184 \$16. Refs. p.58-60. Carbee, D.L.

43-426

FROZEN GROUND MECHANICS, FROZEN GROUND STRENGTH, SOIL CREEP, STRESS STRAIN DIAGRAMS, RHEOLOGY, COMPRESSIVE PROPERTIES, TEMPERATURE EFFECTS, FROZEN GROUND PHYSICS, TESTS.

PROZEN GROUND PHYSICS, TESTS.

Uniaxial constant-stress and constant-strain-rate compression tests were conducted on more than 200 remoided, saturated, frozen specimens of Farthonks silt under various saturated. A series of curves of stress vs strain rate for various temperatures for strain rates ranging from about 0.00 to 1/100,000,000/s show a close strength correspondence between the constant-stress and constant-strain-rate tests. All of these "complete" stress vs strain rate curves could not be described by a single power law or exponential equation, indicating that different deformation mechanisms are dominant within different ranges of strain rate. Two critical strain rates for distinguishing between the different deformation mechanisms were observed to be near 1.1,000 and 1/1,000,000/s for the medium-dense frozen Fastbanks silt. The former indicates the transition from distrile failure to moderate brittle fracture as strain rate increases, while the latter indicates the transition from sistocation creep to glide creep (by the authors' definition). Based on the charges in fine law, two fundamental creeps were classified shortierm creep, which is governed by glide creep, and long-term creep, which is governed by glide creep. The failure strain was not sensitive to temperature and strain rate over a certain range of strain rates, but it was very resource strain was not sensitive to temperature and strain rate over a certain range of strain rates, but it was very sensitive to density. Assur's creep model (1990) for ice was used to fit the creep data in this study. It works well for short-term creep but does not fit as well for long-term creep. The rate process theory was applied to the commonders. A new both value of experimental activations. The rate percess theory was applied to the A very high value of experimental activation

energy was obtained for lower stresses, and a very high value of apparent activation energy was observed for higher temperatures. The peak compressive strength was very sensitive to temperature and strain rate byt relatively inconsitive to density. While the initial tangent modulus in not sensitive to strain rate, it increases with decreasing temperature and

CR 87-11

DISTURBANCE AND RECOVERY OF ARCTIC

ALASKAN TUNDRA TERRAIN. Walker, D.A., et al. July 1987, 63p., ADA-184 442. Refs. p.52-62. Cate, D., Brown, J., Racine, C.H.

42-334

TUNDRA, REVEGETATION, HUMAN FAC-TORS, LAND RECLAMATION, ENVIRONMEN-TAL IMPACT, PIPELINES, PERMAFROST, ROADS, UNITED STATES-ALASKA.

ROADS, UNITED STATES—ALASKA.

This document is a summary of over a decade of CRELmanaged research regarding deturbance and recovery in northern Alaska. Much of this research was sponsored by the U.S. Goulogical Servey's National Petroleum Reserve—Alaska exploration program and the Department of Energy's environmental research program, although somerous other agencies and members of the oil industry have also made contributions to several of the university participants. This work comes at a time of major transition in the facus of morthern Alaskan environmental research from single-impact studies to analysis of cumulative impacts. Thus, it summarizes studies of authropagenic disturbances in northern Alaska and documes the immediate need for new methods to approach the problems of revegetation, resouraion and cumulative impacts of terrain undertain by permaterast. This heritage of research comes from many research sites in methorn Alaska, including Cape Thompson, the Seward Peninsula, Bertow, Fish Creek, Osmalik, East Osmalik, Prothec hay, the Arctic National Wildlife Refuge and along the trans-Alaska spicline. The impacts that are discusted include bladed trails, off-road vehicle trails, winter trails, ice roads, gravel pada and roads, borrow pits, readiled imposminents, read dust, hydrocarbon spills and seawater spills. CR 87-12 CR 87-12

PERSISTENCE OF CHEMICAL AGENTS ON THE WINTER BATTLEFIELD. PART I. LITER-ATURE REVIEW AND THEORETICAL EVALUATION.

Leggett, D.C., Aug. 1987, 20p., ADB-115 298, Refs. p.11-14. 42-1089

MILITARY OPERATION, CHEMICAL PROPER-TIES, DROPS (LIQUIDS), SNOW COVER, ICE COVER, EVAPORATION, TEMPERATURE GRADIENTS, IMPURITIES.

GRADIENTS, IMPURITIES.
Literature concerning persistence of chemical warfare agents and related chemicals in cold coveronments is analyzed. An existing model of droplet persistence is discussed in relation to evaporation theory and practicel uncertainties. This model was questioned in the case of ice and some covered terrain—a new model may be needed, but the necessary experimental data for testing and validation are not yet available. Experimental evaporation data for chemicals on snow are needed as well as the solubilities of ice in the relevant chemicals. Since evaporation from ice is inferred to be significantly retarded, it was emphanized that the rates of chemical degradation need to be addressed under these conditions. Hydrolysis is a mechanism of agent diseptablish already experimentally demonstrated in ice. More experiments are needed under conditions realistically simulating agent dissensations on agent diseptation. Theoretical and indured experimental evidence suggest that it is a water pathway. Because thermal activation is theoretically not required, it may proceed equally rapidly at low received and indirect experimental evidence suggest that it is a wider pathway. Because thermal activation is theoretically not required, it may proceed equally rapidly at low of high temperatures. Suggestions for relevant experiments—despite evaporation and solubility tests, and tests of hydrolysis and photolysis of droplets on see and snow surfaces—are mode.

CR 87-13

GEOCHEMISTRY OF FREEZING BRINES. LOW-TEMPERATURE PROPERTIES OF SODI-

UM CHLORIDE. Thurmond, V.L., et al, Aug. 1987, 11p., ADA-185 751, 21 refs.

s, G.W. 42-914

DRINES, FREEZING, GEOCHEMISTRY, SOLU-TIONS, LOW TEMPERATURE TESTS, SOLU-TIONS, CHEMICAL PROPERTIES, THERMODY-NAMICS, SALINITY.

NAMICS, SALINITY.
Thermodynamic properties of electrolyte solutions change rapidly below 25 C, but these properties are seldom measured over the low temperature range (below 0 C), even though some salt solutions can remain unfroren to -50 C. The heat capacities of concentrated solutions (0.5-0.0 molal) of NaCi-H2O were measured from 25 C to -40 C as part of a study to provide thermodynamic data of salt solutions for use in cold reposts chemical geophysical studies. A differential reasuring calorimeter was used to measure specific heat capacity from cooling scans as a function of temperature and concentration. The heat capacity data were fit to the equations of Piter and convolves to obtain activity and osmotic coefficients of NaCl and H2O, respectively, below 0 C. Supercooling of the solutions was encouraged.

by using a fast scan rate (10 deg/minute) so that specific heat could be measured to lower temperatures then would be possible if the solutions were allowed to equilibrate with the solid phases. The solubility of ice was calculated and compared to the experimental freezing point of NaCl solutions.

PHYSICAL AND STRUCTURAL CHARACTER-ISTICS OF WEDDELL SEA PACK ICE. w. A.J., et al. Aug. 1987, 70p., ADA-188 189, 31

Ackley, S.F., Buck, K.R., Golden, K.M.

42-1950 42-1930
PACK ICE, ICE PHYSICS, ICE STRUCTURE, SEA
ICE, ICE SALINITY, DRILL CORE ANALYSIS,
FRAZIL ICE, MARINE BIOLOGY, LUMINESCENCE, ANTARCTICA—WEDDELL SEA.

FRAZIL ICE, MARINE BIOLOGY, LUMINES-CENCE, ANTARCTICA—WEDDELL SEA.

During Feb. and Mer. 1900 the physical properties of Weddell Sea pack ice were investigated via oute drilling of 66 flors located along a transect of 600 nousical miles from 63 to 74 S latendle at roughly 40 W longitude. These studies revealed widespread frazil see in amounts not known to exact in arctic sea ice of comparable age and thickness. It is estamated from structure studies of 62 of the 66 flors in generated as frazil. The disposition and exceptional bicknesses of the frazil show that mechanisms office than surface turbulence effects are involved and imply that the circulation and structure of water: a the upper levels of the Weddell Sea are significant]. Ifferent flows those in the Arctic basis. Solinities of _uch first-year and multi-year flors are notably higher then those of their Arctic counterports became summer surface melting is rate or shant in the Weddell Sea, in the Arctic, downward percolating michards through the ice and lawers in salinity. Fluorescence was evaluated as a means of revealing birdipal activity in Weddell Sea pack ice. It proved melal as an index of combined living and dead material in the ice, but meanserial from the counterports backed to establish any consistent relationship between fluorescence and selinity as neggetted by earlier work in the Weddell Sea. (Anth.)

CR 87-15

TENSILE STRENGTH OF PROZEN SILT. Zhu, Y., et al, Aug. 1967, 23p., ADA-185 483, 8 refs. 47.475

PROZEN GROUND STRENGTH, TENSILE PROPERTIES, SOIL PHYSICS, STRAINS, SEDI-MENTS, UNFROZEN WATER CONTENT.

MENTS, UNFROZEN WATER CONTENT.
Constant strain-rate tension tests were conducted on remoded acturated frozen Fairbanks silt at various temperatures, artein rates, and denoities. It was found that the critical strain rate of the ductile-bristle transition is not temperatured denoity and temperatures down to -5 C., but waves with denoity. The transition occurs at a strain rate of 0.01/s for medicinely set and 0.000/fs for low-denoity silt. The pendicately with and 0.000/fs for low-denoity silt. The pendicated strength decreases considerably with decreasing strain rate for bristle fracture.

The follows strain remains almost constant at temperatures lower than about -2 C, but it varies with denoity and strain rate of 5 C. The instead tangent rendellus is independent of strain rate and increases with decreasing temperature and denoity.

PHYSICAL PROPERTIES OF SUMMER SEA ICE IN THE FRAM STRAIT, JUNE-JULY 1904. Gow, A.J., et al, Sep. 1987, 81p., ADA-186 937, 39

Tucker, W.B., Weeks, W.F.

ICE PHYSICS, ICE CRYSTAL STRUCTURE, ICE FLOES, SNOW DEPTH, ICE SALINITY, BRINES, FRAZIL ICE, ICE WATER INTERFACE, SEASONAL VARIATIONS, GREENLAND SEA.

FRAZIL ICE, ICE WATER INTERFACE. SEASONAL VARIATIONS, GREENLAND SEA.
The physical properties of sea ice in the Fram Strait region
of the Greenland Sea were examined during June and July
1944 in conjunction with the MIZEX field program. Most
of the see sampled within Fram Strait during this period
was multi-year, it is estimated to ray dent at least 455
by volume of the total see discherged from Fram Strait
during Jance and July. Thickness and other properties
indicated that more of the multi-year see was older than
4 to 5 years. Soom cover on the multi-year see averaged
29 cm deep while that on first-year see was older than
30 cm deep while that on first-year see was older than
Much of the difference appears to be the result of enhanced
submittion of the snow on the thinner first-year see. The
samity profiles of first-year see clearly show the effects
of ongoing brine draining in that profiles from cores defled
inter in the experiment were substantially less saline than
earlier cores. Bulk associates of multi-year see are generally
much lower than those of first-year see. This difference
the time see types. This section examinations of crystal
structure indicate that should 15% of the see commend of
congestions see with typically columnate type crystal structure.
The remaining 25% committed of granular see with only a
few occurrences of snow see. The gravitar necessital
permantly of first, found in small amounts at the top of
See, but mainly observed in multi-year ridges where it
occurred as the more component of see in interfision wools.

CR 87-17

EVALUATION OF THE MAGNETIC INDUC-TION CONDUCTIVITY METHOD FOR DE-TECTING FRAZIL ICE DEPOSITS

Arcone, S.A., et al, Sep. 1987, 12p., ADA-186 940, 13

Brockett, B.E., Lawson, D.E., Chacho, E.F.

ICE DETECTION, FRAZIL ICE, ICE GROWTH, ICEBOUND RIVERS, MAGNETIC SURVEYS, SUBGLACIAL OBSERVATIONS, WATER FLOW, MEASURING INSTRUMENTS.

MEASURING INSTRUMENTS.

The ability to map frazil ice deposits and water channels beneath an ice-covered river in central Alaska using the magnetic induction conductivity (MI) technique has been assessed.

The study was performed during the first week of Mar. 1986 on the Tanana River near Farbanks and employed a commercially available instrument operating at a fixed frequency with a fixed antenna (coil) spacing and orientation

Compansons of the MI data with theoretical models based upon physical data measured along three cross sections of the river demonstrate the sensitivity of the MI technique to frazil ice deposits. The conductivity generally derived for the frazil ice deposits encountered is very low (about 6.3 x 1/10,000 S/m) when compared with the measured value for gravel and sandy gravel bed sediments. In all three cross sections, maxims in the apparent conductivity profiles correlated with frazil ice deposits

In all three cross sections, maxims in the apparent conductivity profiles correlated with frazil ice deposits

Difficulties, possibly due to adverse effects of cold weather upon instrument calibration, affected the quantitative performance of the instrument on one cross section, although the interpretation of the data (locations of open channels vs frazil deposits) was qualitatively unaffected.

CR 87-18

CR 87-18

AUTOMATIC FINITE ELEMENT MESH GEN-

Albert, M.R., et al, Sep. 1987, 27p., ADA-186 939, 10 refs.

42-1518

HEAT TRANSFER, FLUID DYNAMICS, COM-PUTER PROGRAMS, MATHEMATICAL MOD-ELS. ENGINEERING.

Finite element computer codes are used in a variety of fields to solve partial differential equations of importance in science and engineering. The initial input to all of these programs requires the formation of a mesh (i.e. extensive these programs requires the formation of a mesh (i.e., extensive lists of geometrical data listed in particular orders), and the success of the solution depends on a well-formed mesh. This report documents a mathematical mapping technique and its implementation into a computer code that will automatically generate quality finite element meshes. This versatile generator uses standard FORTRAN, requires no special equipment (such as a digitizer), is very economical to run, and is user-friendly. The mathematical technique is discussed, advantages and limitations of the method are presented, examples are shown, and notes on user instructions are provided. provided.

CR 87-19

APPROXIMATE SOLUTIONS OF HEAT CON-DUCTION IN A MEDIUM WITH VARIABLE PROPERTIES.

Y.-C., Sep. 1987, 18p., ADA-186 933, 6 refs. 42-1519

SNOW PHYSICS, HEAT TRANSFER, CONDUCTION, ANALYSIS (MATHEMATICS), HEAT BALANCE, THERMAL CONDUCTIVITY.

The approximate heat balance integral method (HBIM) is extended to the case of a medium with variable properties such as snow. The case of linear variation of thermal conductivity is investigated. An alternative heat balance conductivity is investigated An alternative heat balance integral method (AHBIM) is developed Both constant surface temperature and surface heat flux are considered A comparison is made of the temperature distribution from the HBIM, AHBIM and an analytical method for the case of constant surface temperature in general, results agree quite well with the analytical method for small values of dimensionless time fau, but the difference becomes more pronounced as tau increases. It is found that the AHBIM with a quadratic temperature profile gives a somewhat better result, especially when the value of the dimensionless distance is small. The results, when compared with those from HBIM, AHBIM and the analytical method are found to agree exceptionally well with the analytical method, especially for large values of tau. An alternative heat balance

CR 87-20

MICROWAVE AND STRUCTURAL PROPERTIES OF SALINE ICE.

Gow, A J., et al, Oct. 1987, 36p., ADA-189 307, Refs.

Arcone, S.A., McGrew, S.G. 42-2419

ICE STRUCTURE, ICE SALINITY, MI-CROWAVES, ICE ELECTRICAL PROPERTIES, DIELECTRIC PROPERTIES, TESTS, TEMPERA-TURE EFFECTS, BRINES, MODELS, SEA ICE, STRUCTURAL ANALYSIS.

The structure and salinity characteristics of saline ice slabs removed from ice sheets grown in an outdoor pool have

been studied and related to the complex relative dielectric permittivity measured with free-space transmission techniques at 4.80 and 9.50 GHz. The saline ice closely simulated arctic sea ice in its structural and salinity characteristics, which were regularly monitored in a number of ice sheets grown during the winters of 1983-84 and 1984-85. Institu transmission measurements at similar frequencies were also made on the ice sheets themselves using antennas located above and beneath the ice. The slab measurements were made during warming from -29 to -2 C on slabs grown during the winter of 1983-84 (4.75 GHz) and during a warming and cooling cycle over a slightly larger temperature range on slabs grown during the winter of 1984-85 (4.80 and 9.50 GHz).

CR 87-21 MEASUREMENTS IN SPECTRAL TURBED BOUNDARY LAYER OVER SNOW. Andreas, E.L., Nov. 1987, 41p., ADA-190 217, Reis.

SNOW COVER EFFECT, SPECTRA, BOUNDARY LAYER, SURFACE TEMPERATURE, TURBU-LENT FLOW, HUMIDITY.

The author measured time series of longitudinal (u) and vertical (w) velocity and temperature (t) and humidity (q) fluctuations with fast-responding sensors in the near-neutrally vertical (W) velocity and temperature (I) and humidity (a) studies with fast-responding sensors in the near-neutrally stable surface layer over a snow-covered field. These series yielded individual spectra and u.w., w.q. and t-q cospectra, phase spectra and coherence spectra for nondimensional frequencies (fz/U) from roughly 0 001 to 10. This is, thus, one of the most extensive spectral sets ever collected over a snow-covered surface. With the exception of the u.w cospectra, all of the spectra and cospectra displayed the expected dependence on frequency in an inertial or inertial-convective subrange. All, however, contained significantly more energy at low frequency than the Kansas neutral-stability spectra and cospectra. This excess low-frequency energy and the erratic behavior of the u.w cospectra imply that the forested hills bordering the site on two sides were producing disturbances in the flow field at scales roughly equal to the height of the hills, 100 m. The phase and coherence spectra suggest that internal gravity waves were also frequently present, since the atmospheric boundary layer generally had slightly stable stratification. Consequently, at this complex site, turbulence alone determines the spectra and cospectra at high frequency; at low frequency the spectra and cospectra reflect a combination of topographically generated turbulence and internal waves. From the measured temperature and humidity spectra and the Leg cospectra. ed turbulence and internal waves from the measured temperature and humidity spectra and the 1-q cospectra, the author computed refractive index spectra for light of 0.55-micron and millimeter wavelengths, the first such spectra obtained over snow.

CR 87-22

THERMAL INSTABILITY AND HEAT TRANS-FER CHARACTERISTICS IN WATER/ICE SYS-

Yen, Y.-C., Nov. 1987, 33p., ADA-189 627, 33 refs.

42-2420
ICE WATER INTERFACE, HEAT TRANSFER, MELTWATER, PHASE TRANSFORMATIONS, WATER TEMPERATURE, TEMPERATURE VARIATIONS, CONVECTION, ANALYSIS (MATHEMATICS), DENSITY (MASS/VOLUME), TEMPERATURE DISTRIBUTION.

This review discusses problems associated with the anomalous temperature-density relations of water. It covers a) onset of convection, b) temperature structure and natural convective heat transfer, and c) laminar forced convective heat transfer, and c) laminar forced convective heat transfer in the water/ice system. The onset of convection in a water/ice system was found to be dependent on thermal boundary conditions, not a constant value as in the classical fluids that have a monotonic temperature-density relationship. The water/ice system also exhibits a unique temperature distribution in the melt layer immediately after the critical Rayleigh number is exceeded and soon after it establishes a more or less constant temperature region progressively deepening as the melt layer grows. The constant temperature is approximately 3.2 C for water layers formed from above but varies for melt layers formed from below. The heat flux across the water/ice interface was found to be a weak power function and to increase linearly with temperature. This review discusses problems associated with the anomalous heat flux across the water/ice interface was found to be a weak power function and to increase linearly with temperature for melted layers from above and below, respectively. Both theoretical and experimental incling studies of ice spheres, cylinders, and vertical plates show a minimum heat flux in the water/ice system due to the density extremum of 4C. The inversion temperature was from 5.1 to 5.6 °C. For the case of laminar forced convection melting heat transfer, the presence of an interfacial velocity (due to phase transition) reduces heat transfer in comparison with the case without phase changes. without phase change.

AIRBORNE ELECTROMAGNETIC SOUNDING OF SEA ICE THICKNESS AND SUB-ICE BATH-

Kovacs, A., et al, Dec. 1987, 40p., ADA-188 939, 21

Vallcau, N.C., Holladay, J S

42-2551 ICE COVER THICKNESS, REMOTE SENSING, SEA ICE, ELECTROMAGNETIC PROSPECT-ING, SOUNDING, SUBGLACIAL OBSERVA-TIONS, AIRBORNE EQUIPMENT, ANALYSIS (MATHEMATICS).

A study was made in May 1985 to determine the feasibility of using an autoome electromagnetic sounding system for profiling sea ice thickness and the sub-ice water depth and conductivity.

The study was made in the area of Prudhoe conductivity. The study was made in the area of Prudhoe
Bay, Alaska. The multifrequency airborne electromagnetic
sounding system consisted of control and recording electronics Bay, Alaska sounding system consisted of control and recording electronics and an antenna. The electronics module was installed in a helicopter, and the 7-m-long tubular antenna was towed beneath the helicopter at about 35 m above the ice surface. For this electromagnetic system, both first-year and second-year sea ice could be profiled, but the resolution of ice thickness decreased as the ice became rough. This decrease was associated with the large footprint of the system, which effectively smoothed out the sea ice relief. Under-ice water depth was determined, as was seawater conductivity. The results of the feasibility study were encouraging, and further system development is therefore warranted.

OPTIONS FOR MANAGEMENT OF DYNAMIC ICE BREAKUP ON THE CONNECTICUT RIVER NEAR WINDSOR, VERMONT.

Ferrick, M.G., et al, Mar. 1988, 16p., ADA-195 329, 8 refs.

emieux, G.E., Weyrick, P.B., Demont, W.

ICE BREAKUP, ICE CONTROL, RIVER ICE, HY-DRAULICS, HYDROLOGY, FLOOD CONTROL, TESTS

TESTS

The Cormish-Windsor bridge is the longest covered bridge in the United States and has significant historical value. At a large peak flow, dynamic ice breakup of the Connecticut River can threaten the bridge and cause flood damage in the town of Windsor, VT. Throughout the 1985-86 writer we regularly monitored ice conditions, including a midwinter dynamic ice breakup on 27 January We conducted controlled release tests over the operating range of the turbines at Wilder Dam upstream during both open water and ice cover conditions. These data and observations were analyzed in light of more than 60 years of temperature and discharge records. Our analysis indicates that river regulation presents alternatives for ice management that would minimize the probability of bridge damage and flooding during breakup

FREEZING OF SOIL WITH AN UNFROZEN WATER CONTENT AND VARIABLE THERMAL PROPERTIES.

Lunardini, V.J., Mar. 1988, 23p, ADA-195 343, 15

SOIL FREEZING, UNFROZEN WATER CONTENT, THERMAL CONDUCTIVITY, PHASE TRANSFORMATIONS, TEMPERATURE EFFECTS, SPECIFIC HEAT.

FECTS, SPECIFIC HEAT.

While many materials undergo phase change at a fixed temperature, soil systems exhibit a definite zone of phase change. The variation of unfrozen water with temperature causes a soil system to freeze or thaw over a finite temperature range. Exact and approximate solutions are given for conduction phase change of plane layers of soil with unfrozen water contents that vary inearly and quadratically with temperature. The temperature and phase change depths were found to vary significantly from those predicts of or the constant-temperature or Neumann problem. The thermal conductivity and specific heat of the soil within the mushy zone varied as a function of unfrozen water content. It was found that the effect of specific heat is negligible, while the effect of variable thermal conductivity can be accounted for by a proper choice of thermal properties used in the for by a proper choice of thermal properties used in the constant-thermal-property solution

PERSISTENCE OF CHEMICAL AGENTS ON THE WINTER BATTLEFIELD. PART EVAPORATION FROM ICE AND SNOW. Leggett, D C., Mar. 1988, 10p., ADB-121 807, 17 refs.

MILITARY OPERATION, CHEMISTRY, EVAPORATION, SNOW IMPURITIES, ICE COMPOSI-TION SOLUBILITY, ICE AIR INTERFACE, TESTS

Very little information is available on the evaporation of liquid chemicals from ice or snow Organophosphorus chemical agents and their simulants have appreciable mutual solubility with water. Theoretically, this would be expected to lead to simple dilution, causing retardation of their evaporation at the ice/air interface. Polar chemicals such as these are also known to spread when applied to ice enhancing evaporation due to surface area expansion or a "spread factor" relative to non-spreading droplets. These notions were tested by comparing evaporation of dimethyl methylphosphonate (DMMP) from ice and Teflon, a non-spreading surface. Evaporation from ice was initially much slower, but increased with time, while the evaporation rate from Teflon was nearly constant. The data suggest that dissolution of ice at the interface retards DMMP evaporation. This is supported by the equilib, um solubility of ice in DMMP, which was measured concurrently. These preliminary results imply that evaporation of chemical agents dispersed on ice will be retarded to some degree by the dissolution process. Further experimentation will be needed to explain the observed increase in evaporation rate with time. Very little information is available on the evaporation of

CR 88-04

COMPOSITE BUILDINGS FOR MILITARY

Flanders, S.N., Mar. 1988, 25p., ADA-194 475, 4 refs.

MILITARY FACILITIES, BUILDINGS, SAFETY, COST ANALYSIS, CONSTRUCTION MATERI-

ALS.

This report compares the use of composite buildings with the use of combine into fewer buildings. Composite buildings are those that combine into fewer buildings several uses that traditionally have occurred in separate buildings. The comparisons are based on construction costs, life cycle costs, speed of construction, materials availability, energy efficiency, fire safety, organizational efficiency, incremental or modular construction, and habitability. The uses reported on include a military training facility in St. Jean, Quebec, a shopping and community center complex for Fort Wainwight, Alaska, and battalion and brigade buildings for mobilization at Fort Leonard Wood, Missouri, and in Alaska. In each case, when comparisons are made between permanently constructed buildings, the composite buildings are cheaper to build and maintain than the conventional buildings. The composite buildings consume less energy and are much more convenient to their occupants.

CR 88-05

MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE. PHASE II: ICE STRUCTURE ANAL-

Richter-Menge, J.A., et al, Mar. 1988, 27p, ADA-213 043, 15 refs.

43-4593

SEA ICE, ICE MECHANICS, ICE STRUCTURE, GRAIN SIZE, ICE COMPOSITION

GRAIN SIZE, ICE COMPOSITION

This report describes the structural analysis of multi-year sea ice samples that were tested in the second phase of a program designed to obtain a comprehensive understanding of the mechanical properties of multi-year sea ice from the Alaskan Beaufort Sea. Each test specimen is classified into one of three major ice texture categories granular, columnar or a mixture of columnar and granular ice. The crystallographic orientation, percent columnar ice, and grain size are then evaluated for the granular and/or columnar ice in the sample. Test results are interpreted with respect to these parameters. The overall composition of multi-year ridges is considered, based on the extensive field sampling that was done in the program. The effect of sample orientation on the results is also discussed.

CR 88-06

TEMPERATURE AND STRUCTURE DEPEND ENCE OF THE FLEXURAL STRENGTH AND MODULUS OF FRESHWATER MODEL ICE. Gow, A.J., et al, June 1988, 43p., ADA-199 637, 21

Ueda, H.T., Govoni, J.W., Kalafut, J.

43-1399
ICE STRENGTH, FLEXURAL STRENGTH, ICE STRUCTURE, ICE TEMPERATURE, STRAIN TESTS, STRESSES, ICE CRYSTAL STRUCTURE, TEMPERATURE GRADIENTS, ICE GROWTH, AIR TEMPERATURE.

This report presents results of small beam testing conducted This report presents results of small beam testing conducted in a test tank on ice corresponding in structure to the two major ice types, \$1 and \$2\$, encountered in lake ice sheets. Tests of 730 beams in the temperature range -10 -19 C showed that macrocrystalline (\$1) and columnar (\$2\$) ice differ appreciably in their flexural characteristics, and that these differences are attributable to variations in the size and orientation of the crystals in the ice and the thermal condition of the beams. Parallel testing of cantilever and simply supported beams indicated a virtual non-dependence of flexural strength on the temperature of the fiber in tension. It was also determined that the sharply terminated corners of conventional cantilever beams are a source ence of flexural strength on the temperature of the fiber in tension. It was also determined that the sharply terminated corners of conventional cantilever beams are a source of appreciable stress concentration that can reduce the intrinsic flexural strength by as much as one-half, but which, in most cases, can be substantially relieved by drilling holes at the beam roots. Overall, flexural strengths did not exceed 1200 kPa for cantilever beams or 1650 kPa for simply supported beams tested in parallel with cantilever beams. The highest flexural strengths were measured on isothermal simply supported beams of S2 ice tested with the top surface in tension, with average strengths for such ice increasing from 1650 kPa at -1 C to nearly 2600 kPa at -19 C -19 C

CR 88-07

DECONTAMINATION OF CHEMICAL AGENTS ON THE WINTER BATTLEFIELD. A LITERA-TURE REVIEW AND PRELIMINARY ASSESS-

Parker, L.V., June 1988, 48p., ADB-123 137, Refs. p.38-43.

MILITARY OPERATION, CHEMISTRY, POLLU-TION, COUNTERMEASURES, DECONTAMI-NATION, POLAR REGIONS, WINTER

This report reviews the literature existing prior to 1987 on the effectiveness of chemical decontamination in a cold or winter environment. Both chemical neutralization techniques and physical methods for decontamination are discussed.

with respect to their use on a winter battlefield. The U.S. Army's current standard decontaminants are compared to other chemical neutralizing agents Physical decontamination methods that are discussed include thermal decomposination methods that are discussed include thermal decomposi-tion methods, hot air decontamination, aqueous and solvent cleaning techniques, abrasive cleaning techniques, and the use of absorbents. The potential utility of field expedient methods on a winter battlefield is reviewed Final recom-mendations cite specific areas where research is needed so that cold weather decontamination doctrine can be better

CR 88-08

DEVELOPMENT OF AN ANALYTICAL METH-OD FOR THE DETERMINATION OF EXPLO-SIVE RESIDUES IN SOIL. PART II: ADDI-TIONAL DEVELOPMENT AND RUGGEDNESS TESTING.

Jenkins, T.F., et al, July 1988, 46p., ADA-213 045, Refs. passim.

Schumacher, P.W., Walsh, M.E., Bauer, C.F. 43-4594

SOIL ANALYSIS, SOIL TESTS, SOIL CHEMISTRY, SOIL POLLUTION, EXPLOSIVES.

SOIL ANALYSIS, SOIL TESTS, SOIL CHEMISTRY, SOIL POLLUTION, EXPLOSIVES.

The analytical method for determination of explosive residues in soil developed by Jenkins and Walsh (1987) was tested and modified to improve its usability. The major modification is the use of an aqueous CaCl2 solution to achieve flocculation and settling of suspended particulates prior to filtration. Ruggedness testing demonstrated that the method is not sensitive to minor modifications in analytical protocol Specific studies indicated that the following had negligible effects on determined soil concentrations: the degree of grinding prior to extraction with acctionitrile, the ratio of soil mass to extraction solvent volume, the kind of mixing (vortex mixing or manual shaking) used prior to ultrasonic bath extraction, the concentrations of CaCl2 used for flocculation, the length of time allowed after flocculation before samples were filtered, and the number of samples processed simultaneously in the ultrasonic bath Specific studies were conducted to determine how long stock and working standards and soil extracts were stable. The combined analyte stock solution is good for at least a year, and the combined working standard is good for at least a year, and the combined working standard is good for at least a year, and the combined working standard is good for at least a year, and the combined working standard is good for at least a year, and the combined working standard is good for at least a year, and the combined working standard is good for at least a year, and the combined working standard is good for at least a year. So the substandard is good for at least a year and the combined working standard is good for at least a year. So the substandard is good for at least a year and the combined working standard is good for at least a year. The substandard is good for at least and year and the combined working standard is good for at least and year and test of the method to define performance characteristics

DEVELOPMENT OF A RIVER ICE PROW. Tatinclaux, J.C., et al, July 1988, 26p., ADA-199 466,

Martinson, C.R.

RIVER ICE, ICE NAVIGATION, ICE CONTROL, ICE REMOVAL, ICE CONDITIONS, MODELS, LOCKS (WATERWAYS), CHANNELS (WATER-WAYS), DAMS, TESTS.

This report describes the development of a river ice prow to be attached to a towboat for opening ice-free navigation channels or for ice management in the vicinity of the locks and dams on the northern rivers of the United States (Illinois, Ohio and Upper Mississippi rivers) Following a literature construction and maintenance costs

Three successive models were constructed and tested in level ice in the CRREI. construction and maintenance costs. Three successive models were constructed and tested in level ice in the CRREL Test Basin to optimize the prow's performance from the points of view of resistance and maneuverability in level ice. Test results are presented and discussed.

MEASUREMENT AND INTERPRETATION OF ELECTRICAL FREEZING POTENTIAL OF

Kelsh, D.J, et al, Aug. 1988, 9p., ADA-201 699, 23 refs.

Taylor, S.

43-1562

FREEZING POTENTIAL (ELECTRICAL), FROST HEAVE, SOIL FREEZING, CHEMICAL COMPO-SITION, SOIL WATER, SOIL PRESSURE, EX-PERIMENTATION, ELECTRICAL PROPERTIES PERIMENTATION, ELECTRICAL PROPERTIES
When soil freezes, abrupt changes occur in the electrical
potential measured between electrodes buried in frozen vs
unfrozen regions. These "freezing potentials" can vary
in polarity and magnitude depending on soil type, freezing
rate, nature and concentration of electrolytes in the soilwater, etc. This report finds that electrical potential changes
of the same order of magnitude as freezing potentials (i.e.,
about 100 mV) can be generated by simply compressing
the soil at room temperature. This suggests that a significant
and previously unrecognized source of electrical freezing
potential could be due to pressure induced during frost heaving
Because many interrelated variables are responsible for electrical freezing potential, the use of freezing potential to predict cal freezing potential, the use of freezing potential to predict corrosivity, water migration, or other physical properties of freezing soils is considered to be inappropriate

CR 88-11

ATMOSPHERIC ICING AND BROADCAST AN-TENNA REFLECTIONS.

Rverson, C.C., Aug. 1988, 13p., ADA-200 378, 17

43-1400 ICING, ANTENNAS, ICE DETECTION, ICE ACCRETION, MEASURING INSTRUMENTS, STATISTICAL ANALYSIS.

This study assesses the effects of atmospheric icing on broadcast This study assesses the effects of atmospheric icing on broadcast transmission reflections on two mountains—Mount Mansfield in northern Vermont and Mount Washington in New Hampshire. Experience and theory suggest that antenna ice accretions produce large signal reflections. Correlations between reflection coefficients and ice accretions on Rosemount ice detectors adjacent to antennas were low and occasionally negative. The unexpected correlations may be due to factors not measured, such as antenna tuning, ice type and ice location on the antenna system. Other confounding factors may include ice detector performance and methods used to compute antenna ice accretions from the ice detectors. the ice detectors

CR 88-12 NEW ENGLAND **MOUNTAIN** ICING CLIMATOLOGY.

Ryerson, C.C., Aug. 1988, 35p., ADA-200 281, 24 refs.

ICING, ANTENNAS, ICE DETECTION, SYNOP-TIC METEOROLOGY, MOUNTAINS, ICE AC-CRETION, STATISTICAL ANALYSIS, ATMO-SPHERIC PRESSURE, MEASURING INSTRU-MENTS.

MENTS.
Statistics and weather maps are used to compare the atmospheric icing climatology of two New England mountains Mount Mansfield in northern Vermont and Mount Washington in New Hampshire. Atmospheric icing, as measured with Rosemount ree detectors, is twice as frequent on Mount Washington, with about 12-20 times greater intensities and 25-50 times more accretion. Periods between icing events average 35-45 hours on the two peaks. Most Mount Mansfield icing events are of low intensity. Plots indicate the return probabilities of ice events by length, intensity and accretion magnitude. Approximately half of all severe cing on the two peaks occurs during and immediately after cold front passages. Icing is most intense when lows are about 450 km to the east of the mountains. High-ressure centers are never closer than about 450 km during intense icing. Prolonged accretion periods occur when coastal and inland storms merge or follow closely.

CR 88-13 PROFILE PROPERTIES OF UNDEFORMED FIRST-YEAR SEA ICE.

Cox, G.F.N., et al, Sep. 1988, 57p., ADA-213 087, 75

Weeks, W.F. 43.4595

SEA ICE, ICE MECHANICS, ICE SALINITY, ICE STRENGTH, ICE TEMPERATURE, ICE MOD-ELS, ICE DEFORMATION.

ELS, ICE DEFORMATION.

In many sea uce engineering problems the uce sheet has been assumed to be a homogeneous plate whose mechanical properties are estimated from the bulk salinity and average temperature of the ice sheet. Typically no regard has been given to the vertucal variation of ice properties in the uce sheet or to the time of uce formation. This paper first reviews some of the mechanical properties of sea ice, including the ice tensile, flexural and shear strengths, as well as the ice modulus. Equations for these properties are given as functions of the ice brine volume, which can be determined from the ice salinity and temperature. Next a numerical, finite difference model is developed to predict the salinity and temperature profiles of a growing ice sheet. In this model ice temperatures are calculated by performing an energy balance of the heat fluxes at the ice surface. The conductive heat flux obtained from the energy balance is then used to calculate the rate of ice growth and ice thickness by applying the Stefan ice growth equation. Ice salinities are determined by considering the amount of initial salt entrapment at the ice/water interface and the subsequent brine drainage due to brine expulsion and gravity drainage least only an experiment of the central Arctic Basin. The profiles appear to be realistic and agree reasonably well with field data. Finally the predicted salinity and temperature profiles are combined with the mechanical property data to provide mechanical property profiles for first-year sea ice of different thicknesses, grown at different times of the winter. The predicted profiles give composite plate properties that are significantly different from bulk properties obtained by assuming homogeneous plates. In addition with failure strength, profiles give maximum strengths in the interior of the sheet as contrasted vith the usual assumption of maximum strength at the cold, upper ice surface. Surprisingly the mechanical property profiles are only a function of the ince thickness, i In many sea ice engineering problems the ice sheet has

CR 88-14 ON THE PRESSURE DROP THROUGH A UNIFORM SNOW LAYER.

Yen, Y.C., Sep. 1988, 10p., ADA-201 045, 8 refs. 43-1401

43-1401 SNOW COVER, POROUS MATERIALS, FLUID FLOW, PRESSURE, FLOW RATE, FRICTION, SNOW DENSITY, MATHEMATICAL MODELS, EXPERIMENTATION.

An experimental study covering a mass flow rate ranging from 162 to 67.45 g/sq cm-s and snow density varying from 0.377 to 0.472 g/cu cm has been conducted Pressure drops ranging from 0.012 to 2.868 gf/sq cm were recorded A plot of the friction factor f(p) vs Re(p) (defined as the classical Reynolds number Re for fluid flow through conduits) red a good representation of all the experimental data

Cr 88-15 SHIP MODEL TESTING IN LEVEL ICE: AN OVERVIEW.

Tatinclaux, J.C., Oct. 1988, 30p., ADA-201 012, Refs.

p.26-30. 43-1402

ICE STRENGTH, ICE MODELS, SHIPS, SHEAR STRENGTH, FLEXURAL STRENGTH, TANKER SHIPS, TESTS, ICE CONDITIONS, ICE DENSITY, ICE GROWTH, COMPRESSIVE PROPERTIES.

ICE GROWTH, COMPRESSIVE PROPERTIES.
This report presents a general discussion of model testing of ships in level (see The main points covered are: 1) modeling criteria for ships in ice, which must take into account the presence of a solid boundary at the water surface; 2) types of model ice used in various tanks—saline ice, urea-doped ice, EG/AD/S ice and synthetic ice; 3) techniques for growing model ice sheets, and achieving and monitoring the required ice properties, 4) limitations of both model ice and property measurement techniques. 5) model testing procedures for EHP and SHP tests and their limitations; 6) comparison between model test results and available full-scale trials data; 7) existing empirical and analytical or semi-analytical algorithms for predicting ship performance in level: 6) current research at CRREL and research facilities to improve modeling techniques and data interpretation, and 9) novel bow designs for ice-transiting vessels.

CHEMICAL ASPECTS OF SOIL FREEZING. Henry, K, Oct. 1988, 8p, ADA-205 392, 17 refs.

SOIL FREEZING, SOIL WATER, FROST HEAVE, FREEZING POINTS.

PREEZING POINTS.

Soil water chemistry and soil particle characteristics directly and significantly influence the freezing process in soils. The rate of frost heave is influenced because chemicals modify water migration and depress the freezing point in soils. Solutes are concentrated when they are expelled from crystallizing ice, modifying adsorbed film thicknesses, depressing freezing points, creating concentration gradients, altering forces between particles or between ice and particles, and modifying the chemical potential of the water. These effects often have counteracting influences on frost heave. Solute expulsion during freezing produces a "fringe-like" freezing front in saline soils, primarily because of freezing point depression; this may also be true in "nonsaline" soils. Heave can be reduced by adding chemicals to soil to depress the freezing point or to modify the soil's structure or hydraulic characteristics. The concentration of solutes in the unifrozen water of the freezing soil can possibly be used for isolating toxic wastes in soil.

CR 88-18 MEASUREMENT OF THE UNFROZEN WATER CONTENT OF SOILS: COMPARISON OF NMR AND TOR METHODS

Smith, M.W., et al, Oct 1988, 11p., ADA-203 082, 10 refs.

Tice. A R.

SOIL WATER, UNFROZEN WATER CONTENT. NUCLEAR MAGNETIC RESONANCE, DIELECTRIC PROPERTIES, FROZEN GROUND, TESTS, PHOTOMETERS, MEASURING INSTRU-MENTS

The results of a laboratory testing program, carried out to compare two independent methods for determining the unfrozen water content of soils, are described. With the to compare two independent methods for determining the unifozon water content of soils, are described. With the time domain reflectometry method, the unifozon water content is inferred from a calibration curve of apparent delectric constant vs volumetric water content, determined by experiment. Previously, precise calibration of the TDR technique was hindered by the lack of a reference comparison method, which nuclear magnetic resonance now offers. This has provided a much greater scope for calibration, including a wide range of soil types and temperature (unfrozen water content). The results of the testing program yielded a relationship between dielectric constant and solumetric unifozen water content that is largely unaffected by soil type, although a subtle but apparent dependency on the texture of the soil was noted. It is suggested that this effect originates from the lower valued dielectric constant for adsorbed soil water. In spite of this, the general equation presented may be considered adequate for most practical purposes. The standard error of estimate is 0.015 cu cm'eu cm, although this may be reduced by calibrating for individual soils.

Brief guidelines on system and probe

design are offered to help ensure that use of the TDR method will give results consistent with the relationship

CK 88-19 UNFROZEN WATER CONTENTS OF UNDIS-TURBED AND REMOLDED ALASKAN SILT AS DETERMINED BY NUCLEAR MAGNETIC RESONANCE

Tice, A.R., et al, Nov. 1988, 17p, ADA-203 696, 13

Black, P.B., Berg, R.L

43-1998
UNFROZEN WATER CONTENT, FROZEN
GROUND, FREEZE THAW CYCLES, NUCLEAR
MAGNETIC RESONANCE, DRILL CORE
ANALYSIS, TEMPERATURE EFFECTS, SOIL
STRUCTURE, TESTS, WATER CONTENT.

Unfrozen water content as a function of temperature was measured in the laboratory using nuclear magnetic resonance (NMR) for 16 undisturbed frozen cores acquired from the Northwest Alaska Pipeline Company Chilled Gas Test Facility. The cores were then remolded and brought to their original densities and water contents, and unfrozen water content densities and water contents, and unifozen water content as a function of temperature was again measured over three warming and cooling cycles It was found that differences in unfrozen water contents between the undisturbed warming and cooling curves depended upon relative degree of saturation and its effect on soil structure. Only slight changes occurred during the three warming curves of the remolded soil, indicating minor freezing and thawing consequences on the soil structure.

CR 88-20 DEVELOPMENT AND DESIGN OF SLUDGE FREEZING BEDS.

Martel, C.J., Dec. 1988, 49p., ADA-213 086, Refs. p.43-46. 43-4597

SLUDGES, SEWAGE TREATMENT, FREI THAW TESTS, MATHEMATICAL MODELS.

THAW TESTS, MATHEMATICAL MODELS.
This study develops design enteria for a new sludge dewatering unit operation called a sludge freezing bed. This bed uses natural freeze-thaw to condition the sludge. The total depth of sludge that can be frozen, thawed and dewatered by this process in a year is the main enterion needed for design. Laboratory tests assessed the dewaterability of freeze-thaw conditioned water treatment plant sludge and both anaerobically and aerobically digested wastewater sludges at various depths. Mathematical models for predicting the design depth were developed; values for the input parameters to the models were obtained from the literature or from laboratory and pilot-scale experiments. The dewaterability tests indicated that the depth of sludge that can be applied is not limited by drainability. Up to 20 m of each sludge drained in minutes after freeze-thaw conditioning Except for the aerobically digested sludge, the solids content each studge drained in minutes after treeze-inaw conditioning Except for the aerobically digested studge, the solids content after drainage is high enough to permit mechanical removal The physical and thermal characteristics of frozen studge were found to be equivalent to those of ice. An analysis of the freezing and thawing models reveals that the design of a freezing bed will depend on the duration and intensity of the freezing and thawing seasons.

MEASUREMENT OF FROST HEAVE FORCES ON H-PILES AND PIPE PILES.

Johnson, J.B., et al, Dec. 1988, 49p., ADA-205 010,

Refs. p.33-34. Buska, J.S.

FROST HEAVE, MEASUREMENT, PILES SHEAR STREES, ANALYSIS (MATHEMATICS).

SHEAR STRES, ANALYSIS (MATHEMATICS). The magnitude and variation of forces and shear stresses, caused by frost heaving in Fairbanks silt and the adfreeze effects of a surface ice layer and a gravel layer, were determined as a function of depth by using electric strain gauges along the upper 2.75 m of a pipe pile, 30.5 cm 1 D x 0.95 cm wall, and an H-pile, 254 cm web x 85 kg. lineal m. The peak frost heaving forces on the H-pile for three consecutive winter seasons (1982-1985) were 752, 790 and 802 kN, respectively Peak frost heaving forces on the pipe pile of 1118 and 1115 kN were determined only for the second and third winter seasons. Maximum average shear kN, respectively Peak frost heaving forces on the pipe pile of 118 and 1115 kN were determined only for the second and third winter seasons Maximum average shear stresses acting on the H-pile were 256, 348 and 308 kPa during the three winter seasons Maximum average shear stresses acting on the pipe pile were 627 and 972 kPa for the second and third winter seasons. Lee collars were placed around the tops of both piles during the first and third winter seasons to measure the adfreeze effects of a surface ice layer. The ice layer may have contributed 15 to 20% of the peak forces measured on the piles. A 06-m-thick gravel layer replaced the soil around the tops of both piles for the second and third winter seasons to measure the adfreeze effects of a gravel backfill. The gravel layer on the H-pile may have contributed about 35 of the peak forces measured. Maximum heaving forces and shear stresses occurred during periods of maximum cold and soil surface heave magnitude. These were not related to the depth of frost penetration for most of the winter since frost was present at all depths extending to the permafrost table. Soil surface displacements of 2 to 7 cm were measured at the experiment site during the study. The important mechanisms that determine the magnitude of uplift heave forces are 1) soil heaving as the driving force, and

2) soil temperature, which controls the unfrozen water content, mechanical properties of the soil and the area of influence of heaving pressure

CR 88-26

COMPARISON OF SOIL FREEZING CURVE AND SOIL WATER CURVE DATA FOR WIND-SOR SANDY LOAM.

Black, P.B., et al, Oct. 1988, 37p., ADA-202 365, 14

Tice AR

SOIL FREEZING, SOIL WATER, NUCLEAR MAGNETIC RESONANCE, LOAMS, TEMPERATURE EFFECTS, FREEZING POINTS, TESTS, ANALYSIS (MATHEMATICS).

ANALTSIS (WATHEMATICS). Unforcen water content as a function of temperature was measured in the laboratory using nuclear magnetic resonance (NMR) for a Windsor sandy loam soil. The data were related to previously measured soil moisture retention data through the modified Clapeyron equation with suitable adjustment for surface tension. The results show the usefulness of extending the soil freezing curve to temperatures only slightly below freezing and the soil water curve to very great suction.

CR 89-01

SEAFLOOR TEMPERATURE AND CONDUCTIVITY DATA FROM COASTAL WATERS OF THE U.S. BEAUFORT SEA.

Sellmann, P.V., et al, Jan. 1989, 19p., ADA-205 428, 6 refs.

Reimnitz, E., Kempema, E.W.

OCEAN BOTTOM, WATER TEMPERATURE, TEMPERATURE MEASUREMENT, WATER TEMPERATURE MEASUREMENT, WATER TEMPERATURE, THERMAL CONDUCTIVITY, BEAUFORT SEA.

BEAUFORT SEA.

Important and unique seabed engineering properties and conditions observed on the shallow shelf of the Beaufort Seamay be caused by low temperatures and variable salinities of bottom waters. A year-long monitoring program was initiated during the fall of 1985 to make daily measurements of these parameters using small, self-contained, low-cost instrumentation units placed on the seabed in 4 locations The 4 sites selected were in areas where overconsolidated sediments, seasonal seabed freezing and shallow ice-bonded permaffost are known to occur The instruments were recovered during the iall of 1986, 3 units contained useful data. The longest record was 341 days at station 8 in outer Harrison Bay. Seabed temperatures above 0 C, for the period of record, occurred only 15 days at one site and 13 days at another. The mean annual temperatures for these sites were -155 C and -160 C. Estimates of the onset of scabed freezing suggest that the seabed can freeze on all but 82 days of the year.

CR 89-02 AIRBORNE RADAR SURVEY OF A BRASH ICE JAM IN THE ST. CLAIR RIVER. Daly, S F, et al, Feb. 1989, 17p., ADA-206 868, 11

refs.

Arcone, S.A. 43-3475

ICE JAMS, AIRBORNE RADAR, RIVER ICE, SAINT CLAIR RIVER.

A brash ice jam in the South Channel of the St. Clair River was profiled in Feb 1987 using a helicopter-borne short-pulse radar operating in the UHF band near 500 MHz. During the same time, measurements of the brash ice depth and water temperature were made from a Coast Guard icebreaker. The returned radar pulses consisted of a strong coherent reflection from the water surface, preceded (and followed) by incoherent returns from the brash ice. The measured waveform time delays were then converted to mean freeboard height of the brash ice pieces above the water surface. Given the mean freeboard height, an estimate was greater than the range of the direct shipboard measurements. The difference is believed due to differences between ice porosity above and below the water line, to melting within the ice and to partial submergence of some of the surface; s. It is concluded that this technique could be used for mapping relative brash ice depth if the complexities of automating waveform analysis could be overcome.

CR 89-03

ON THE USE OF THE PHI-VARIABLE TO DE-SCRIBE THE STATE OF WATER IN POROUS MEDIA

Black, PB. Feb. 1989, 7p. ADA-206 869, 11 refs.

44-3014
SOIL FRFEZING, SOIL WATER MIGRATION,
FROST HEAVE, ICE PRESSURE, WATER PRESSURE, ICE WATER INTERFACE, AIR WATER
INTERFACE, ANALYSIS (MATHEMATICS)

INTERFACE, ANALYSIS (MATHEMATICS)
The concepts of Gibbs free energy and surface tensions are deceloped to describe the state of water in two-phase porous soil systems in terms of the phis-variable. This approach differs from previous attempts at describing the thermodynamic behavior of water in porous materials by offering a simple and infutive framework. In this framework, the phis-variable is found to control the microscopic interfaces between the pore constituent ice or air and water.

INVESTIGATIONS OF DIELECTRIC PROPER-TIES OF SOME FROZEN MATERIALS USING RADIOWAVE CROSS-BOREHOLE TRANSMISSIONS

Arcone, S.A., et al, Mar. 1989, 18p, ADA-207 302, 24

Delaney, A.J.

43-3476

FROZEN GROUND, RADIO WAVES, DIELEC TRIC PROPERTIES, SITE SURVEYS, UNITED STATES-ALASKA

Pulsed radiowaves have been transmitted between boreholes at specially prepared sites in central Alaska to determine physical properties of the intervening material. The boreholes were drilled 12-25 m deep in both ice-rich sitt and frozen alluvium, materials commonly found in the Alaskan interior. The pulse spectra were centered near 100 MHz and were analyzed to obtain the ground dielectric constant and the attenuation rate (beta), which were then correlated with material type, water content and temperature. The ice-rich sitt, which had volumetric ice contents between 4 and 7 and beta values between 2 and 4 dB/m, thus limiting the use of our commercial equipment to borehole spacings of less thin 20 m. For this material, ground dielectric constant correlated well with volumetric ice content but not with temperature. In a deep section (25 m), dielectric contrasts were seen between 12 and 6 and beta values were less than 1 dB/m, thus allowing signals to be received at a borehole spacing of over 40 m. Generally, ground dielectric constant varied little with depth for any borehole pair. The pulses recorded at the widest spacing were due to direct transmissions and not to alternate, indirect with the meth timely surfed with the purch timelong were the surfer to the pulses recorded at the widest spacing were due to direct transmissions and not to alternate, indirect which the timelon timelong the pulse recorded at the widest spacing were due to direct transmissions and not to alternate, indirect which the direct and the pulse recorded at the widest spacing were due to direct transmissions and not to alternate, indirect which the direct and the pulse recorded at the widest spacing were due to direct transmissions and not to alternate, indirect which the direct and the pulse recorded at the widest spacing were due to direct transmissions and not to alternate, indirect which the direct and the pulse recorded at the widest spacing were due to direct transmissions and not to alternate, indirect which the differance and the Pulsed radiowaves have been transmitted between boreholes borehole pair The pulses recorded at the widest spacings were due to direct transmissions and not to alternate, indirect were due to direct transmissions and not to alternate, indirect paths that might include surface reflection or refraction. The observations thus demonstrate a method for reducing the number of boreholes commonly required for obtaining geotechnical information, and they provide data for determining borehole separation for a few common materials.

CR 89-05

EXPERIMENTS ON THE CUTTING PROCESS

Ueda, H.T., et al, Apr 1989, 36p., ADA-209 350, 9

Kalafut, J.

43-3895

ICE CUTTING, LAKE ICE, ICE LOADS, ICE BREAKING, ICE CRACKS.

BREAKING, ICE CRACKS.

Cutting tests were carried out on natural lake ice using parallel motion, orthogonal cutting tools parameters that varied were cutter rake angle, from -5 to 30 deg, cutter velocity from 40 to 106 in./s, and depth of cut from 0 to 0 200 in The average horizontal and vertical components of force and the average of the five highest peak horizontal forces were determined and the specific energies were calculated. The maximum average horizontal force was 67 lb and the maximum average vertical force was 33 lb The 30 deg rake angle cutter had the lowest specific energy. Since some of the cuts were made from a free surface and some from within a groove made by earlier cuts, all of the data cannot be compared. The sequence of going from the shallowest to the deepest cuts or vice versa in the same groove has a significant effect or vice versa in the same groove has a significant effect on the cutting forces and on the contour of the fractured surface. The effect of cutter velocity was not clearly evident, at least within the range of velocities employed

RADIATIVE TRANSFER IN FALLING SNOW: A TWO-STREAM APPROXIMATION

Koh, G, Apr 1989, 10p, ADA-208 960, 8 rcfs

LIGHT TRANSMISSION, SNOW OPTICS, LIGHT SCATTERING, SNOWFALL, ATMOSPHERIC ATTENUATION.

Light transmission measurements through falling snow have Light transmission measurements through rating show have produced results unexplainable by single scattering arguments. A two-stream approximation to radiative transfer is used to derive an analytical expression that describes the effects of multiple scattering as a function of the snow optical depth and the snowy asymmetry parameter. The approximate solution is simple and it may be as accurate as the exact solution for describing the transmission measurements without the light of consequents in the state of the same transmission measurements. within the limits of experimental uncertainties

CR 89-07

WATER DETECTION IN THE COASTAL PLAINS OF THE ARCTIC NATIONAL WILD-LIFE REFUGE USING HELICOPTER-BORNE SHORT PULSE RADAR.

Arcone, S.A., et al, Apr. 1989, 25p., ADA-208 908, 4

Delaney, A J., Calkins, D J 43-3477

AIRBORNE RADAR, RIVER ICE, SURVEYS, EN-VIRONMENTAL IMPACT

A helicopter-borne short-pulse radar survey was performed along the coastal plants of the Arctic National Wildlife Refuge in Mar. 1988 to help evaluate the potential environmental impact of resource exploration. The surveys

concentrated on the major rivers and a few lakes of the area and were performed at approximately 5-m altitude and 5-m/s flight speed. The radar antenna was externally mounted on the helicopter skids and emitted 6- to 7-ns pulses whose bandwich was centered near 500 MHz. The locations of most surveys were determined by a satellite positioning system. The ice cover was generally frozen to the river bed in all areas investigated, except for open water resets within extensive single, that developed downto the river bed in all areas investigated, except for open water reaches within extensive cings that developed downstream from hot springs. The reader data revealed subice water channels within the icings as well as water beneath the mound features in cing areas in the delta regions of the major rivers. A systematic radar survey, augmented with drilling, of one chain of three mounds allowed "be water volume to be estimated, but did not reveal any external source. It is speculated that a more intensive ground-based radar and drilling survey would clearly identify whether the water soruce was confined to the talik or was from an aquifer system. an aquifer system.

CR 89.08

ICE-WATER PARTITION COEFFICIENTS FOR RDX AND TNT.

Taylor, S., Apr. 1989, 10p, ADA-209 243, 7 refs.

EXPLOSIVES, SOIL POLLUTION, WASTE DIS-POSAL, SOIL FREEZING, ARTIFICIAL FREEZING, FREEZING RATE, ICE WATER INTERFACE, WASTE TREATMENT, ENVIRONMEN-TAL PROTECTION, ICE GROWTH.

TAL PROTECTION, ICE GROWTH.

An ice-water partition experiment using RDX and TNT was conducted to determine the efficiency with which the formation of ice excludes nonvolatile organic compounds RDX and TNT are being used by CRREL as substitutes in saturated soils. Knowledge of the behavior of RDX and TNT, i.e., diffusivity and partition coefficient, is important for determining the conditions under which they, and the volatile organics of interest for hazardous waste cleanup, might be moved. TNT and RDX are excluded from the ice structure at freezing rates of up to 0.00009 cm/s. (3 1 in /day). An upper limit for the partition coefficient, K, was estimated using the measured effective partition coefficient and the growth rate of the ice.

DEVELOPMENT OF AN ANALYTICAL METH-OD FOR THE DETERMINATION OF EXPLO-SIVE RESIDUES IN SOIL. PART 3. COL-LABORATIVE TEST RESULTS AND FINAL PERFORMANCE EVALUATION.

Bauer, C.F., et al, May 1989, 89p, ADA-213 000, 23

Jenkins, T.F., Koza, S.M., Schumacher, P.W., Miyares, P.H., Walsh, M.E.

SOIL POLLUTION, EXPLOSIVES, CHEMICAL ANALYSIS, SOIL TESTS, SOIL CHEMISTRY, STATISTICAL ANALYSIS.

A collaborative test of a method for the determination of A collaborative test of a method for the determination of introatomatic and nitramine explosives in soil was conducted at eight laboratories

The method involves extraction of a 200-g portion of soil with 100 mL of acetontrile in a sonic bath, dilution of 500 mL of soil extract with 500 mL of aqueous CaCl2, filtration and determination by RP-HPLC-UV at 254 nm

Certified reporting limits (CRLs) and method detection limits (MDLs) were obtained for HMX, RDX, TNT and ten other analytes

Values ranged from 007 to 215 microgram/g for the CRLs and from 003 to 1.27 microgram/g for the MDLs

The analytes (HMX, RDX, TNB, DNB, tetryl, TNT and 2,4-DNT) were measured in eight field-contaminated soils and eight spiked standard RDX, TNB, DNB, tetryl, TNT and 2,4-DNT) were measured in eight field-contaminated soils and eight spiked standard soils. Both sets of eight consisted of four individual samples in duplicate. Concentrations ranged from the limits of detection to nearly 1000 microgram; and The results were evaluated by means of analysis of variance and regression analysis with and without the inclusion of data identified as outliers. The results indicate that collaborators have nearly equivalent performance on spiked samples, and that for field-contaminated soil the variability of extraction recoveries contributes to imprecision. Analyte recoveries were good, except for tetryl 95-97% for HMX, RDX, TNT and DNT (similar to recoveries from aqueous samples), 92-93% for DNB and 1NB, and 70% for tetryl

DEFINITION OF RESEARCH NEEDS TO AD-AIRPORT PAVEMENT DISTRESS IN COLD REGIONS

Vinson, T.S., et al. May 1989, 142p , ADA-212 238, 17 refs

Berg, R.L., Zomerman, I., Haus W.M. 44-1722

RUNWAYS, PAVEMENTS, FROST ACTION. DAMAGE, AIRPORTS, CRACKS In early fall 1984, a questionnaire was sent to over 325

In early fall 1984, a questionnaire was sent to over 325 general aviation airports in cold regions. The results from over 200 responses were compiled and evaluated and over 20 airport managers were contacted for additional details site visits were made to 16 airports to obtain additional information. The most common pavement problems identified in the study were associated with non-traffic-related phenomena and include 1) pre-existing cracks reflicting through asphalt concrete overlays (in two years or less) 2) thermal cracking, and 3) longitudinal cracking (at a construc-

tion io.nt) Most of the airports experienced 1) water pumping up through cracks and joints in the pavements during spring thaw, or 2) additional roughness due to differental frost heave in the winter, or both problems. Many airport managers reported that debris was generated at cracks during the winter and spring Many pavement problems can be traced to the evolutionary history of general aviation airports and the lack of consideration for site drainage. Based on the recognition of these problems, several future research programs are identified

CR 89-11 THERMAL AND SIZE EVOLUTION OF SEA SPRAY DROPLETS.

Andreas, E L., June 1989, 37p., ADA-210 484, Refs. 34-37 43-4042

DROPS (LIQUIDS), SEA SPRAY, MOISTURE TRANSFER, THERMODYNAMICS, BUBBLES, ANALYSIS (MATHEMATICS), MODELS.

ANALYSIS (MATHEMATICS), MODELS. Sea spray droplets initially have the same temperature as the ocean surface from which they formed. In high latitudes, under a relatively cold wind, they therefore cool and evaporate, in effect enhancing the air-sea exchange of heat and moisture. With a future goal of investigating this enhanced exchange in mind, this report develops model equations with which to track the thermal and size (moisture content) evolution of a spray droplet from the time it is created until it comes to equilibrium with its environment. On testing the model of a spray droplet from the time it is created until it comes to equilibrium with its environment. On testing the model against some of the scanty data available on the evolution of saline droplets, good agreement is found. The thermal evolution of the droplets obeys T(1)-T sub eq exp(-t/tau sub T) very well. Here, T is the instantaneous droplet temperature, T sub eq is the equilibrium temperature of the droplet and t is time. The time constant is the time required for the droplet to come to within 1/e of T sub eq. Similarly, for the moisture (size or radius) evolution, a time scale is defined as the time required for the droplet radius to come to within 1/e of its equilibrium radius. Tau sub r is always about three orders of magnitude larger than tau sub T, the thermal exchange is thus virtually complete before the moisture transfer starts. Consequently, the ambient humidity has little effect on the thermal exchange, and, analogously, the initial droplet temperature has negligible and, analogously, the initial droplet temperature has negligible effect on the moisture exchange.

CR 89-12 FRAMEWORK FOR CONTROL OF DYNAMIC ICE BREAKUP BY RIVER REGULATION.

Ferrick, M.G., et al, June 1989, 14p., ADA-210 869, 18 refe

Mulherin, N.

ICE BREAKUP, RIVER ICE, UNSTEADY FLOW, FLOOD CONTROL, ICE JAMS, ICE MODELS.

ICE BREAKUP, RIVER ICE, UNSTEADY FLOW, FLOOD CONTROL, ICE JAMS, ICE MODELS. In this report, we describe and classify the entire range of ice breakup behavior, from thermal to dynamic, to provide order to this complex process. The theory and model of the authors are refined, building on the concept of an intrinsic relationship between river waves and dynamic ice breakup. A force balance is developed for a common dynamic breakup behavior. Empirical criteria that quantify the resistance to breakup of an ice cover are obtained from a case study and compared with published values. Sensitivity studies of ice breakup with the completed model demonstrate insights that follow from the theory presented and the intuitive nature of the results. This framework for understanding river ice processes provides the option for ice management by river regulation, and we focus on the potential for control of ice breakup. The concept of controlled breakup models and that moves the ice downstream of locations with a high potential for damage during uncontrolled breakup. The abrupt, short-duration characteristics of the controlled release, patterned after those of unregulated river breakup, minimize both the volume of water required to cause breakup and the water levels at breakup. The open water created by the breakup collects heat that increases the rate of melting of the ice. The benefits of successful regulation include flooking prevention, minimum erosion, and decreased potential for ice damage to structures during breakup, without adverse effects on the convenience. decreased potential for ice damage to structures during breakup, without adverse effects on the environment. CR 89-13

COASTAL SUBSEA PERMAFROST AND BEDROCK OBSERVATIONS USING DC RESISTANT

Sellmann, P.V., et al, June 1989, 13p, ADA-210 784, 20 refs

Delaney, A J, Arcone, S A.

43-4386

MAPPING, SUBSEA PERMAFROST, COASTAL TOPOGRAPHIC FEATUPES. ELECTRICAL RESISTIVITY, SOUNDING MODELS.

RESISTIVITY, SOUNDING MODELS.
Measurements were made at several New England coastal sites and at three sites in Prudh e Bay, Alaska, to evaluate de resistivity techniques for myping resistive scabed features bedrook and subsea permaffrest. The field studies employed the four-probe Wenner arrey technique, with electrode separations up to 50 m. The New England sites were selected to simulate permaffrest conditions to help establish a feeling for the range of apparent resistivity in areas of subsea permaffrest, and for information on the "tieal and lateral resolution of the technique. At Prudhoc 6ay, offshore measurements were made with a floating cible, and mland measurements were made using electrodisc diven into the ground. These observations indicate that the electrical properties of permafrost beneath the coastal bluff and adjacent tundra are rapidly

modified by coastal erosion and periodic flooding during storms. Maximum apparent resistivity at the water's edge was around 50 ohm m, and at distances greater than 100 m from shore all values were less than 20 ohm m Modeling m from shore all values were less than 20 ohm m. Modeling supported by the drilling data permitted an interpretation of the position of the top of ice-bonded subsea permafrost. Real resistivities for the ice-bonded permafrost ranged from 200 to 1000 ohm m. The technique and equipment used for this study appear to have applications for studies in shallow coastal waters where permafrost is not more than 30 m below the seabed and where water depths do not exceed 6 to 7 m.

DYNAMIC FRICTION OF A METAL RUNNER ON ICE. I. MODEL SLED TEST. Itagaki, K., et al, June 1989, 17p., ADA-211 498, 30

Huber, N.P., Lemieux, G.E.

SLEDS, METAL ICE FRICTION, ICE FRICTION, ICE SOLID INTERFACE, SKIS.

ICE SOLID INTERFACE, SKIS.

The effects of runner material and surface conditions on the friction between runners and ice were studied. A model sled was pushed over a 6-m-long ice sheet and the reduction of speed of the sliding sled was measured. The friction calculated by the reduction of speed between two gates indicated that smooth runners showed lower friction at around -1 C than at around -10 C, as expected, but the friction of rough runners showed little temperature dependence. The lower thermally conductive runner showed lower friction than higher thermally conductive smooth runners as the theory predicted, but such effects were obscured on rougher runners.

CR 89-15 TWO-STREAM CK 83-13 TWO-STREAM MULTILAYER, SPECTRAL RADIATIVE TRANSFER MODEL FOR SEA ICE. Perovich, D.K., July 1989, 17p, ADA-212 433, 24 refs.

SEA ICE, ICE OPTICS, ALBEDO, LIGHT TRANS-MISSION, ELECTROMAGNETIC PROPERTIES, RADIATION, MATHEMATICAL MODELS.

MISSION, ELECTROMAGNETIC PROPERTIES, RADIATION, MATHEMATICAL MODELS.

The reflection, absorption, and transmission of light at visible and near-infrared wavelengths is important for a number of geophysical problems. Light reflection is an important parameter in remote sensing studies, absorption is significant to ice thermodynamics, and transmission strongly influences biological activity in and under the ice. The focus of this report is on the reflection and transmission of light by spatially inhomogeneous and temporally varying sea ice covers. This is investigated using a two-stream, multilayer radiative transfer model in the wavelength region from 400 to 1000 nm. The model is computationally simple and utilizes the available experimental data on the optical properties of sea ice. The ice cover is characterized as a layered medium composed of selections from nine distinct snow and ice types. Three case studies are presented illustrating values of spectral albedo, transmittance, and transmitted photosynthetically active radiation (PAR) for 1) a spatially inhomogeneous ice cover. 2) a uniform ice cover as it undergoes a melt cycle, and 3) a temporally changing spatially variable incover. The importance of thickness and surface conditions on the reflected and transmitted radiation fields is demonstrated.

PHYSICAL AND OPTICAL PROPERTIES OF FALLING SNOW.

Koh, G, July 1989, 22p, ADA-212 432, 54 refs.

SNOWFALL, SNOW PHYSICS, SNOW OPTICS, MILITARY OPERATION, COLD WEATHER OPERATION, VISIBILITY.

The physical and the optical properties of falling snow have been investigated during a series of winter tests (SNOW experiments). The techniques for measuring the physical properties of falling snow are described and a review of the empirical and the theoretical models for describing the extinction of visible and infrared radiation by falling snow is presented. The utility of these findings for the evaluation of electro-optical sensor performance in a winter environment is examined.

CONTRAST AND VISIBILITY UNDER WINTER CONDITIONS WITH APPLICATION TO MO-TION DETECTION SYSTEMS.

Peck, L. Sep 1989, 8p., ADB-137 592, 21 refs 44-608

SNOW OPTICS, VISIBILITY, WARNING SYSTEMS, DETECTION, MILITARY EQUIPMENT, FOG, ANALYSIS (MATHEMATICS).

Video motion detection systems are used to automate the detection of intruders for physical security purposes. Wintertime conditions of fog and falling or blowing snow are likely to hinder the detection of objects by either an observer or a motion detection system. Theoretical equations of contrast and visibility are reviewed.

EVALUATION OF FOUR WELL CASING MATERIALS FOR MONITORING SELECTED TRACE LEVEL ORGANICS IN GROUND WA-

Parker, L.V., et al, Oct. 1989, 29p., ADA-216 502, 37

Jenkins, T.F., Black, P.B.

44-1223

44-1223
GROUND WATER, WATER POLLUTION, SOIL
POLLUTION, WELL CASINGS, MONITORS,
MATHEMATICAL MODELS, WATER CHEMISTRY, CHEMICAL ANALYSIS, ENVIRONMEN-TAL PROTECTION

In this study four well easing materials are examined, polyvinyl chloride (PVC), Teflon, stainless steel 304 (SS 304) and stainless steel 316 (SS 316), to determine their suitability for monitoring selected trace level organic constituents in stanless steel 316 (SS 316), to determine their suitability for monitoring selected trace level organic constituents in ground water. Analyte solutions containing pieces of the different well casings were compared to controls that did not contain any well casing material. The aqueous test solution contained approximately 2 mg/L of each of the following organic substances hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), trinitrobenzene (TNB), cis- and trans-1,2-dichlorethylene (CDCE and TDCE), m-introtoluer e (MNT), trichlorotehylene (CDCE, chlorobenzene (CDB, and o-, p., and m-dichlorobenzene (ODCB, and MDCB). Mercuric chloride was added to prevent biodegradation of the analytes. Two sets of isomers for DCE and DCB were selected to examine the effect of structure on sorption. Samples were taken after 0 hour, 1 hour, 8 hours, 72 hours, 7 days (168 hours), and approximately 6 weeks (1000 hours). There was no loss of any analyte in the samples that contained there type of stainless steel casing, although both types of casing rusted. The greatest losses were seen in samples that contained Teflon casings, especially for the chlorinated organics. Losses of PDCB and MDCB were the greatest, 16% and 18%, respectively, after only 8 hours. While losses were also observed for the samples containing PVC casing, the rate of loss was much slower, and usually 24 hours or more elapsed before losses were significant (more than 5%). After the 1000-hour samples were taken, the casings were rinsed and placed in clean vials containing fresh water and left for three days to allow for desorption. From both plastic casings measurable quantities of all the organics that had been lost from solution were recovered. fresh water and left for three days to allow for desorption. From both plastic casings measurable quantities of all the organics that had been lost from solution were recovered. We were able to correlate the loss of hydrophobic organic constituents in the ground water containing the Tellon casings with the substance's octanol-water partition coefficients, although this correlation overestimates losses of hydrophilic organics. The results indicate that Teflon casings are probably not suitable for monitoring trace level organics. For wells that are purged and sampled within an 8-to 24-hour period, PVC well casings probably are suitable for monitoring trace level organics.

DEVELOPMENT OF AN AIRBORNE SEA ICE THICKNESS MEASUREMENT SYSTEM AND FIELD TEST RESULTS.

Kovacs, A., et al, Dec. 1989, 47p., ADA-224-867, 23 refs.

Holladay, J.S.

44-4265

SEA ICE, ICE COVER THICKNESS, ICE SUR-VEYS, AERIAL SURVEYS, RADIO ECHO SOUNDINGS, PRESSURE RIDGES, ICE ELEC-TRICAL PROPERTIES.

TRICAL PROPERTIES.

Recent efforts to improve airborne electromagnetic inductionmeasurement technology and to downsize the related helicopter-towed antenna assembly from about 7.5 m long to about
3.5 m long for use in airborne measurement of sea ice
thickness are discussed, as are the results from arctic field
testing. Also outlined are the system noise and drift
problems encountered during arctic field evaluation, problems
that adversely affected the quality of the sounding data.
The sea ice sounding results indicate that it should be possible
to determine thickness to within 5% to .ce floes with moderate
relief but that, because of sounding footprint size and current
model algorithm constraints, steep-sided pressure ridge keels
cannot be well defined. The findings also indicate that
routine sea ice thickness profiling from an airborne platform
is close at hand with further system improvement, as is
the apparent capability to determine the conductivity of
the sea ice, from which an assessment of sea ice strength
can be made can be made

ICE CONDITIONS ALONG THE ILLINOIS WA-TERWAY AS OBSERVED ON LANDSAT IM-

AGES, 1972-1985. Gatto, L.W., Dec. 1989, 112p., ADA-219 745, 11 refs.

ICE CONDITIONS, RIVER ICE, ICE SURVEYS, REMOTE SENSING, LANDSAT, UNITED STATES—ILLINOIS WATERWAY

Landsat images were used to map ice distributions along the navigable portions of the Illinois Waterway from the Mississippi River to Lake Michigan and air temperature and discharge data were used to characterize the conditions under which the observed ice formed and changed. The presence or absence of ice on adjacent water bodies i.e. lakes, channels and sloughs, is also discussed but not imapped. Ice was observed on the waterway during 10 of the 13

winters from 1972 to 1985, with the most severe ice conditions in 1981-82 when 79% of the waterway was ice covered, of which 68% was white ice on Feb. 4 The most extensive ice was observed during 1984-85 when 83% of the waterway was ice covered, but only 38% was white ice. Ice was observed on the adjacent water bodies every winter for about 100 days from early to mid-Dec to mid-Mar. Ice conditions changed frequently on the navigation channel of the waterway and usually lasted an average of 63 days from middle to late Dec. to middle to late Feb. Air temperature discharge data and data from Landsat images, when used together, provide a reasonably reliable method when used together, provide a reasonably reliable method to study river ice conditions and changes.

AIRPIELDS ON ANTARCTIC GLACIER ICE. Mellor, M., et al, Dec. 1989, 97p., ADA-217 638, 42

Swithinbank, C.

44-3383

ICE RUNWAYS, GLACIER ICE, GLACIER SUR-FACES, GLACIER ABLATION, ANTARCTICA

FACES, GLACIER ABLATION, ANTARCTICA
The physical characteristics of blue are ablation areas in
Antarctica are described and some representative ablation
rates are given The possibilities for using blue-ice areas
as arificids are outlined and exploratory surveys are mentioned.
Site details are given for ineffelds at Mount Howe, Mill
Glacier, Patriot Hills, Rosser Ridge, Mount Lechner, SI
near Casey station, and on the Ross Ice Shelf near McMurdo
station The surface roughness of blue ice is discussed,
microrelief surveys are presented for Mount Howe and Patriot
Hills, and spectral analyses are used to develop relations
between bump height and wavelength U.S military specifications for the roughness limits of various types of runways
are summarized and graphical comparisons are made with
the roughness analyses for Mount Howe and Patriot Hills,
Special machines for smoothing ice runways are discussed
and design specifications are developed Some notes on
ground facilities and ground transport are included. Appendices give discussions of weather patterns in the Transantarctic
Mountains and methodology for making spectral analyses
of surface roughness

It is concluded that glacier-ice airfields
for conventional transport aircraft can be developed at low
cost in Antarctica Recommendations for further work
are offered cost in Antarctica are offered

CR 97-12 ESTIMATING SEA ICE THICKNESS USING TIME-OF-FLIGHT DATA FROM IMPULSE RADAR SOUNDINGS.

Kovacs, A., et al, Dec. 1989, 10p., ADA-218 736, 1

Morey, R.M.

SEA ICE, DIELECTRIC PROPERTIES, RADIO ECHO SOUNDINGS, REMOTE SENSING, ICE FLOES, RADAR ECHOES.

FLOES, RADAR ECHOES.

Two second-year sea ice floes were probed using "impulse" radar sounding and direct drilling methods

The resulting two-way time of flight of the impulse radar EM wavelet, traveling from the surface to the ice "bottom" and back to the surface, was compared with snow and ice thickness data obtained from a drill hote

From this comparison, simple relationships are presented that provide an estimate of the thickness of sea ice, from about 1 to 8 m thick, with or without a snow cover. Relations are also presented that show the bulk or apparent dielectric constant of the sea ice decreased with inverteasing ice thickness from a value of about 7 for ice 1 m thick to about 35 for ice 6 m thick

THERMAL RESPONSE OF DOWNHILL SKIS. Warren, G C., et al, Dec 1989, 40p, ADA-219 279,

Colbeck, S.C., Kennedy, F.E.

SKIS, METAL SNOW FRICTION, THERMAL CONDUCTIVITY, SNOWMELT.

Large temperature increases were measured in donwhill skis A steady-state temperature was observed at the base, indicating that melting occurs over some portion of the base. This steady-state temperature increases with the ambient temperature and depends on ski speed and load, and the type of snow on the surface in the field measurements and in a finite element model of a Rossignol DH ski. In that particular ski, much heat propagates along an aluminum plate that connects with the steel edges of the ski. This combination about doubles the heat loss from the base and could reduce the thickness of the layer of lubricating meltwater, especially at lower temperatures. These large temperature increases provide further evidence of the existence of a layer of meltwater that would control the friction. The finite element model allows the predictions of material properties and geometry in the design of sliders for snow and tec. A steady-state temperature was observed at the base, indicating

CR 89-25 CHEMICAL AND STRUCTURAL PROPERTIES OF SEA ICE IN THE SOUTHERN BEAUFORT SEA.

Meese, D.A., Dec. 1989, 134p., ADA-219 746, 63 refs. For Ph.D. thesis of same title see 43-4573. 44-2630

SEA ICE, ICE COMPOSITION, ICE CORES, CHEMICAL ANALYSIS, SEA WATER FREEZING, BEAUFORT SEA.

ING, BEAUFORT SEA.

The purpose of this study is to provide a detailed chemical and structural profile of first-year and multiyear arctic sea ice. Ice cores were collected during Apr.-May 1986 and 1987 near Prudhoe Bay, AK. Concentrations of Cl. Br. SO4, Na. Aca, K. Mg. PO4, SIO4, NO3, NO2 and NH4 were determined for samples chosen on the basis of structural ice type. Chemical and statistical analyses indicate that finer-grained structures incorporate more impurities and that sailor in the ice indicating preferential drainage. Ratios of the major ions are the same for first-year and multiyear ice and are similar to that of seawater indicating that as the ice ages no significant changes occur in ice chemistry. Nutrient concentrations in the ice are enriched with respect to the underlying water, indicating that biological activity occurs in the ice and processes other than the overall salinity effect and brine drainage are affecting nutrient concentrations within the ice. within the ice.

CR 90-01 SIMULATION OF OIL SLICK TRANSPORT IN GREAT LAKES CONNECTING CHANNELS: THEORY AND MODEL FORMULATION. Shen, H.T., et al, Feb. 1990, 29p., ADA-222 446, 54 refs.

Yapa, P.D., Petroski, M.E. 44-3736

Yapa, P.D., Petroski, M.E.
44-3736
OIL SPILLS, COMPUTERIZED SIMULATION,
RIVER FLOW, MATHEMATICAL MODELS, ICE
COVER EFFECT, LAKE EFFECTS, ENVIRONMENTAL IMPACT, CHANNELS (WATERWAYS), GREAT LAKES.
The growing concern over the impacts of oil spills on aquatic
environments has led to the development of many computer
models for simulating the transport and spreading of oil
slicks in surface water. Almost all of these models were
developed for coastal environments. In this study, two
computer models, named as ROSS and LROSS, were developed
for simulating oil slick transport in rivers and lakes, respectively. The oil slick transformation processes considered in
these models include advection, spreading, evaporation and
dissolution. These models can be used for slicks of any
shape originated from instantaneous or continuous spills in
rivers and lakes with or without ice covers. Although
the study was originated by U.S. Army Corps of Engineers,
Detroit District in relation to the Great Lakes limited navigation season extension study, these models can be used for
any river and lake.

CR 90-05

CR 90-05
THREE FUNCTIONS THAT MODEL EMPIRICALLY MEASURED UNFROZEN WATER CONTENT DATA AND PREDICT RELATIVE HYDRAULIC CONDUCTIVITY.

Black, P.B., May 1990, 7p., ADA-223 875, 22 refs.

SOIL FREEZING, UNFROZEN WATER CONTENT, SOIL WATER MIGRATION, MATHEMATICAL MODELS, FROZEN GROUND.

EMATICAL MODELS, FROZEN GROUND. Empirically determined data on changes in unfrozen water content, occurring as result of changes in the state of ice and water in soil, are discussed with reference to the changes in soil-water retention data for ice-free soil. The similarity between the two types of data is developed The Brooks and Corey, van Genuchten and Gardner equations are then shown to be applicable to describing unfrozen water content data. These three functions are then used in the model of Mualem, and the relative hydraulic conductivity of frozen soil is predicted.

SPECIAL REPORTS

SR 76-01

CLIMATIC AND SOIL TEMPERATURE OBSER-VATIONS AT ATKASOOK ON THE MEADE RIVER, ALASKA, SUMMER 1975.

Haugen, R.K., et al, May 1976, 25p., ADA-025 193,

Brown, J., May, T.A.

CLIMATOLOGY, AIR TEMPERATURE, SOIL TEMPERATURE, UNITED STATES—ALASKA— ATKASOOK.

ATKASOOK.

Air temperatures measured during the summer of 1975 indicated that the Meade River site, 120 km south of Barrow, has a distinctly continental summer temperature pattern in comparison to Barrow, which is cooler and has a smaller daily temperature fluctuation. Stepwise multiple regression analysis indicated a significant relationship between current and previous day's air temperature and all of the (near) surface temperatures examined

Precipitation and pan evaporation were not significantly related to terrain surface temperatures. At the wet site, the warmest subsurface temperatures were measured in a shallow pond. Dry site temperatures were warmer and showed less variation with depth in comparison to wet site temperatures. depth in comparison to wet site temperatures.

SR 76-02

REGIONALIZED FEASIBILITY STUDY OF COLD WEATHER EARTHWORK.

Roberts, W.S., July 1976, 190p., ADA-029 936, M.S. thesis. 91 refs. 32-1238

COLD WEATHER OPERATION, EARTHWORK, SOIL STRUCTURE, MAPPING, ECONOMIC ANALYSIS.

A regional approach is used to delineate areas in Canada and the United States, in which selected earthwork operations should receive careful consideration for winter execution Soil texture and soil "form" or physical site environment are deemed important physical factors in the economic feasibility of cold weather earthwork. Summary maps showing significant soil forms and related feasible earthwork operations are presented. A seneral disquision of the importance significant soil forms and related feasible earthwork operations are presented. A general discussion of the importance of the soil form in the economic feasibility of winter earthwork is included. A summary is presented which shows, with respect to physiographic sections, the salient information and conclusions developed by this study. At least 94% of physiographic sections have two or more winter earthwork operations that are deemed feasible. Only 5 of 213 sections considered do not have any aerthwork considered the not have any aerthwork considered the sections. considered do not have any earthwork operations that appear feasible in the winter season.

SR 76-03

THERMOINSULATING MEDIA WITHIN EMBANKMENTS ON PERENNIALLY FROZEN SOIL.

Berg, R.L. May 1976, 161p, ADA-062 447, Ph.D. 120 refs. 32-1239

EMBANKMENTS, THERMAL INSULATION, PERMAFROST PRESERVATION, PROTECTIVE COATINGS, SOIL STABILIZATION, MATH-EMATICAL MODELS.

EMATICAL MODELS.

Most transportation facilities proposed for arctic and subarctic regions will be constructed on embankments. Incorporation of a thermonisulating layer within the embankment may permit use of reduced quantities of embankment material. Thermal design and analysis procedures applicable to embankments are reviewed and a two-dimensional numerical method coupling heat and mass transfer and vertical displacement is proposed. The modified Berggere equation, a method developed by Lachenbruch, and a finite difference technique are used to illustrate design and analysis methods for insulated embankments on permafrost. Most applications of insulation have been in seasonal frost areas but a few test sections have been constructed on permafrost. Stability of thermal and physical properties is a desirable characteristic of thermonisulating layers. Moisture absorption causes increased thersulating layers. Moisture absorption causes increased thermal conductivity and degradation of strength of some insulating materials. Several types of moisture barriers have been used but the most successful have been polyethylene sheets

SR 76-04 CREEP THEORY FOR A FLOATING ICE

Nevel, D.E., June 1976, 98p. ADA-026 122, 73 refs.

FLOATING ICE, ICE CREEP, LOADS (FORCES). STRESSES, ICE MECHANICS, MATHEMATI-CAL MODELS

The problem investigated is the prediction of the deflection and stresses in a floating tee sheet under loads which act over a long period of time. A review of analytical methods for predicting the bearing capacity of an ice sheet is given. The problem is formulated by assuming the ice is isotropic with a constant Poisson's ratio. The shear modulus is

assumed to obey a linear viscoelastic model. The specific model selected is a series of one Maxwell model and two Voigt models. One of the Voigt models has a negative spring constant which produces tertiary creep. The ice model exhibits a primary, secondary, and tertiary creep response, similar to that observed in uniaxial creep tests of ice. The material properties in the viscoelastic model may be a function of the vertical position in the ice sheet, but all these material properties must be proportional to the same function of position. Using the thin-plate theory for the floating ice sheet, the solution is obtained for the effection and stresses in the ice sheet for primary, secondary, and tertuary creep regions. It is then shown that for a load that is not distributed over a large area, the time-dependent part of the deflection and stresses is relatively independent of the load's distribution. For the elastic case, the stress significantly depends upon the load's distribute assumed to obey a linear viscoelastic model. The specific case, the stress significantly depends upon the load's distribu-tion Results are given for the deflection and stresses as a function of time and distance from the load. The maximum deflection and stresses occur at the center for the load. At this point the deflection increases with time, while the stresses decrease.

UTILITY DISTRIBUTION SYSTEMS IN ICE-

Aamot, H.W.C., May 1976, 63p., ADA-026 956.

UTILITIES, WASTE DISPOSAL, SEWAGE DIS-POSAL, SUBARCTIC LANDSCAPES, ICELAND. The study reports on new developments and special problems or solutions in water distribution systems, sewage collection systems, heat distribution and electric transmission system. Cold weather considerations are highlighted. For water and sewage transport, the use of ductile iron, concrete and plastic materials is reported. Utility lines are generally placed individually, utilidors are too expensive for most installations excent in some city center locations. placed individually, utilidors are too expensive for most installations except in some city center locations. Heat distribution with hot water from geothermal wells is mostly one-way piping. After heating, the water is discharged through the sewage system. Street heating is being expanded. With electric distribution, the use of self-supporting aerial cables is becoming popular because it is very cost-effective and reliable. Within the city, all distribution is under ground. Arcing of isolators on high voltage transmission lines due to salt from the ocean atmosphere is being reduced with silicone fluids.

SR 76-06

INFLUENCE OF INSULATION UPON FROST PENETRATION BENEATH PAVEMENTS. Eaton, R.A., et al, May 1976, 41p., ADA-026 957, 10

Dukeshire, D.E. 32-1242

PAVEMENTS, SUBGRADE PREPARATION, FROST HEAVE, FROST PENETRATION, CEL-LULAR MATERIALS, THERMAL INSULATION. LULAR MATERIALS, THERMAL INSULATION. In order to minimize differential frost heaving caused by variable in-situ soil conditions, granular material is placed on top of the frost-susceptible subgrade. This creates a uniform layer to bridge subsurface irregularities in soil properties. This method of protecting the pavement structure can be costly. A method of reducing the amount of granular material is the use of a thermal insulating layer beneath all or part of the base course which prevents freezing temperatures from reaching the non-uniform subgrade. A test road which includes styrofoam board insulated test sections was constructed at CREEL in 1973. A transition section was built between a control section and an insulated section to minimize the drastic difference in frost penetration and resultant differential frost heave. Large temperature differences were measured between the insulated and conventional sections, frost penetrations were one-third as deep beneath the insulated section, differences in frost heave were negligible.

the insulated section, differences in frost heave were negligible. and pavement deflections were approximately the same on the two sections Surface differential leing did occur between the control and insulated sections

SKYLAB IMAGERY: APPLICATION TO RESER-VOIR MANAGEMENT IN NEW ENGLAND. McKim, H L., et al, Sep. 1976, 51p, ADA-030 329, 24

refs. Gatto, L.W., Merry, C.J., Haugen, R.K. 32-1243

AERIAL SURVEYS, SPACEBORNE PHOTOGRA-PHY, MAPPING, RESERVOIRS.

PHY, MAPPING, RESERVOIRS.
The purpose of this investigation was to determine the utility of Skylab S190A and B photography for providing reservoir management information in New England LANDSAT, Skylab S190A and S190B and RB-57, RCB images were reduced to a common scale of 163,360 for a marping base to demonstrate the extent to which the imagery could be utilized in the preparation of reconnaissance land use maps Visual interpretations were accomplished on original NASA

color infrared S190A/B and RB-57/RC8 transparencies and a LANDSAT false color print made in-house. Ancillary data were not used during the mapping exercise to eliminate bias in the comparisons and to ensure that the results were bias in the comparisons and to ensure that the results were derived strictly from interpretations of tones and textures on the photography. The classification scheme was a modified version of the U.S. Geological Survey Land Use Classification System for use with remote sensor data. The relative utility of the multiband imagery in identifying and quantifying hydrologic factors was evaluated. The land use statistics for two small watersheds were determined and the effects of these land use factors were appraised for possible contribution to runoff potential. This appraisal indicated that basin topography and the nature of runoff may be more important factors in predicting volume of runoff from a watershed than land use factors. Comparisons of the usefulness of the various imagery systems are made.

SURVEY OF ROAD CONSTRUCTION AND MAINTENANCE PROBLEMS IN CENTRAL ALASKA.

Clark, E.F., et al, Oct. 1976, 36p., ADA-032 085, 21 refs.

Simoni, O.W.

Simoni, O.W.
32-1244
ROADS, WINTER MAINTENANCE, ROAD ICING, PERMAFROST PRESERVATION, THERMAL INSULATION, EROSION.

MAL INSULATION, EROSION.

A survey of road construction and maintenance problems in central Alaska is presented The problems of poor fill and foundation material, permafrost degradation under pavement and shoulders, slope instability, water erosion, road cing from subsurface seepage, and culvert icing are described. Possible solutions to road maintenance problems in central Alaska include the use of insulating materials in permafrost areas, MESL construction when non-frost-susceptible soils are unavailable, and the use of improved drainage in areas where extensive icing occurs. Bridge damage, erosion of sidehill cuts and embankment instability are also discussed and potential solutions are given.

SR 76-09

COMPRESSED AIR SEEDING OF SUPER-COOLED FOG.

Hicks, J.R., Oct. 1976, 9p., ADA-040 819, 1 ref.

SUPERCOOLED FOG, CLOUD SEEDING, FOG DISPERSAL, ICE CRYSTAL FORMATION.

DISPERSAL, ICE CRYSTAL FORMATION.

Two series of experiments, 25 in a light fog and 25 in a heavy fog, were conducted in the CRREL cold cloud chamber. Compressed air was used to glaciate the -4C fog. The gage air pressure was 413.7 kPa. These tests showed that the number of ice crystals produced exceeded the number of water droplets in the fog by a factor of 21 for a light fog and 133 for a heavy fog. Approximately 26 times as many ice crystals were created in a heavy fog than were created in a light fog.

TEMPORARY ENVIRONMENT. COLD REGIONS HABITABILITY.

Bechtel, R.B., et al, Oct. 1976, 162p., ADA-032 353, Bibliography p.115-116. Ledbetter, C.B.

ENVIRONMENTS, HUMAN FACTORS ENGI-NEERING, BUILDINGS.

NEERING, BUILDINGS.

After classifying government environments in Alaska and studying four Federal Aviation Administration (FAA) and three Aircraft Control and Warning (AC&W) stations (in Phases 1 and 2), a cold regions environmental psychology behavior setting survey was made of Fort Wainwright, Alaska, to complete Phase 3. Phase 4 analyzed Fort Wainwright data and compared it with the FAA and AC&W data and previous studies The military locations could be characterized as temporary environments. The military environments differed from civilian environments in the behavioral areas of religion, government and professionalism FAA stations owere found to have the richest environment and AC&W stations compensated by providing greater leadership opportunities. Small stations the most deprived. Yet AC&W stations compensated by providing greater leadership opportunities. Small installations had an advantage over large installations in the participation level of their populations in recreational and other activities. Family housing, transient housing, barracks and work environments of Fort Wainwright were studied. Habitability guidelines were suggested for minimal renovation, major renovation and new construction of these kinds of buildings. An overall plan for a more habitable location of post facilities was suggested. The behavic setting survey technique in shortened form proved useful in this study. Suggestions for future research in testing habitability guidelines were made. SR 76-11 OBSERVATIONS ALONG THE PIPELINE HAUL ROAD BETWEEN LIVENGOOD AND THE YUKON RIVER.

Berg, R.L., et al, Oct. 1976, 73p., ADA-033 380, 7 refs. Smith, N.

32-1247

ROADS, SLOPE STABILITY, GROUND ICE, VEGETATION.

VEGETATION.

Periodic observations over a six-year period along the TAPS Road have been evaluated with respect to construction and slope stabilization techniques in ice-rich roadway cuts and embankment subgrades. Lateral drainage ditches of sufficient width to handle construction excavation equipment, along with near-vertical slope cuts with hand-cleared tops equal in width to one and one-half times the height of the cuts, significantly enhance natural processes of slope stabilization. Right-of-way clearing limited to the toe of embankment fill slopes minimizes subsidence of the roadway and its shoulder slopes. In extremely ice-rich soal cuts, the seeding of the slopes should not be attempted until late in the first thaw season for best results. Natural woody growth can be expected to have a substantial stabilizing effect after five or six thaw seasons but could be accomplished sooner by planting tree seedings. Attempts to stabilize ice-rich cut slopes with applications of insulation are not very effective and seem to prolong the natural stabilization process.

OPERATIONAL REPORT: 1976 USACRREL-USGS SUBSEA PERMAFROST PROGRAM BEAUFORT SEA, ALASKA.

Sellmann, P.V., et al, Oct. 1976, 20p., ADA-032 440,

Lewellen, R.I., Ueda, H.T., Chamberlain, E.J., Blouin, 32-1248

OFFSHORE DRILLING, LOGISTICS, SEA ICE, SUBSEA PERMAFROST.

SUBSEA PERMAFROST.

During the spring of 1976, three holes were drilled offshore in the Prudhoe Bay area using the sea ice cover as a drilling platform. The objectives of this program were to obtain samples and subsurface information to aid in quantification of the engineering characteristics of permafrost beneath the Beaufort Sea as well as to conduct supporting thermal and geological studies. The results of the drilling and related investigations are being used in conjunction with data from other subsea permafrost projects to develop maps and models for the prediction of permafrost occurrence in this offshore environment. The project also provides a means of testing drilling, sampling, and in-situ measurement techniques in an offshore setting where material types and sea ice conditions make acquisition of undisturbed samples extremely difficult. This report documents the operational aspects of the spring 1976 field study, subsequent reports will cover the technical and research results.

ENVIRONMENTAL ANALYSES IN THE KOOTENAI RIVER REGION, MONTANA. McKim, H.L., et al, Nov. 1976, 53p., ADA-033 500,

Gatto, L.W., Merry, C.J., Brockett, B.E., Bilello, M.A., Hobbie, J.E., Brown, J.

CLIMATOLOGY, RESERVOIRS, ICE COVER, LIMNOLOGY, SPACEBORNE PHOTOGRAPHY, UNITED STATES-MONTANA-KOOTENAL RIVER.

RIVER.

The purpose of this investigation was 1) to compile and analyze climatic data for the past 10 years from all available weather observing stations in the East Kootenai River Basin.

2) to analyze changes in ice and snow cover, and turbidity and plankton blooms on Lake Koocanusa, 3) to assess the present limnology of Lake Koocanusa and the potential for water quainty problems, especially eutrophication, and 4) to demonstrate the reliability of the LANDSAT Data Collection Platform (DCP)-Martek Water Quality Monitor system for acquisition of data from a remote site. Results of the investigations indicate that the Kootenai region is about twice as cold as the Libby region in winter, and that reservoir ice first forms along the shore in the northern region in alte November and in the southern part in mid-Deember, with total freeze-over usually occurring 2 to 4 weeks later lee break-up in the northern sections usually occurs 1-3 weeks later than in southern areas, average annual snowfall is 42 to 144 in, with ice thickness and snowfall varying with relief. Variations in areal distribution of snow within the basin and ice cover on the reservoir were effectively. is 42 to 144 m, with ice thickness and snowfall varying with relief. Variations in areal distribution of snow within the basin and ice cover on the reservoir were chiervable for periods from January to October 1973, and reservoir turbidity was observed to increase south of Ellsworth and Stenerson Mountains. Low algal productivity observed was due to the algae being circulated most of the time below the depth of 1% light and due to high Liribidity. The DCP-Martek system operated well and reliable lata were received while the system was located in the pool above Libby Dam and downstream below the dam. Brief interruptions in data transmissions occurred in April, when the Martek sensor showed a few minor inconsistencies, but the system demonstrated the feasibility of this technique for data acquisition from remote sites.

SR 76-14

NOTES ON CONDUCTING THE BEHAVIOR SETTING SURVEY BY INTERVIEW METHOD. Ledbetter, C.B., Nov. 1976, 33p., ADA-062 448, 17

ENVIRONMENTS. HUMAN FACTORS, MILI-TARY FACILITIES.

Practical guidelines for conducting the behavior setting survey by interview method are presented. This training manual for the layperson describes the data, survey forms and interview techniques.

SR 76-15

FATE AND EFFECTS OF CRUDE OIL SPILLED ON PERMAFROST TERRAIN. FIRST YEAR PROGRESS REPORT.

Collins, C.M., et al, Nov. 1976, 18p., ADA-034 140. 3 refs.

Deneke, F.J., Jenkins, T.F., Johnson, L.A., McFadden, T., Slaughter, C.W., Sparrow, E.B. 32-1257

OIL SPILLS, SOIL TEMPERATURE, VEGETA-TION, PERMAFROST.

TION, PERMAPKOS1.

The long-term effects and ultimate fate of crude oil spilled on permafrost-underlain tundra is the subject of this study. The project involves two experimental oil spills of 2,000 gallons (7,570 liters) each on 500 sq m test plots near Fairbanks, Alaska. A winter spill, discussed in this progress report, took place in February 1976. Another spill will take place at the peak of the growing season in the summer This allows conditions prevailing during these climatic periods to be studied as to their effect on oil spills, and makes it possible to study the reaction of the spilled oil to these temperature extremes. The spill discussed in this report the possible to study the temperature extremes temperature extremes was designed to simulate a real pipeline leak, and was large enough to approach reality while remaining within the limits of logistical capabilities Monitoring of the spill and control plots includes: oil movement, temperature regime, biological effects, microbiological changes, permafrost impact, and chemical degradation of the oil.

UTILITY DISTRIBUTION SYSTEMS IN SWE-DEN, FINLAND, NORWAY AND ENGLAND. Aamot, H.W.C., et al, Nov. 1976, 121p., ADA-035 088, Bibliography p.116-121.

McFadden, T.

32-1258

UTILITIES, SEWAGE DISPOSAL, ELECTRICI-TY, HEATING, WATER SUPPLY, SCANDINAVIA, UNITED KINGDOM.

The study reports on new developments and special problems or solutions in water distribution systems, sewage and solid waste transport systems, heat distribution systems and electric transmission systems. Cold weather considerations are highlighted. For water and sewage systems, the use of ductile iron and plastic materials for pipes is reported. The use of heating, insulating or shielding of the pipes for frost protection is of interest. Some developments in tunneling technology were identified. Pneumatic solid waste collection and vacuum sewage collection represent new developments. For heat distribution, the many different types of pipe and insulation systems used are described. Good moisture control in insulation is emphasized. Developments in long The study reports on new developments and special problems insulation systems used are described. Obvelopments in long distance heat transmission are discussed. With electric distribution, the use of self-supporting aerial cables is a new development. With transmission, problems of icing and countermeasures are discussed.

ENERGY CONSERVATION IN BUILDINGS.

Ledbetter, C.B., Dec. 1976, 8p , ADA-034 141, 3 refs.

HEATING, BUILDINGS, CONSERVATION

This report scans current building designs and describes, for the layman, ways that buildings could be designed for improved energy consumption. Topics of building design addressed are insulation, thermal bridges, ventilation, orientation, lighting, windows, and solar heat.

SR 76-18

IMPROVED MILLIVOLT-TEMPERATURE CONVERSION TABLES FOR COPPER CONSTANTAN THERMOCOUPLES. 32F REFERENCE TEMPERATURE.

Stallman, P.E., et al. Dec 1976, 66p., ADA-034 841, 6 refs.

Itagaki, K.

32-1260 TEMPERATURE MEASUREMENT, CONVER-SION TABLES.

This report extends and improves the conversion tables already available (CRREL Special Report 108, G.W. Aitken, 1966, 24-3490 (AD-805-751)). The computational method is described with discussion of error, improved methods, and limitations. The tables are presented in two sections the first for temperatures in the range -184C to Oc. the second for temperatures in the range 0C to 100C. The corresponding Fahrenheit temperatures are also included.

SR 77-01

SELECTED EXAMPLES OF RADIOHM RESISTIVITY SURVEYS FOR GEOTECHNICAL EXPLORATION.

Hoekstra, P., et al, Jan. 1977, 16p, ADA-035 761, 20

Sellmann, P.V., Delaney, A J.

GEOPHYSICAL SURVEYS, ELECTRICAL RESISTIVITY, PERMAFROST INDICATORS, GRAV-

Measurements of ground resistivity using radio wave techniques have been made in support of several geotechnical projects. Examples of surveys conducted for locating and evaluating gravel deposits, for delineating permaffors, and for extrapolating subsurface information between drill holes are used to illustrate some advantages of ground and airborne surveys. surveys using this method

CREEL ROOF MOISTURE SURVEY, PEASE AFB BUILDINGS 33, 116, 122 AND 205. Korhonen, C., et al, Jan. 1977, 10p., ADA-035 762. Tobiasson, W., Dudley, T

32-1276 ROOFS, MOISTURE, INSULATION, INFRARED EQUIPMENT.

Four building roofs at Pease AFB were surveyed with a hand-held infrared camera to detect wet insulation. Areas of wet insulation on these roofs were marked with spray paint, and 3-in diam core samples of the built-up membrane and insulation were taken to verify wet and dry conditions. Flashing defects are considered esponsible for most of the wet insulation uncovered in this survey. Recommendations for maintenance, repair, and replacement were developed from the infrared surveys, core samples and visual examinations.

ESTIMATING HEATING REQUIREMENTS FOR BUILDINGS UNDER CONSTRUCTION IN COLD REGIONS—AN INTERACTIVE COM-PUTER APPROACH.

Bennett, F.L., Feb. 1977, 113p., ADA-035 709, 65

COLD WEATHER CONSTRUCTION, BUILD-INGS, HEATING, HEAT LOSS, COMPUTER PROGRAMS.

The paper documents a review of construction literature to find reports of projects constructed under low-temperature conditions. A survey of Alaskan contractors to determine "cutoff temperatures" and other factors that cause suspension of various construction works is also presented. For both the literature search and the contractor survey, the lowest temperature mentioned was -70P. The paper also describes a computer program for estimating heat loss and enclosures and heating costs for buildings under construction in cold regions. The program is described, a sample program run is presented, and a successful validation effort is summarum.

HAINES-FAIRBANKS PIPELINE: DESIGN, CONSTRUCTION AND OPERATION.
Garfield, D.E., et al, Feb. 1977, 20p., ADA-038 445,

Ashline, C.E., Haynes, F.D., Ueda, HT.

32-1278
PIPELINES, MAINTENANCE, CONSTRUCTION, UNITED STATES—ALASKA.
This report is intended to provide a background for the analysis and evaluation of new pipelines being built in cold regions. Topics discussed include the initial design, construction, testing, operation and mignitenance of, and modifications to, the 8 in pipeline from the deep water port of Haines to multitary installations at Fairbanks, Alaska. The 626-mile multi-product pipeline began operation in 1956. The results of a corrosion survey completed in 1970 indicated that extensive renovation would be required to continue operations, and the section from Haines to Eiclson Air Force Base was closed in 1973

SR 77-05

GUIDELINES FOR ARCHITECTURAL PRO-GRAMMING OF OFFICE SETTINGS. Ledbetter, CB, Mar 1977, 14p, ADA-037 124, 2

refs

ENVIRONMENTAL TESTS, HUMAN FACTORS ENGINEERING, BUILDINGS

ENGINEERING, BUILDINGS

A demonstration of Barker's k-21 test for identifying and differentiating behavior settings is presented as a means of diagnosing problems in an office environment. Couldelines for rearranging the layout of an organization so offices are developed that could also be used for architectural programming for a new building if the organization were to be reiocated. As an instructional program, the demonstration presented here shows how to conduct the k-21 test in order to analyze problems on crome behavior setting boundarorder to analyze problems concerning behavior setting boundar-ies or conflicts between behavior settings

SYMPOSIUM: GEOGRAPHY OF POLAR COUNTRIES; SELECTED PAPERS AND SUM-

Brown, J., ed, Mar. 1977, 61p., ADA-038 379, In English and Russian. Numerous refs. For selected pa-pers see 32-1302 through 32-1306. 32-1301

MEETINGS, LAND DEVELOPMENT, ENVI-RONMENTAL PROTECTION.

RONMENTAL PROTECTION.

The symposium on Geography of Polar Countries held in Leningrad 22-26 July 1976 as part of the XXIII International Geographical Congress consisted of three sessions. (1) Polar environment, natural resources, their exploration and exploitation; (2) Past, present and future economic developments in the polar regions; (3) Polar environment protection. This report presents the full text or extended summaries of a number of the U.S. papers, and English and Russian summaries of the Soviet contributions related to environmental protection.

The papers and summaries presented in this report reflect of the Soviet contributions related to environmental protection. The papers and summaries presented in this report reflect the participation of members and of the joint US-USSR environmental protection agreement project, Protection of Northern Ecosystems. The US papers deal with land use planning to mitigate environmental impact the impact of resource development on natives, fish and wildlife, and permafrost, the impacts of pipelines and roads on the environment, and computer modeling to simulate terrain modification due to man's activities. The Soviet summaries deal with subjects of properties and changes in arctic and subarctic flora, treeline, and permafrost, and methods of predicting changes in the environment.

SELECTED BIBLIOGRAPHY OF DISTURBANCE AND RESTORATION OF SOILS AND VEGETATION IN PERMAPROST REGIONS OF

THE USSR (1970-1976). Andrews, M., Mar. 1977, 116p., ADA-051 813.

BIBLIOGRAPHIES. CRYOGENIC REVEGETATION, LAND RECLAMATION.

REVEGETATION, LAND RECLAMATION.
The literature is discussed in chronological fashica, with general statements followed by highlights of each year's contributions (with three tables and two appendices for amplifications, and by 1975 there was a noticeable lag in pickup of publications by the indexing services. A trend is apparent from a reconnaissance and description approach in earlier papers toward an integrated ecosystem approach in more recent publications

Increased consciousness of the effects of disturbance on the permafrost environment, and the importance of restoration and preservation of these environments, are reflected in the recent literature, particularly in symposium proceedings

REVEGETATION AND EROSION CONTROL OBSERVATIONS ALONG THE TR PIPELINE—1975 SUMMER CONSTRUCTION SEASON.

Johnson, L.A., et al, Mar. 1977, 36p., ADA-038 416. Quinn, W.F., Brown, J.

32-1311 PIPELINES, SOIL EROSION, EROSION CONTROL, PROTECTIVE VEGETATION.

TROL, PROTECTIVE VEGETATION.

Procedures for revegetation and erosion control of the TransAlaska Pipeline System during the initial construction phase
are reviewed. Fertilizer and seed rates and schedules
of application by major areas (sections) are presented. During
the field season of 1975 CRREL personnel observed
revegetation and erosion control practices along the entire
length of the pipeline route. The types of problems and
early successes are discussed. Thirty-eight photographs
are presented of characteristic areas on which revegetation
was initiated. A list of sites for follow up observations
is presented. was initiated.

SR 77-09 INFRARED THERMOGRAPHY OF BUILD-INGS: AN ANNOTATED BIBLIOGRAPHY Marshall, S.J., Mar. 1977, 21p., ADA-038 447, 42 refs.

BIBLIOGRAPHIES. BUILDINGS. ANALYSIS, INFRARED RADIATION.

32-1312

ANALYSIS, INFRARED RADIATION. This report summarizes a review of the current literature on the new subject of infrared thermography of buildings. Infrared thermography of buildings. Infrared thermography of buildings (IRTB) uses a thermal imaging scanner to detect heat loss, structural defects, mosture, and other anomalies in building envelopes. Photographs of the imagery called thermograms provide hard copy documentation of faults detected. Thirty-four references are abstracted, covering research and development, roof mosture surveys, and qualitative/quantitative field surveys. The readily obtainable sources were chosen for their practical approach to providing potential users who are not scientifically oriented with an opportunity to quickly grasp the value of this new technology.

SR 77-10 COMPUTER ROUTING OF UNSATURATED FLOW THROUGH SNOW

Tucker, W.B., et al, May 1977, 44p., ADA-040 121. Colbeck, S.C.

SNOW COVER, WATER FLOW, SNOWMELT, COMPUTER PROGRAMS.

COMPUTER PROGRAMS.

Computer programs for routing the vertical movement of water through snow have been developed. The shock front is dependent on surface melt taking place now as well as the antecedent flow in the snow, usually a function of the nature of the flow for the previous day. One program, designed to accommodate actual surface melt data, has the ability to handle complicated input profiles such as when melt is erratic on a cloudy day, creating such complexities as intersecting shock fronts. Another program, designed for rapid simulation purposes, approximates a simple surface input with a function, in this case a sine wave. This function is easily changed, allowing a variety of conditions to be assessed, although only one shock front is accommodated. Error analysis and some applications of the programs are presented.

DEMONSTRATION OF BUILDING HEATING WITH A HEAT PUMP USING THERMAL EF-

Sector, P.W., May 1977, 24p., ADA-041 024, 13 refs. 32-1314

HEAT RECOVERY, HEATING, BUILDINGS, COST ANALYSIS, HEAT PUMPS.

COST ANALYSIS, HEAT PUMPS.

This report describes efforts made to recover waste heat and to reuse it to heat a building. A heat pump, which is a refrigeration device, was operated to provide building heat and to demonstrate both economic benefits and energy savings possible with this type of heating system. Heat pump fundamentals and system design considerations supplement the report of this demonstration project. Operational characteristics were monitored and are reported. A 25% reduction in heating costs was observed compared with an oil-fired system. The author recommends that the minimum coefficient of performance should be 3.4 for a cost effective, energy-conservative heat pump heating system.

LABORATORY STUDIES OF COMPRESSED AIR SEEDING OF SUPERCOOLED FOG. Hicks, J.R., et al, May 1977, 19p., ADA-040 633, 3

refs. Rice, R.C., Jr.

32-1315

SUPERCOOLED FOG. CLOUD SEEDING. LABORATORY TECHNIQUES.

CABORATORY IEE-MINQUES.

Some 400 tests were conducted in the CRREL cold cloud chamber to determine the combination of air pressure and nozzle design that yielded the maximum production of ice crystals in a supercooled fog. It was found that some 022 cu m/mm of air which was compressed to 517 kPa is needed to be effective for clearing a supercooled fog.

STAKE DRIVING TOOLS: A PRELIMINARY Kovacs, A., et al, May 1977, 43p., ADA-041 053, 9

Atkins, R.T.

refs.

32-1316 ANCHORS, FROZEN GROUND, DRILLS, PILE DRIVING, HAMMERS.

DRIVING, HAMMERS.

This report gives results of a study of four commercial breaker-rock drills, a prototype hydraulic stake driver-retriever and a prototype propellant-actuated hammer which were evaluated for driving anchors into hard frozen ground. The tests found that commercial breaker-rock drills can be used without modification to drive standard military GP-112/G and GP-113/G stakes into frozen ground The study revealed that while the hydraulic stake driver would require further development to increase its reliability, it could drive heabove stakes into frozen ground. The procellant-actualthe above stakes into frozen ground. The propellant-actuated stake driver was found incapable of driving stakes into hard frozen ground and was not considered worthy of further development as a stake driver.

RUNWAY SITE SURVEY, PENSACOLA MOUNTAINS, ANTARCTICA. Kovacs, A., et al, June 1977, 45p., ADA-051 814, 6 refs

Abele, G.

SITE SURVEYS, AIRCRAFT LANDING AREAS, ICE RUNWAYS, ANTARCTICA—PENSACOLA MOUNTAINS.

TWO DUE AINS.

Two blue ice areas were surveyed in the Pensacola Mountain region of Antarctica and found suitable for runway sites. A length of 25 to 3 km, oriented in the predominant and direction, is available at Rosser Ridge, requiring very little snow removal. A length of 3 km, oriented at 30 deg to 45 deg with the predominant wind direction, is available at Mt. Lechner, but considerable snow removal would be required, and some obstacles are present near

both ends of the runway area. Aerial inspection disclosed one and probably two more suitable sites near the Patuxent Range.

SR 77-15

KOLYMA WATER BALANCE STATION, MAGA-DAN OBLAST, NORTHEAST U.S.S.R.: UNITED STATES-SOVIET SCIENTIFIC EXCHANGE

Slaughter, C.W., et al, May 1977, 66p., ADA-041 606, 16 refs. For a shorter version see Arctic bulletin, 1978, 2(13), p.305-313.

32-1318

WATER BALANCE, STATIONS, RESEARCH PROJECTS, INTERNATIONAL COOPERATION, HISSR-MAGADAN

USSR—MAGADAN.

Two U.S scientists visited Kolyma Water Balance Station (KWBS) in Magadan Oblast of northeast USSR during the last two weeks of August 1976. Under the auspices of the Joint USA-USSR Agreement on Cooperation in the Field of Environmental Protection, this trip was undertaken to review current Soviet watershed hydrology research in a permafrost dominated setting similar to that of central Alaska. Research objectives, instrumentation, and field practices were observed and discussed at KWBS A series of proposals for future cooperation in high latitude hydrology research. for future cooperation in high latitude hydrology research and data exchange was prepared.

SR 77-16 COMPOSITION OF VAPORS EVOLVED FROM MILITARY TNT AS INFLUENCED BY TEM-PERATURE, SOLID COMPOSITION, AGE AND SOURCE.

Leggett, D.C., et al, June 1977, 25p., ADA-040 632,

Jenkins, T.F., Murrmann, R.P. 32-1319

EXPLOSIVES, IMPURITIES, VAPOR PRESSURE,

EXPLOSIVES, IMPURITIES, VAPOR PRESSURE, CHEMICAL ANALYSIS.

A number of domestic and foreign military TNT samples were analyzed by a gas chromatographic headspace technique. The method allowed the determination of the vapor pressure of TNT and the partial pressures of several associated impurities over a 2 to 32C temperature range.

A major volstile impurity in all U.S. military TNT samples was 2,4-dinitrotoluene, which had a partial pressure 1 to 2 orders of magnitude higher than the vapor pressure of TNT. The experimental data followed a Clausius-Clapeyron temperature dependence for the vapor pressure of TNT, and the partial pressure of DNT was related to its concentration in the solid by a Henry's constant.

Age and source of the TNT were found to have little or no influence on these relationships. The reasons for finding a relatively high DNT partial pressure are discussed, as is its implication for TNT detection by trace gas methods. trace gas methods.

SR 77-17 EFFECTS OF LOW-PRESSURE WHEELED VEHICLES ON PLANT COMMUNITIES AND SOILS AT PRUDHOE BAY, ALASKA.

Walker, D.A., et al, June 1977, 49p., ADA-041 593, 11 refs. Webber, P.J., Everett, K.R., Brown, J.

TUNDRA TERRAIN, DAMAGE, ALL TERRAIN VEHICLES, TIRES, TUNDRA VEGETATION, UNITED STATES—ALASKA—PRUDHOE BAY. An off-road vehicle test utilizing a smooth tired Rolligon weighing approximately 25,000 lb. was conducted at Prudhoe Bay, Alaska, on 25 June 1976. Vehicle impact on the vegetation and terrain was documented at 32 stations selected vegetation and terrain was documented at 32 stations selected as representative of the coastal tundra terrain. Twenty-seven stations were of single pass track and five were multiple pass lanes of up to 30 passes. The report documents the impacts with photographs and numerical ratings. Future observations will enable determination of rates of recovery

INSTALLATION OF LOOSE LAID INVERTED ROOF SYSTEM AT FORT WAINWRIGHT, ALASKA.

Schaefer, D., June 1977, 27p., ADA-041 574, 11 refs.

ROOFS, INSULATION, COST ANALYSIS.

ROOFS, INSULATION, COST ANALYSIS. In the summer 1971 the Corps of Engineers replaced the roof on Building 1033 at Ft. Wainwright, Alaska, with a loose-laid inverted roof system. This roof system was selected to permit an evaluation of its performance and potential suitability for general use in Corps construction. The installation of the roof also permitted an analysis of its construction crosts and a record of the construction procedures. Costs were identified in terms of costs of the materials used and the number of man-hours required. For the analysis, the job was broken down into four phases. I) removal of the existing roofing material and preparation of the deck, 2) application of a surface of plywood decking, 3) placement of the butyl membrane and installation of fashings, and 4) placement of the insulation and ballast pavers. The results show that the installation time requirements compare favorably with those of conventional builting roofs but the butyl membrane and the pavers cause higher material costs. Advantages are in the maintainability of the roof system and in its increased life expectancy.

SR 77-19

RECLAMATION OF ACIDIC DREDGE SOILS WITH SEWAGE SLUDGE AND LIME AT THE CHESAPEAKE AND DELAWARE CANAL.

Palazzo, A.J., June 1977, 24p., ADA-041 636, Bibliography p.22-24. 32-1322

SOIL ANALYSIS, SOIL CHEMISTRY, SLUDGES. PLANTS (BOTANY), VEGETATION.

PLANTS (BOTANY), VEGETATION.

A field study was conducted to assess the effects of sewage sludge and lime on the revegetation and reclamation of acidic (pH 3 0) and infertile dredge soils. Sewage sludge at 100 metric tons/ha and lime at 25 metric tons/ha were applied during the summer of 1974 on a seven hectare site and plowed into the soil to a depth of 20 cm. Soils were sampled 20 months after sludge incorporation at three depths, 0-20, 20-40, and 40-60 cm within the sludged and control areas. A total of 29 grass treatments, containing grasses seeded alone or in combinations, were also evaluated and seven grass types analyzed for mineral composition. Comparisons between the sludged and control areas in the layers from 0-20 cm and below 20 cm were made in terms of changes in soil and plant chemistry, plant utilization of soil minerals, plant adaptability and vigor, and eventual resulting vegetative cover.

SR 77-20

UNCONFINED COMPRESSION TESTS ON SNOW: A COMPARATIVE STUDY. Kovacs, A, et al, July 1977, 27p., ADA-062 445, 21

refs. Michitti, F., Kalafut, J.

32-4357 SNOW COMPRESSION. COMPRESSIVE STRENGTH, TESTS.

STRENGTH, TESTS.

Results of unconfined compression tests performed on snow from Camp Century, Greenland, using a new self-aligning platen system are compared with tests using a more conventional platen system. The average unconfined compressive test strength was 42% higher for samples tested on the new platen assembly vs the old. Test results indicate that the new platen system provides for better sample alignment and therefore a more uniform load distribution applied to the ends of the sample. The higher strength values obtained with the new platen system are considered more representative. with the new platen system are considered more representative of the unconfined compressive strength of the snow tested

SR 77-21

INVESTIGATION OF SLUMPING FAILURE IN AN EARTH DAM ABUTMENT AT KOTZEBUE. ALASKA.

Collins, C.M., et al, July 1977, 21p., ADA-042 306, 5 refe

McFadden, T.

RESERVOIRS, EARTH D GROUND TEMPERATURE, DAMS, FROZEN SETTLEMENT (STRUCTURAL), SUBSIDENCE.

(SIRUCTORAL), SUBSIDENCE.

A slumping failure on the upstream side in one area of the water supply reservoir at Kotzebuc, Alaska, was investigated.

Seven 80-ft (24.4-m) thermocouple strings were emplaced in the dam abutment, and an additional four thermocouples intimas were installed behind the dam, extending to a depth of 95 ft (28.9 m) below the bottom of the reservoir All thermocouples indicated below freezing temperatures at their respective positions

These measurements combined with the drill logs indicate that neither the dam nor the abutment is in immediate danger of failure, but that steps abutment is in immediate danger of failure, but that steps must be taken to stop the sloughing of material in the abutment area Recommendations are given to accomplish

SR 77-22

LOCK WALL DEICING STUDIES.

Hanamoto, B., ed, Aug. 1977, 68p, ADA-044 943. For individual papers see 32-1350 through 32-1352, 31-1800, and 32-1109.

ICE REMOVAL. CHANNELS (WATERWAYS), LOCKS (WATERWAYS)

LOCKS (WATERWAYS)

Four methods for removing the ice buildup on navigation lock walls on the Poe Locks at Sault Ste Marie, Michigan, were investigated mechanical pneumatic boots, high-pressure water jets, mechanical chain saws, and chemical coatings. Two of the more promising means of ice removal, the chain saw and the chemical coatings, are being developed further so that they may be used as operational aids for lock wall deicing during the winter navigation season.

SR 77-23

ABNORMAL INTERNAL FRICTION PEAKS IN SINGLE-CRYSTAL ICE.

Stallman, P.E., et al. Aug. 1977, 15p. ADA-045 412, 9 refs.

Itagaki, K.

32-1355

CUBIC ICE, ICE PHYSICS, ICE CRYSTAL STRUCTURE, TEMPERATURE EFFECTS, ICE FRICTION

A series of sharp skewed internal friction peaks were observed during warming of single crystal i.e. after cooling below 120C (153K), the cubic hexagonal transition temperature. The peaks were higher when the strain amplitude was lower

Since handling and annealing strongly affect the occurrence of the skewed peaks, those peaks are probably related to the stacking fault process in hexagonal-cubic transition. SR 77-24

BRAZIL TENSILE STRENGTH TESTS ON SEA ICE: A DATA REPORT.

Kovacs, A., et al, Aug. 1977, 39p., ADA-044 941, 6 refs.

Kalafut, J. 32-1356

SEA ICE, IMPACT STRENGTH, PENETRATION

In March 1970 drop penetrometer tests in sea ice were made by Sandia Laboratories for the U.S. Coast Guard In support of this study, properties of the sea ice penetrated were measured. The data collected included ice temperature, salinity, brine volume, density and Brazil tensile strength versus depth.

The data are presented in this report in both tables and graphs as a permanent data sou SP 77-25

SOLVING PROBLEMS OF ICE-BLOCKED DRAINAGE FACILITIES.

Carey, K.L., Aug. 1977, 17p., ADA-044 994, 4 refs. 32-1357

SURFACE DRAINAGE, ICE CONTROL, HEAT-ING. SUBSURFACE DRAINAGE.

ING, SUBSURFACE DRAINAGE.

The report summarizes several processes for ice formation and blockage in culverty, ditches, and subsurface drains. Solutions to ice blockage problems involve ice prevention and ice control, usually the latter. In some cases, culverts can be closed, leading to intentional ponding and storage of ice. Alternatively, flow can be maintained in culverts by heating them electrically, with steam, or with oil-burner heaters. Ditches can also be heated, but it is usually more effective to widen them to provide more storage space for ice, or to invitall insulating covers. Subsurface drain outlets can be heated, protected with insulating covers, or partially blocked to prevent cold air entry. Ground seepage that forms ice is successfully controlled using ice fences. Design changes, such as more and larger drainage structures, staggered culverts, and channel modifications, are discussed. SR 77-26 SR 77-26

INFRARED THERMOGRAPHY OF BUILD-INGS: QUALITATIVE ANALYSIS OF FIVE BUILDINGS AT RICKENBACKER AIR FORCE BASE, COLUMBUS, OHIO. Munis, R.H., et al, Sep. 1977, 21p., ADA-067 161.

Marshall, S.J. 32-4358

INFRARED PHOTOGRAPHY, LOSS. HEAT BUILDINGS, THERMAL ANALYSIS, THERMAL MEASUREMENTS.

MEASUREMENTS.

A heat loss survey was performed on five typical Air Force Base buildings with an infrared camera system two with wood frames and wood clapboards, one with wood frame and aluminum siding, and two of einder block construction with brick veneer. This report presents thermograms typical of the heat loss problems in each of the five buildings along with a complete explanation of each thermogram. The report is intended to serve as a basis upon which Air Force civil engineers can plan a future retrofit program for the buildings surveyed and write a set of specifications incorporating thermography. SR 77-27

ICING ON SHIPS AND STATIONARY STRUC-TURES UNDER MARITIME CONDITIONS—A PRELIMINARY LITERATURE SURVEY OF JAPANESE SOURCES.

Itagaki, K., Sep. 1977, 22p., ADA-044 792, 8 refs.

SHIP ICING, ICE ACCRETION, ICE FORECAST-ING, TEMPERATURE EFFECTS, SEA SPRAY.

This report reviews Japanese literature on ship icing, including finis report reviews Japanese interature on sinp leng, including direct measurements of ice accumulated on ship, ice accretion rate and sea spray flux as well as statistical analyses of icing conditions. The report also describes some possibilities of forecasting icing conditions.

SR 77-28

AIRBORNE SPECTRORADIOMETER COMPARED WITH GROUND WATER-TUR-BIDITY MEASUREMENTS AT LAKE POWELL. CORRELATION AND QUANTIFICA-TION OF DATA.

Merry, C.J., Sep. 1977, 38p , ADA-044 793, Bibliography p 26-29. 17.1150

VATER CHEMISTRY, TURBIDITY, LIGHT TRANSMISSION, SPECTRORADIOMETERS, AERIAL SURVEYS, UNITED STATES—UTAH— LAKE POWELL.

The objective of this study is to correlate and quantify The objective of this study is to correlate and quantify the airborne spectroadiometer mulisspectral data to ground truth water quality measurements obtained at Lake Powell, Lish, during 1975. A ground truth water sampling program was accomplished during 9-16 June 1975 for correlation to an aircraft spectroradiometer flight brief measurements were taken of persentage of transmitiance, surface temperature, pH and secundist depth. Also, persentage of light transmitiance was measured in the laboratory for the water samples in addition, electron micrographs and suspended sediment. concentration data were obtained of selected water samples located at Hite Bridge (Mile 171), Mile 168, Mile 150 (along the Colorado River main channel) and Bullfrog Bay (Mile 122). Airborne spectroradiometer spectra were select-(Mile 122). Airborne spectroradiometer species which correlated to the same test sites

SR 77-29

INFRARED THERMOGRAPHY OF BUILD-INGS: QUALITATIVE ANALYSIS OF WINDOW INFILTRATION LOSS, FEDERAL OFFICE BUILDING, BURLINGTON, VERMONT.

Munis, R.H., et al, Sep. 1977, 17p., ADA-044 942. Marshall, S.J.

32-1360

INFRARED PHOTOGRAPHY, THERMAL DIF-FUSION, BUILDINGS, HEAT LOSS, WINDOWS.

An interior, infrared thermographic survey of single-pane, aluminum-frame, projected windows was performed to pinpoint locations of excessive infiltration. Infrared thermographic inspection accomplishes this more quickly and more accurately than conventional techniques of studying window infiltration. This report presents 32 thermograms and photographs which in many cases dramatically illustrate infiltrations around the in many cases dramatically illustrate infiltrations around the mullion, along the top opening cracks, and under the frame/sill interfaces. Poor glazing seals were easily detected and the exact points of glass/frame leakages were pinpointed. Plumes of warm air on the window glass, rising from the convectors, were dramatically captured by the infrared camera system. In several cases, the plumes were noted 12 ft. above the convectors on the top window panels. Heat loss from the convectors was noted through the walls of the building in the semerame take from the outside. Several the building in thermograms taken from the outside. Several recommendations were prepared for the General Services Administration, owner of this Federal Office Building in Burlington, Vermont.

SR 77-30

PAVEMENT RECYCLING USING A HEAVY BULLDOZER MOUNTED PULVERIZER. Eaton, R.A., et al, Sep. 1977, 12p. + appends., ADA-

046 008, 8 refs. Garfield, D.E.

32-1361

EXCAVATION, SUBGRADES, PAVEMENT BASES.

Recycling of paving materials is currently gaining acceptance as a means of economic savings in pavement reconstruction or rehabilitation. Pavements having low serviceability indices due to surface irregulanties such as cracks, bumps, spalling, potholes, etc., may be broken up to meet specified granular base course gradation requirements and reused as a base for the new surface. The USACRREL developed a base for the new surface The USACRREL developed a permafrost excavating attachment for heavy buildozers and a prototype test rig was constructed.

Tests were conducted on frozen soils, gravels, and ledge this rig was used to pulverize a flexible pavement on North Main Street in Hanover, N H, and highway pavement test sections in a CRREL test facility The resultant processed material did meet Corps of Engineers base course gradation requirements. The machine can process 120 square ft of pavement structure per minute to a depth of 12 inches The most uniformly graded material was obtained at a drum speed of 15 revolutions per minute. Once the pavement structure is broken down from the solid mass (asphalt concrete pavement), the machine does not further break down or pulverize the aggregate. A minor amount of dust was evident during the operations, but no refinements are recommended mended

SR 77-31

EFFECTS OF LOW GROUND PRESSURE VEHI-CLE TRAFFIC ON TUNDRA AT LONELY, ALAS-KA.

Abele, G., et al, Sep. 1977, 32p, ADA-062 446, 13

Brown, J., Brewer, M.C., Atwood, D.M.

AIR CUSHION VEHICLES, TRACKED VEHICLES, TUNDRA VEGETATION, VEHICLE WHEELS, ENVIRONMENTAL IMPACT, DAM-AGE. PATTERNED GROUND, SOIL TURE

TORE. Traffic tests were conducted with two low pressure tire Rolligon-type vehicles and a small, tracked Nodwell with minimal load for 1, 5, and 10 vehicle passes on relatively dry undra near Lonely, Alaska The traffic impact was limited to compression of the vegetation and the organic mat and a maximum terrain surface depression of several cm, with no shearing or disaggregation of the mat

SR 77-32

AERIAL PHOTOINTERPRETATION OF A SMALL ICE JAM.

DenHartog, S.L., Oct. 1977, 17p., ADA-045 870. 32-1362

ICE JAMS, AERIAL SURVEYS, PHOTOINTER-PRETATION

Acrial photos of a small ice jam on the Pemigewasett River near Plymouth, New Hampshire, were taken three days after the jam and compared with photos taken after the ice went out. The winter photos show a marked and sudden decrease out. In eviline photos show a marked and sudden decrease in floe size apparently indicative of faster and longer movement of the ice. The spring photos show a number of shallows and obstructions that apparently had no effect on the ice movement. It is concluded that this jam was caused by a change in slope and subsequent reduction in selectly

SR 77-33 LAND TREATMENT OF WASTEWATER AT WEST DOVER, VERMONT.

Bouzoun, J.R., Oct. 1977, 24p, ADA-046 300, 12 refs WATER TREATMENT.

WASTE DISPOSAL, W SEWAGE TREATMENT.

A general description of a wastewater land treatment system located in a "cold temperate" climatic region is given. The winter season average daily design now is almost double that of the summer-fall season (0.55 MGD vs 0.30 MGD) wastewater is sprayed on a forested knoll after it receives secondary biological treatment. The system is operated secondary biological treatment. The system is operated during the winter when the ambient air temperature is as low as 10F. Spray nozzles have been developed that ensure rapid drainage of the spray laterals after each spray cycle and, therefore, prevent their freezing

CANOL PIPELINE PROJECT: A HISTORICAL

Ueda, H.T., et al, Oct. 1977, 32p., ADA-046 707, 8

Garfield, D.E., Haynes, F.D.

PIPELINES, HISTORY, ARCTIC LANDSCAPES

PIPELINES, HISTORY, ARCTIC LANDSCAPES
This report is a historical review of the Canol project, the
first long-distance petroleum pipeline system constructed in
the Arctic region of North America. The project was
initiated during the early days of World War II when the
military situation appeared critical. It was designed to
supply the military need for fuel in the area, particularly
Alaska, by exploiting the Norman Wells oil field in the
Northwest Territory of Canada. The system was completed
in April 1944 and operated for II months converting 975,764
barrels of crude oil into gasoline and fuel oil. Construction
for the pioneering effort was difficult and costly. Considerable controversy plagued the project throughout, nevertheless,
its completion proved that undertakings of such magnitude
could be accomplished despite the formidable problems of
the Arctic.

SR 77-35

CEMENTS FOR STRUCTURAL CONCRETE IN COLD REGIONS.

Johnson, R., Oct. 1977, 13p., ADA-046 302, 19 refs

WINTER CONCRETING, CONCRETE ADMIX-TURES, CONCRETE STRENGTH, CONCRETE CURING, CEMENTS.

A literature search was undertaken to collect information on cements which could be used in structural concrete and would cure at low temperatures. In the literature search, 18 types of cements or concretes manufactured by various firms were reviewed. Trade names are identified with their cement or concrete description, temperature range for curing, use experience and application, approximate cost (in 1976), and reference source or manufacturer.

SR 77-36

SMALL COMMUNITIES RESULT IN GREATER SATISFACTION: AN EXAMINATION OF UN-DERMANNING THEORY.

Ledbetter, C.B., Nov. 1977, 15p, ADA-046 817, 3

32-1367

HUMAN FACTORS, THEORIES.

HUMAN FACTORS, THEORIES.
Roger Barker's undermanning theory states that the smaller an organization, the greater the degree of undermanning, resulting in greater inhabitant satisfaction. This theory is examined using the National Opinion Research Center's General Social Survey for 1974. Two groups of survey variables were dichotomized and net transmittances or coefficients of correlation for the system were determined. Two groups of variables were chosen objective groups, such as age and income, and subjective ones, such as sociability and job satisfaction. The only positive correlation found was that people residing in small communities are more satisfied with their community than are people who live in large communities. Only a small portion of this is explained by the degree to which small town inhabitants are satisfied with their financial situation.

UTILIZATION OF SEWAGE SLUDGE FOR TER-RAIN STABILIZATION IN COLD REGIONS. Gaskin, D.A., et al. Nov. 1977, 45p., ADA-047 368 Hannel, W., Palazzo, A.J., Bates, R.E., Stanley, L.E.

SOIL STABILIZATION, SLUDGES, EROSION CONTROL, SEWAGE, VEGETATION.

CONTROL, SEWAGE, VEGETATION.
A terrain stabilization research/demonstration site was constructed in May 1974 at Hanoser, New Hampshire, to investigate various combinations of physical, chemical and biological techniques for terrain stabilization in cold regions. Fourteen test plots (10 x 40 ft) with individual 350 gal tanks to collect sediment were installed on a 16 deg slope. These 14 test plots were to examine the effectiveness of seage sludge and primary effluent on terrain stabilization in cold regions. In 19 of the 14 plots the variables studied were nutrient source (fertilizer, sludge, and primary wastewater), moisture (trigated and nonirrigated), crission control material fute netting, straw tacked with a tasking compound), in occision control material and segetation (three grasses and two legiumes). The control plot was left bare of seed,

fertilizer and erosion control material for compensation 20,000 sq ft area adjacent to the 14 plots was installed for general testing of various combinations of tacking chemicals, the control of the co plastic netting, straw, and wood fiber mulch. In general, all treatments with the exception of two plots were effective in reducing soil loss in comparison with the control which had a loss of 34,531 lb of soil (dry weight) on a per acre basis.

SR 77-38

FINITE ELEMENT MODEL OF TRANSIENT HEAT CONDUCTION WITH ISOTHERMAL PHASE CHANGE (TWO AND THREE DIMEN-

Guymon, G.L., et al, Nov. 1977, 167p., ADA-047 369. Hromadka, T.V., II.

THERMAL CONDUCTIVITY, MATHEMATICAL MODELS, COMPUTERIZED SIMULATION, FROZEN GROUND MECHANICS, COMPUTER PROGRAMS.

The partial differential equation for transient heat conduction is solved by a finite element analog using a quadratic weighting function for the discretized spatial domain. The transient problem is solved by the Crank-Nicolson approximation. Two dimensional and three dimensional models incorporated Two dimensional and three dimensional models incorporated in the same computer program are presented element method is reviewed, assumptions and limitations upon which the model is based are presented, and a complete derivation of the system analog is included. Certain problems can only be modeled as a three dimensional system, e.g., thaw degradations around roadway culverts, embankment dams on permafrost where dam length is short relative to dam width, and thaw and freezeback under buildings. In most cases, however, the more economical two dimensional model can be used. Numerical tests of both models have been accomplished but field verification has not been attempted. A user's manual and a FORTRAN IV computer listing of the program are presented.

SR 77-39

TEMPORARY PROTECTION OF WINTERTIME BUILDING CONSTRUCTION, FAIRBANKS, ALASKA, 1976-77.

Bennett, F.L., Nov. 1977, 41p, ADA-048 987, 2 refs. 32-2729

COLD WEATHER CONSTRUCTION, BUILDINGS, HEATING.

Nine building construction projects, whose total area exceeds one half million square feet, were under construction in Fairbanks, Alaska, area during the winter of 1976-77. These projects were studied to determine the methods used for projects were studied to determine the methods used to providing temporary enclosures and temporary building heating during the construction process. The types of construction activities underway at various temperature conditions are reported, and a record of temperature variations in the buildings. under construction is discussed. Both black and white and color photo documentation was developed, and several black and white photographs are included in this report

SR 77-40 VINTER EARTHWORK CONSTRUCTION IN

UPPER MICHIGAN. Haas, W M., et al. Nov 1977, 59p., ADA-049 052, 5 See also 32-293.

Alkire, B.D., Dingeldein, J.E.

EARTHWORK, SUBGRADE PREPARATION, COLD WEATHER CONSTRUCTION, FROZEN

Winter earthwork construction was observed in three counties in Michigan's Upper Peninsula during the 1975-76 season. In all cases, construction methods are used which exclude frozen soil from the central core of the embankment, with frozen soil permitted in the outer slope zone. While all projects were technically successful, construction was halted all projects were technically successful, construction was halted in early. February on one project because it was uneconomical for the contractor to continue. On another project, the contractor successfully exploited soil freezing to form stable smooth haul roads for his scrapers. Most of the work consisted of raising the grade of existing roads by 18 inches of non-frost-susceptible soil to minimize frost heaving and losts of bearing capacity. This winter activity resulted in better utilization of county equipment and work crews

SR 77-41 1977 CRREL-USGS PERMAFROST PROGRAM BEAUFORT SEA, ALASKA, OPERATIONAL RE-PORT.

Sellmann, P.V., et al. Dec. 1977, 19p., ADA-048 985. 11 refs See also 32-1248 (SR 76-12, ADA-032 440). Chamberlain, E.J., Leda, H. F., Blouin, S.E., Garfield. D.E. Lewellen, R.I.

12-2697 OFFSHORE DRILLING, DRILL CORP ANAL-

OFFSHORE DRILLING, DRILL CORP ANALYSIS, SUBSEA PERMAFROST, BOTTOM SEDI-MENT, TEMPERATURE MLASUREMENT During the spring of 19²⁰ soil samples were obtained in the Prudhoe Bay area from one hole drilled on land and five holes drilled offshore. The study is a continuation of the program started the previous season to examine the engineering characteristics and properties of permafrost under the Beaufort Sea. I imphasis was placed on establishing the range of thermal and physician properties found in this geological setting, which is thought to be common to much

of the eastern Alaska coastal zone. Twenty-seven probe sites were selected to determine local engineering properties of the eastern Alaska coastal zone. Twently-seven probestes were selected to determine local engineering properties and temperature conditions, and to aid in interpreting the lithology between the drill holes. Core drilling information from some of the probe sites was used as control for interpreting the probe records. Deep thermal and geological information was obtained from the drill sites by the USGS personnel participating in the study. Maximum drill hole depth was 68.5 m (225 ft) and maximum penetration depth was 15 m (50 ft). The probe temperature data indicated the presence of permaftost in all holes. Probe penetration resistance measurements helped to delineate shallow, techonded zones, some of which may have been only seasonal. In the core study, frozen sediments were found in only one hole, at approximately the 29 6-m (97-ft) depth. Fine-grained sediments were more common than course-grained material, and showed general increase in thickness with increasing distance from shore. The only departure from the previous year's field drilling techniques was the use of larger diameter, thick-walled easing and an air-operated casing driver. The probe equipment and techniques employed, however, represented a significant improvement over the prototype equipment used in 1976.

SR 77-42

GROUTING OF SOILS IN COLD ENVIRON-MENTS: A LITERATURE SEARCH.

Johnson, R., Dec 1977, 49p., ADA-049 436, 52 refs. 32-2548 GROUTING, ADMIXTURES, SOIL STRENGTH.

A literature search was undertaken to collect information on grouting of soils as related to low temperature environment, 40 F and below This report reviews existing literature and the state-of-the-art on conventional grouting engineering methods and materials to seek which may be used in thawed or dry, frozen ground and to establish the need of new methods and techniques where conventional grouting methods

CREEL ROOF MOISTURE SURVEY, BUILD-ING 208 ROCK ISLAND ARSENAL. Korhonen, C., et al, Dec. 1977, 6p., ADA-051 490. Dudley, T., Tobiasson, W. 32-2730

ROOFS, MOISTURE, INFRARED RADIATION.

The roof of building 208 at Rock Island Arsenal was surveyed for wet insulation using a hand-held infrared camera Areas for wet insulation using a hand-held infrared camera. Areas of wet insulation were marked with spray point on the food and 3-in-diam core samples of the built-up membrane and insulation were obtained to verify wet and dry conditions. Roof defects uncovered during a visual inspection were also marked with spray paint. The majority of the wet areas detected are associated with flashing flaws, which are considered responsible for the wet insulation. Recommendations for maintenance of this roof are based on information derived from the infrared survey, core samples and visual examinations.

SR 77-44

FATE AND EFFECTS OF CRUDE OIL SPILLED ON PERMAFROST TERRAIN. SECOND ANNUAL PROGRESS REPORT, JUNE 1976 TO

MULY 1977.

McFadden, T., et al, Dec 1977, 46p, ADA-061 779, 4 refs. Includes progress report for the first year, CRREL SR 76-15, q.v. 32-1257.

Jenkins, T.F., Collins, C.M., Johnson, L.A., McCown, B.H., Sparrow, E.B.

33-1528

OIL SPILLS, DAMAGE, CHEMICAL REACTIONS, FROZEN GROUND, ENVIRONMENTAL IMPACT, VEGETATION.

TAL IMPACT, VEGETATION.
This spill was compared with one that took place in February 1976 (reported upon in the first annual progress report). Oil moved downslope at a much faster rate during the summer spill than during the winter spill. In the winter he oil cooled and pooled rapidly. The summer spill covered approximately one-third more surface area than did the winter spill in the final configuration, even though the worspills were of almost identical volume. Increases in microbial populations and activities during the months following the spill were evident. Increased counts of bacteria, yeasts, dentitifying bacteria, and petroleum degrading bacteria following the spills were particularly evident. Analysis of oil decomposition using gas chromatography techniques indicated that the low molecular weight fractions, methane and ctane, were lost almost immediately after the spill in each case. Fractions in the C3 to C3 range were reduced significantly in two months and were nearly zero at the end of five months. An obsious adverse effect on vegetation was noted in both spills. Biological damage from the summer spill appeared to exceed that from the winter spill.

RECOMMENDATIONS FOR IMPLEMENTING ROOF MOISTURE SURVEYS IN THE U.S. ARMY.

U.S. Army CRREL, W.E.S. FESA Roof Moisture Research Team, Aug. 1978, 8p., ADB-031 978L, Distribution limited to U.S. Government agencies only

MOISTURE METERS, ROOFS. RECONNAISSANCE, SITE SURVEYS.

Nuclear, infrared, capacitance, microwave and impuise radar methods for non-destru tisely detecting moisture in roofs

were evaluated. No system was rehable enough by itself or by cross-checking with another system to eliminate the need for a few core samples of membrane and insulation need for a few core samples of membrane and insulation to verify findings. Airborne infrared surveys are a cost-effective way of reconnoitening numerous roofs at a major installation. However, follow-up on-the-roof surveys are necessary. Of the several grid techniques examined, nuclear surveys were the most reliable. Hand-held infrared surveys are the most accurate on-the-roof method studied. Although an infrared camera costs significantly more than a nuclear meter (\$25K vs \$3K), infrared surveys can be conducted more rapidly. Since the Army has numerous roofs to survey, infrared surveys appear to be the most cost-effective method. For reasons of continuity, accuracy and economy, the Army should establish its own capability to survey roofs for moisture. Implementation should not be at the installation level A centralized team of roof moisture surveying specialists, skilled in poperating infrared equipment but, more importantly, skilled in roofing technology, should be estabspecialists, skilled in operating infrared equipment out, more importantly, skilled in roofing technology, should be established. The team should both conduct and contract for airborne and on-the-roof infrared surveys. The CRRELF-WES/FESA roof moisture research group has initiated development of training aids for use by such a team

ARCHITECTURAL PROGRAMMING: MAKING SOCIALLY RESPONSIVE ARCHITECTURE MORE ACCESSIBLE. Ledbetter, C.B., Mar. 1978, 7p., ADA-052 153, 6 refs

BUILDINGS, DESIGN.

SR 78-03 PHYSICAL MEASUREMENT OF ICE JAMS 1976-77 FIELD SEASON.

Wuebben, J.L., et al, Mar. 1978, 19p., ADA-053 260. 2 refs.

Stewart, D.M. 32-3538

RIVER ICE, ICE JAMS, ICE COVER THICKNESS, MEASUREMENT.

MEASUREMENT.

Three shallow stream ice jams which occurred on the Ottauquechee River in Vermont during the 1976-77 winter season
are documented. Measurements of the variation in jam
thickness along the longitudinal profile of the jams are given
along with the variation in surface ice floe sizes. These
measurements are compared with those of previous work
All jams were caused to some extent by hackwater conditions
in the river. The effects of an ice cover and the ice
jams on the longitudinal water surface profiles are examined
and compared with open water conditions

SR 78-04 LARGE MOBILE DRILLING RIGS USED ALONG THE ALASKA PIPELINE.

Sellmann, P.V., et al, Mar. 1978, 23p., ADA-053 536 Mellor, M.

32-3539 PIPELINES, DRILLING, UNITED STATES-ALASKA.

The requirement for installing more than 70,000 vertical support members along elevated sections of the Alaska Pipeline resulted in an extremely large drilling program. Several large drilling units, some specially designed, including rotary (auger), percussive, and combination rotary-percussive units, were selected for this job. This selection of equipment and techniques provided the potential to drill in all conceivable. and techniques provided the potential to drill in all conceivable material types. An examination of these drills in the field, together with product literature, provided some insight into the characteristics of these drills compared with other commercially available drilling units. The pipeline drilling program provided a major impetus for design and development of new equipment in the area of large rotary-percussive and percussive drilling units. The pipeline drills in general showed sound design characteristics in weight, power, thrust, torque, and speed. Many of the auger boring heads could benefit from improvements in shape, angles, cutter position, and in consideration of the center of the hole problem heed for work in this area was indicated by drilling rates, as well as by noticeable improvements in some augers following contractors' field modifications.

SR 78-05 SPECIALIZED PIPELINE EQUIPMENT.

Hanamoto, B., Mar. 1978, 30p., ADA-055 715, 3 refs.

PIPELINES, CONSTRUCTION EQUIPMENT, PIPELINE INSULATION, COLD WEATHER CONSTRUCTION, UNITED STATES—ALASKA CONSTRUCTION, UNITED STATES—ALASKA The use of specialized heavy equipment in the construction phase of the 800-mile Trans-Alaska Pipeline is described. The types include equipment used in bending, taping and insulating the 48-in pipe used for the pipeline. Stretching from Prudhoe Bay on the North Slope and Beaufort Sea to the southern terminal at Valder on the Prince William Sound and the Gulf of Alaska, the pipeline construction task, with the combination of varied arctic terrain, severe climatic conditions, conservational and and environmental restraints, and rigid scheduling is a project unline any that has been undertaken before

SR 78-06

COMPUTER PROCESSING OF LANDSAT DIGI-TAL DATA AND SENSOR INTERFACE DEVEL-OPMENT FOR USE IN NEW ENGLAND RESER-VOIR MANAGEMENT.

Merry, C.J., et al, Apr. 1978, 61p., ADA-055 762, Refs. p.40-44.

McKim, H.L. 32-4373

RESERVOIRS, REMOTE SENSING, SNOW WATER EQUIVALENT, LANDSAT, FLOODS, WATER SUPPLY, COMPUTER APPLICATIONS. WATER SUPPLY, COMPUTER APPLICATIONS. A preliminary analysis of Landsat digital data using the NASA GISS computer algorithms for a February 11 sene of the upper St. John River Basin, Maine, showed that the total radiance of pixels contained in three snow courses varied from 5.34 to 7.4 mW/sq cm st for a water equivalent of approximately 24 1 cm (9 5 in) of water This correlation between radiance values and water equivalent of the snowpack still needs to be tested A multispectral signature was developed with an accuracy of 75% for a wetlands category in the Mertimack River estuary. Low-water reservoir and flood water stages were mapped from grayscale printouts of MSS band 7 for October 27, 1972, and July 6, 1973, respectively, for the Franklin Falls reservoir area. New Hampshire Two snow pillow transducer systems for measuring he water equivalent of the snowpack in northern Maine were interfaced and field tested A water quality monitor interfaced to the Landsat DCS was field tested in northern Maine and transmitted the following water quality information: interfaced to the Landsat DCS was field tested in northern Maine and transmitted the following water quality information: PH, dissolved oxygen, river stage, water temperature and conductivity. A thermocouple system was successfully interfaced and field tested at Sugarloaf Mountain, Maine. Temperature data from the surface to a depth of 30 m (100 ft) were transmitted through the Landsat DCS. Also, a tensioneter/transducer system to measure moisture tension and soil volumetric moisture content was successfully interfaced to the Landsat DCS.

SR 78-07

FRESH WATER SUPPLY FOR A VILLAGE SUR-ROUNDED BY SALT WATER-POINT HOPE, ALASKA.

McFadden, T., et al, Apr. 1978, 18p, ADA-054 147, 9 refs.

Collins, C.M.

WATER SUPPLY, GROUND WATER, PERMA-FROST HYDROLOGY.

FROST HYDROLOGY.

Point Hope is a village located on a narrow gravel spit extending eight miles out into the Bering Sea. Studies to locate an adequate fresh water source for the village have yielded two possible supplies which will fill the needs of the village. The first is a ground water supply existing on top of the undulating permafrost layer which underlies the gravel spit. This supply consists of several million gallons of water and can be augmented with snow fences which will drift blowing snow into areas where it will drain into the augmer when it melts. Excess water will overflow the sides of the spit. The second source is a small lake located approximately four miles from the village. The lake provides water of adequate quality and quantity to used as a raw water supply; however, this source is not as desirable since it is surface water and supports a higher level of bacterial contamination. In addition, it is a much greater distance from the village, and longer, much more expensive piping would be required to get the water to the village.

SR 78-08

METHODOLOGY FOR NITROGEN ISOTOPE ANALYSIS AT CRREL.
Jenkins, T.F., et al., Apr. 1978, 57p., ADA-054 939, 9

32-4374

SOIL CHEMISTRY, WASTE DISPOSAL, ISO-TOPE ANALYSIS, NITROGEN ISOTOPES, COM-PUTER APPLICATIONS

This report documents the chronology of events and the This report documents the chronology of events and the procedures employed in developing a nittogen isotope analysis capability at the U.S. Army Cold Regions Research and Ingineering Laboratory. Both the instrumental and wet chemistry procedures are reported to enable others interested in the procedures to obtain useful data. The procedures described have resulted in the ability to measure the 15-N-14-N ratio to a precision of 0.001 atom 7-, a value easily thin the acceptable range for tracer experiments.

SR 78.09 SR 78-09
IMPROVED DRAINAGE AND FROST ACTION
CRITERIA FOR NEW JERSEY PAVEMENT DESIGN. PHASE 2: FROST ACTION.
Berg, R. L., et al, May 1978, 80p. ADA-055 785, Nu-

merous refs. passim.

McGaw, R.

FROST ACTION, PAVEMENTS, FROST HEAVE, DRAINAGE, THERMAL CONDUCTIVITY. DRAINAGE, THERMAL CONDUCTIVITY, FROST PENETRATION, SOIL FREEZING, COM-PUTER APPLICATIONS

Before constructing actual pavements with open-graded drain age layers in New Jerses, the influence of the drainage

layer on frost penetration beneath hypothetical pavements was analytically examined. Thermal conductivity values of several New Jersey soils, stabilized drainage layer materials, of several New Jersey soils, stabilized drainage layer materials, and pavement samples were measured using the Guarded Hot Plate method or the probe method frost penetration depths were computed using the modified Berggren equations Mean air freezing indexes used in the computation ranged from 50 deg-days in Atlantic City to 480 deg-days in Newton. Design freezing indexes ranged from 250 deg-days to 900 deg-days for the same two sites Maximum computed frost depths ranged from 0.8 to 2.1 ft beneath conventional pavements, i.e., those without drainage layers for pavements incorporating an open-graded drainage layer, computed maximum frost depths ranged from 0.8 ft to 1.4 ft. It was concluded that frost penetration beneath a pavement including an open-graded drainage layer would be approximately equal to a pavement without the drainage layer at the same site

TUNDRA FIRE AT KOKOLIK RIVER. ALASKA.

Hall, D.K., et al, Aug. 1978, 11p., ADA-062 439, 10 refs. For this paper from another source see MP 1125, 32-4577.

Brown, J., Johnson, L.A.

35-2501

TUNDRA, FIRES, VEGETATION, DAMAGE, THAW DEPTH, REMOTE SENSING, SPACE-BORNE PHOTOGRAPHY, LANDSAT.

BORNE PHOTOGRAPHY, LANDSAI.

During summer 1977 widespread fires occurred in northwest
Alaska Through the use of Landsat imagery and ground
studies, one such fire, at Kokolik River was examined. The
Kokolik fire was first reported on 26 July, and by the
time it was extinguished had consumed 44 sq km of tundra
segetation. Streams and drainages contained the fire on
several sides. Ground observations provided information
on the intensity of the fire effects. Depth of thaw by
late August measured 354 cm in the burned areas and
266 cm in the unburned areas.

SR 78-11 CONSTRUCTION EQUIPMENT PROBLEMS AND PROCEDURES: ALASKA PIPELINE PRO-JECT.

Hanamoto, B., June 1978, 14p., ADB-029 226, 4 refs. Distribution limited to U.S. Government agencies

only. 33-1535

COLD WEATHER PERFORMANCE, CON-STRUCTION EQUIPMENT, PIPELINES, EN-GINES, HUMAN FACTORS.

Trans-Alaska pipeline construction project posed many The Trans-Alaska pipeline construction project posed many problems which are not encountered in the more temperate regions. Construction equipment maintenance and operation is of major concern in the far north. Difficulties encountered were due to extreme low temperature of 70F (-57C) and common winter temperatures of -30F (-34C), the temoteness and isolation of the work area, hard environment, and the working personnel. This report describes some of the typical problems encountered with construction equipment on this project and some of the remedies and procedures for solving these problems.

SR 78-12 SOIL LYSIMETERS FOR VALIDATING MOD-ELS OF WASTEWATER RENOVATION BY LAND APPLICATION.

Iskandar, I.K., et al, June 1978, 11p. ADA-059 994.

Nakano, Y. 33-1536

MOISTURE METERS, WATER TREATMENT, WASTE DISPOSAL, MODELS.

This report describes the construction, operation and performance of large-scale (90 cm-inside diameter and 150-cm-high) lyameters. These lysimeters can continuously monitor soil moisture flow, soil temperature and redox potential with depth, and sample soil water and soil air with depth. The rate of soil water movement to the groundwater was continuously monitored by a rain gage and a recorder field condition, an automatic sprax system was developed, this system is also described in this report. The total cost of one symmeter is approximately \$650 (1975 estimate) the lysimeters are being used to validate a biophysical-chemical model of wastewater tenovation by application to land. Detailed blueprints of the lysimeters are kept at CRREL, and are available on request. This report describes the construction, operation and perform

SP 78.13 ECOLOGICAL BASELINE INVESTIGATIONS ALONG THE YUKON RIVER-PRUDHOL BAY HAUL ROAD, ALASKA.

Brown, J., ed. Sep. 1978, 131p., ADA-060 255, For this item as a progress report to the U.S. Department of Energy and for individual papers see 32-3888 through 32-3896

RESEARCH PROJECTS, ECOLOGY, ILNDRA VEGETATION, ROADS, CLAY SOILS

Results of the first full year's field research on five projects along the Yukon River-Prudboe flas. Haw Road are reported. Several projects are extensions of investigations begin in 1976 and are being conducted in cooperation with a Ederal

Highway Administration sponsored environmental engineering study. The extent and success of weeds and weedy species along the road and in material sites has been followed for summer 1976 and 1977. In order to document the vegetation along the complex elevational and latitudinal gradient and its potential for impact and recovery, 17 vegetation maps have now been completed, and vegetation Gescribed and plots established at 120 locations along the 600-kilometeriong road. Collections of vascular plants, bryophytes and lichens were made and catalogued for an additional 9 sites. Sampling for soil invertebrates to determine their sensitivity to impact was undertaken at approximately 25 sites.

Sampling for son inverteorates to determine their sensitivity to impact was undertaken at approximately 25 sites. A detailed study of the impact of road dust upon the vegetation was initiated at one tundra site, and four sites were established to monitor the amount of dust transported onto the tundra across 1000-meter-long transects. The clay mineralogy and chemistry of the dust and road material were investigated. SR 78-14

SK 78-14
GEOCHEMISTRY OF SUBSEA PERMAFROST
AT PRUDHOE BAY, ALASKA.
Page, F.W., et al, Sep. 1978, 70p., ADA-060 434, Refs.

p.62-68.

Iskandar, I.K.

33-1543

SUBSEA PERMAFROST, SEDIMENTS, SEA WATER, CHEMICAL ANALYSIS, DRILL CORE ANALYSIS, SALINITY.

ANALYSIS, SALINITY.

The analytical data from sediment, interstitial water, and seawater analyses of samples collected near Prudhoe Bay, Alaska, during the period from March to May 1977, are presented Analyses include determinations of moisture, calcium carbonate, and organic carbon contents in the sediment samples and pH, electrical conductivity, alkalinity, and concentrations of sodium, potassium, calcium, magnesium, chloride, and sulfate in the interstitial water and seawater samples. Salinity, ionic balance, and freezing point of the water samples were calculated. The marine sediments in Prudhoe Bay generally contain more calcium carbonate, organic carbon, and interstitial water than the underlying glecula and fluvial gravels. On land, a surficial layer of peat also had high organic carbon and moisture contents. The salimity of the seawater samples varied from concentrated brines near organic carbon and moisture contents. The salmity of the seawater samples varied from concentrated brines near the shore where sea ice is frozen directly to, or is located near, the sea bottom to water which was 1.0 to 1.5 ppt less saline than normal seawater at a distance of approximately 10 to 15 km from shore.

SR 78-15

WATERPROOFING STRAIN GAGES FOR LOW AMBIENT TEMPERATURES

Garfield, D.E., et al, Sep. 1978, 20p., ADA-061 749, 10 refs.

33-1544

STRAIN MEASURING INSTRUMENTS, LOW TEMPERATURE TESTS, FREEZE THAW CY-CLES, WATERPROOFING.

CLES, WATERPROOFING.

Due to recent problems experienced with strain-gage based transducers immersed in water at below-freezing ambient temperatures, a test program was conducted to determine if commercially available strain-gage waterproofing systems could withstand these conditions. A total of 96 combinations of eight waterproofing systems, three beam materials and four strain gage adhesives were evaluated. Test environments included strain cycling at temperatures from +32F to +79F and freeze-thaw cycling from -35 to +90F. Only one waterproofing system withstood all tests with no failutes. Other results ranged from one installation failure on three systems to the failure of all 12 installations of one system. SR 78-16

EFFECTS OF LOW GROUND PRESSURE VEHI-CLE TRAFFIC ON TUNDRA AT LONELY, ALAS-KA.

Abele, G., et al, Sep. 1978, 63p., ADA-061 777, 18

Walker, D.A., Brown, J., Brewer, M.C., Atwood, D.M.

TUNDRA VEGETATION, TIRES, SOIL TRAFFI-CABILITY, DAMAGE

CABILLY F. DAMAGE.

Traffic tests were conducted with two low-pressure-tire Rolligon-type vehicles and a small, tracked Nodwell for 1,5,
and 10 vehicle passes on tundra near Lonely, Alaska. The
traffic impact was limited to compression of the vegetation
and the organic mat and a maximum terrain surface depression and the organic mat and a maximum terrain surface depression of several continueters, with virtually no shearing or disaggregation of the mat. After one year, the visibility of the traffic signatures had increased, surface depression remained the same, and the thaw depth below the multiple pass tracks had increased a few centimeters.

SR 78.17 EFFECTS OF WINTER MILITARY OPERA-TIONS ON COLD REGIONS TERRAIN.

Abele, G., et al, Sep. 1978, 34p., ADA-061 260 Johnson, L.A., Collins, C.M., Taylor, R.A.

COLD WEATHER OPERATION, MILITARY OP-ERATION, DAMAGE, ENVIRONMENTAL IM-PACT, VEGETATION.

Observations were made on the 19** winter military maneuver sites south of Fairbanks to obtain base line data for monitoring terrain and vegetation recovery from the impact of winter trail preparation, and vehicular and troop activities in various terrains and vegetation types

SR 78-18

GUIDE TO THE USE OF 14N AND 15N IN ENVI-RONMENTAL RESEARCH.

Edwards, A.P., Sep. 1978, 77p., ADA-060 385.

WASTES, WATER CHEMISTRY, SOTOPIC LA-BELING, RESEARCH PROJECTS.

The fate of the mineral nitrogen in wastewater can be established only through natural or artificial stable isotopic labeling. insteed only through natural of artificial stable isotopic tabeling. This report assesses the possibilities and problems associated with such tracer techniques applied to the small amounts of nitrogen normally present after secondary waste treatment. The methods outlined for sample processing to minimize analytical errors are applicable to other types of environmental research involving isotope ratio analysis as a means of tracing nitrogen in the biosphere.

SR 78-19 SELECTED BIBLIOGRAPHY OF DISTURB-ANCE AND RESTORATION OF SOILS AND VEGETATION IN PERMAFROST REGIONS OF THE USSR (1970-1977).

Andrews, M., Oct. 1978, 175p., ADA-062 339. 33-2520

BIBLIOGRAPHIES, HUMAN FACTORS, ENVI-RONMENTAL IMPACT, CONTINUOUS PER-MAFROST, DISCONTINUOUS PERMAFROST, REVEGETATION, CRYOGENIC SOILS, DAM-AGE.

AGE.

This compilation of literature, published in Russian since 1970, comprises 1225 bibliographic citations relating to disturbance and restoration of soils and vegetation. Sixty-five percent of these were found by a manual search of CRREL Bibliography Vols. 25-32, the others were obtained through off-line searches from the relevant computerized data bases and personal files. Only one of these data bases, that of the National Agricultural Library, is shown to be of significance in providing a valuable checking source. The iterature is discussed in chronological feshion, with general statements followed by highlights of each year's contributions. The years 1972 and 1973 produced the most publications, and by 1976 there was a noticeable lag in pickup of publications by the indexing services. A trend is apparent from a reconnaissance and description approach in earlier pears toward are integrated ecosystem approach in more recent publications. Increased consciousness of the effects of disturbance on the permafrost environment, and the importance of restoration and preservation of these environments, are reflected in the recent literature, particularly in symposium proceedings.

SR 78-20 EFFECTS OF WASTEWATER AND SEWAGE SLUDGE ON THE GROWTH AND CHEMICAL

COMPOSITION OF TURFGRASS.
Palazzo, A.J., Nov. 1978, 11p., ADA-061 878, 17 refs.

WASTE DISPOSAL, SEWAGE DISPOSAL, GRASSES, GROWTH, CHEMICAL COMPOSI-

TION.

A greenhouse study was conducted to determine the effects of wastewater and sewage applications on the growth and chemical composition of two turfgrass mixtures. A mixture of tall fescue and annual ryegrass was compared to a mixture of Kentucky bluegrass, red fescue and annual ryegrass. The mixtures were grown in pots of Charlton silt loam in a greenhouse Prior to seeding, soil in some pots was amended with sludge at rates of 45 or 90 g/pot. Commercial fertilizer supplying N. P. and K was incorporated with soil in pots designated as controls. Treated municipal wastewater was applied on unamended and sludge-amended soil at rates of 5 or 10 cm per week. Wastewater and sludge treatment increased yields, and total uptake of N. P. K. Zn. Cd. P. Cu. and Ni by the turfgrasses differed by treatment The two grass mixtures were similar with regard to yields and composition. Larger yields corresponded to greater plant uptake of N. P. K. and metals. SR 78-21

SR 78-21 CLIMATIC SURVEY AT CRREL IN ASSOCIA-TION WITH THE LAND TREATMENT PRO-JECT.

Bilello, M. A., et al., Nov. 1978, 37p., ADA-062 518, 39 tels

Bates, R.E.

MICROCLIMATOLOGY, WASTE DISPOSAL, WATER TREATMENT, WASTE TREATMENT, METEOROLOGICAL DATA.

During 1972, six test cells were constructed at CRRFL for the purpose of studying application of wastewater on various soil types and vegetation. In computeron with this program, a meteroelogical observing station was established in order to obtain basic information on the climate proximate to the test cells. This report describes the equipment and its installation, and provides a duly tabulation equipment and its installation, and provides a duly tabulation of the following observed parameters maximum and minimum air temperatures, relative humidity, dew point, wind speed and direction, precipitation amounts, depth of snow on the ground, solar radiation and pan evaporation. The meteorological data collected during the period starting Oct. 1, 1922, to Mar. 31, 1974, were then summarized, and the results are presented in a series of graphs and line diagrams. The meteorological parameters recorded at CRRF1 were then examined to determine how weather can constrain or

help year-round operation of wastewater application to the land. The positive and negative effects of air temperature, precipitation, wind speed, evaporation and snow cover, with respect to land treatment of wastewater, were evaluated. Although no specific recommendations or conclusions are given, the influences of these climatic elements as observed at the CRREL wastewater site are presented for consideration.

COMPUTER FILE FOR EXISTING LAND AP-PLICATION OF WASTEWATER SYSTEMS: A USER'S GUIDE.

Iskandar, I.K., et al. Nov. 1978, 24p., ADA-062 658.

Robinson, D., Willcockson, W., Keefauver, E. 33-2521

WASTE DISPOSAL, WATER TREATMENT, COMPUTER PROGRAMS.

COMPUTER PROGRAMS.

Two computer programs, both written in BASIC, have been developed to store and retrieve information on enisting wantewater land treatment systems. The purpose of establishing these programs is to provide assistance to design engineers during the planning of new land treatment systems by making available the design criteria and performance characteristics of operating systems. The SFARCH program is designed to locate systems with specific design parameters, such as flow rate, waste type, application rate and mode, ground cover and length of operation. The printout from SEARCH includes a list of articles on similar systems in addition to the design parameters. The UPDATE program is used for the revision of information on file. Currently, there are about 350 domestic and 75 foreign systems on file.

SR 78-21 ENGINEERING ASPECTS OF AN EXPERIMEN-TAL SYSTEM FOR LAND RENOVATION OF SECONDARY EFFLUENT.

Nylund, J.R., et al, Nov. 1978, 26p., ADA-062 923. Larson, R.E., Clapp, C.E., Linden, D.R., Larson, W.E. 33-2522

WASTE DISPOSAL, WATER TREATMENT, WASTE TREATMENT, IRRIGATION, LAND RECLAMATION.

RECLAMATION.

A research system was designed and installed at the Apple Valley Wastewater Treatment Plant, two miles south of Rosemount, Minnesota, to develop agricultural management practices for removal of nitrogen from municipal wastewater effluent. A soil set strigation system was designed and installed to apply wastewater effluent to 12 test blecks, each measuring 60 x 150 ft. A perforated plastic drainage tile was placed lengthwise in each block at a depth oquivalent to the normal water table level and opening at one end of the block into a sampling station. Six blocks were planted to corn and six planted to eight species of forages. The effluent was applied at rates up to 15 ft/yr. This report presents the engineering considerations in the design of a solid act irrigation system and drain the and monitoring system for evaluating the influence of the effluent application and agronomic practices on drainage waters.

SR 78-24

ROOF CONSTRUCTION UNDER WINTER-TIME CONDITIONS: A CASE STUDY. Bennett, F.L., Nov. 1978, 34p., ADA-062 519.

ROOFS, COLD WEATHER CONSTRUCTION, INSULATION, CONSTRUCTION MATERIALS.

This report describes construction of the roof of an addition to the Interior City Branch of the First National Book of Anchorage, located in downtown Fairbanks, Alaska, during the 19⁵⁶⁻⁷² winter. The report documents the schoolie and procedure for building the roof, reports successful performance of the roof to date, and presents some general comments on roof construction in the wintertime.

INCREASING THE EFFECTIVENESS OF SOIL COMPACTION AT BELOW-FREEZING TEM-ERATURES.

Haas, W.M., et al, Nov. 1978, 58p., ADA-062 875, 57

Alkire, B.D., Kaderabek, T.J.

SOIL COMPACTION, FROZEN GROUND COM-PRESSION, COMPRESSIVE STRENGTH, SOIL WATER, CHEMICAL REACTIONS.

This report presents data from an experimental program undertaken to determine the effect of low temperatures on the compaction characteristics of a silty sand. The effects of compactive effort and chemical additives were also investiof compactive effort and chemical additives were also investigated to determine possible methods of improving the densities of soils placed and compacted at low temperatures. A single soil type was used throughout the test program, and test results were obtained using Standard and Modified AASHO compactive efforts on an untreated soil prepared and tested at temperatures of 20C and 3C. Additional test series, using the same compactive efforts and temperatures, were performed on the soil after it had been treated with an additive. The amounts of additive used, based on the dity weight of soil, were 3, 2, 1, 0.5, and 0.25% of calcium chloride and 0.5% of soilumn chloride. From the results of the experimental programs, series important concentions concerning the effect of low temperature compaction were drawn. SR 78-26

FIVE-YEAR PERFORMANCE OF CRREL LAND TREATMENT TEST CELLS; WATER QUALITY PLANT YIELDS AND NUTRIENT UPTAKE. Jenkins, T.F., et al, Nov. 1978, 24p., ADA-086 172, 6 refs.

Palazzo, A.J., Schumacher, P.W., Keller, D.B., Gra-ham, J.M., Quarry, S.T., Hare, H.E., Bayer, J.J., Foley, E.S.

34-3449

LAND RECLAMATION, WASTE TREATMENT, WATER TREATMENT, WATER TREATMENT, WASTE DISPOSAL.

The performance of the six land treatment cells is summarized over a five-year period from June 1937 through May 1978. The data presented include quality and volume of wastewater applied and percolate resulting from application of primary and secondary wastewater by spray irrigation. Mass loadings and removals are presented as well as crop production and nutrient uptake. Nutrient bulance sheets are shown which demonstrate the percentage of nitrogen and phosphorus that is attributed to crop uptake and leachate over this period.

SR 78-27

CONSTRUCTION AND PERFORMANCE OF PLATINUM PROBES FOR MEASUREMENT OF REDOX POTENTIAL.

Blake, B.J., et al, Nov. 1978, 8p., ADA-062 426, 2 refs. Brockett, B.E., Iskandar, I.K. 33-1596

SOIL WATER, PROBES, MEASURING INSTRU-MENTS.

MEDILE.

A simple method is described for construction and testing of platinum oxidation-reduction probes in the laboratory. The probes are "blacked" with platinic chloride to increase their lifetime. Methods of standardization and problems encountered are discussed.

WASTEWATER STABILIZATION POND LIN-

Middlebrooks, E.J., et al, Nov. 1978, 116p., ADA-062 903, Refs. p.63-66. Perman, C.D., Dunn, I.S.

33-2524

WASTE DISPOSAL, WATER TREATMENT, STA-BILIZATION, PONDS, LININGS, SEALING,

SEEPAGE.

A review of the Interature on wastewater stabilization Iagoon linings, covering the work during the past 20 years, is presented. Design, operating and mointenance experiences are presented for soil scalants, natural scalants, bentonite clays, chemical treatments, gunide, concrete, asphaltic compounds, plastics and elastomers. The characteristics of various materials, applicability to different wastes, construction techniques and details of installation techniques are presented. Installation costs for various materials and comparative costs are summarized. A summary of reported accepage rates for various types of lining materials is presented. A sorvey of the 50 states was conducted to determine the requirements for liners and allowable scepage rates. Requirements are varied and depend upon the local and conditions and the experience of the requisitory agencies with various materials. The trend is toward more stringent requirements. Accepted denays and untallistion procedures are summarized, and detailed denaying of installation techniques are presented. Recommendations of the manufacturers and installers of liners are also presented.

SUMMARY OF CORPS OF ENGINEERS RE-SEARCH ON ROOF MOISTURE DETECTION AND THE THERMAL RESISTANCE OF WET INSULATION.

Tobiasson, W., et al, Dec. 1978, 6p., ADA-063 144, 12

Korbonen C.

33-2525 ROOFS, MOISTURE TRANSFER, DETECTION, INFRARED SPECTROSCOPY.

INFRARED SPECTROSCOPY.

Nuclear, infrared, capacitance, microwave and impulse radar methods for noedistructively detecting meeture in roofs were evaluated. No system was refulled enough by stock or by cross-checking with another system to eliminate the need for a few core samples of membrane and insulation with the send for a few core samples of membrane and insulation of verify findings. Authoric infrared surveys are a confedence way of reconnectering municious roofs at a major insulation.

However, follow-up on-the-oroof surveys are necessary. Of the several grid techniques examined, modern surveys were the most reliable. Hand-held infrared surveys are the most necessary each the-orio furthed studyed. Although necessary. On the severa paragramatical extracts, most in surepsy were the most reliable. Hand-held infrared survers are the most accurate on-the-roof method studend. Although an infrared camera costs significantly more than a market meter (\$27,000 vs.\$3,000), infrared surveys can be conducted more tapelly. Where numerous roofs are to be survered, affrared surveys appear to be the most con-effective method. In-sets measurements have been made of the thermal resultance of well and day portions of roofs. A laboratory appearance has been built to subject 12 in v. 12 in specimens of roof insulation to combined thermal and mostiture gradents. Thermal resultance and mostiture content we periodically determined, and characteristic curves are being developed for various roof insulations.

GROWTH RATES AND CHARACTERISTICS OF ICE ON THE OTTAUQUECHEE AND WINOOS-KI RIVERS OF VERMONT DURING WINTER 1977-78

Deck, D.S., Dec. 1978, 30p., ADA-063 874. 34-1107

RIVER ICE, ICE GROWTH, ICE COVER THICK-NESS, FRAZIL ICE.

lee thickness, growth rates and characteristics of river ice are tabulated for use with a planned physical hydraulic model of the Ottauquechee River in Quechee, Vermont, using real

INFRARED THERMOGRAPHY OF BUILDINGS
—A BIBLIOGRAPHY WITH ABSTRACTS.
Marshall, S.J., Feb. 1979, 67p., ADA-068 682.

33-3429

BIBLIOGRAPHIES. INFRARED RADIATION. BUILDINGS, HEAT LOSS, MOISTURE.

BUILDINGS, HEAT LOSS, MOISTURE.

This report contains annotated abstracts of over 100 reports (66 more than the 1977 edition) on the new, but rapidly expanding subject of infrared thermography of buildings. The references cover remote sensing airborne surveys of minuted large numbers of buildings, close-up ground surveys of minuted all buildings, and qualitative (speculative) and semi-quantitative (ground-truth) field surveys. The report presents exampled themographic energy audits, roof moisture surveys, building retroft surveys, solar panel anzlysis, window assessments, and other practical applications by povernment agencies and private sector survey teams. It lists research and development efforts to provide fundamental information to imprese quantification accuracy, evaluate equipment, and develop interpretation standards, along with examples of daily usage in contract specifications, public awareness programs, and product testing. testing.

SR 79-02

ANDSAT DATA COLLECTION PLATFORM AT DEVIL CANYON SITE, UPPER SUSITIVA BA-SIN, ALASKA—PERFORMANCE AND ANAL-SIS OF DATA

Haugen, R.K., et al, Feb. 1979, 17 refs., ADA-068 508, 7 sels

Tuinstra, R.L., Slaughter, C.W.

33-3649 DATA TRANSMISSION, REMOTE SENSING. LANDSAT.

In October 1974, a Landsat Data Collection Platform was installed near the prospective Devil Campon damsite on the Sustina River, south central Aliaska. The development of sensee interfaces and characteristics of transmitted data to season minimizes and characteristics of transmitté data for air and ground surface temperature, sundappeed and wind run, water equivalent season accommands, and battery voltage are discussed. Temperature data are analyzed statistically run, water equivalent saws accommented, and nettery vestage are discussed. Temperature data are analyzed statistically and compared with data from various-ling National Weather Service stations. Although some difficulties were excoun-tered in operation during the winter of 1974-75, it was demonstrated that the Landari data collection system could provide useful environmental data from a remote, subactic location in the winter on a near-resisting basis.

SR 79-03

COMMUNICATION IN THE WORK PLACE: AN **ECOLOGICAL PERSPECTIVE.** Ledbetter, C.B., Feb. 1979, 19p., ADA-066 322, 30

33-2977

COLD WEATHER CONSTRUCTION, DATA TRANSMISSION, HUMAN FACTORS, ENVI-RONMENTS.

Patterns of communication and social interaction within a work organization are significantly influenced by architecture. Nearly all work organizations are dependent upon information from both information, both informal and formal, between convenients. As a rule, the more open and informal the communication, the more productively and efficiently the organization operates. The architectural design concept of focal points is personally as a strategy for planning the work facility for improved informal communication. Examples of energy-efficient building design schemes for cold regions are presented. These prototype buildings combine design to improve d worker efficiency, with thermal efficiency. Patterns of comm mater and social microtism within a

SR 79-04

PRELIMINARY INVESTIGATIONS OF THE KI-NETICS OF NITROGEN TRANSFORMATION AND NITROSAMINE FORMATION IN LAND TREATMENT OF WASTEWATER.

Jacobson, S., et al, Mar. 1979, 59p., ADA-086 169, 94 refs

Alexander, M

WASTE DISPOSAL, WATER TREATMENT, SOIL CHEMISTRY, LABORATORY TECHNIQUES

CHEMISTRY, LARORATORY TECHNIQUES. In laboratory experiments, deminification of mirrate in materia for proceeded somily in an aisolous (pll 4.1), but the rate may fast in soils with pll values of 5.5 to 6.8. The rate may feeting of deminification was postured by the carbon source added, with gluone supporting the fastest rate. The rate was somewhat shoner with methanol and soil mechanical appreciable, shower with secondary efficients at the source appreciable, shower with secondary efficients at the source of supplemental carbon. Charlion loam supported the more

rapid denitrification with glucose as a carbon source, but the rate was higher in Windsor sandy loar: with sewage as the carbon source. Denitrification in these selfs did not occur at IC, and the rate increased with rising temperatures.

PHYSICAL AND THERMAL DISTURBANCE AND PROTECTION OF PERMAFROST. Brown, J., et al, Mar. 1979, 42p., ADA-069 405, Nu-

Grave, N.A.

33-3830

PERMAFROST PRESERVATION, THERMAL STRESSES, HUMAN FACTORS, PERMAFROST DISTRIBUTION, DAMAGE.

DISTRIBUTION, DAMAGE.
This report is based on a review paper presented at the Third International Conference on Per-afront held in July 1978 at Edmonton, Canada. It reviews the Steraure covering 1974-1978 and corers subjects related to natural and human induced disturbance of terram adderlate in papernatives. Subjects include investigations andertaken in computation with oil and gas papelines, terram mapping, intribude for estimating terrain sensitivity, methods of protecting terrain, and the thermal effects of off road transportation, oil applie, fire, removal of the surface soil layers, now conditions, mining and other constitution practices. Methods of protecting and restoring permittens in the USSR are presented in valuate form. An appendix seminanties results of modeling and microclimatic investigation, and the distribution and properties of subseq. land-beauty, and alpre permittent. subsea, land-bestd, and alpine permatent

SPRAY APPLICATION OF WASTEWATER EF-FLUENT IN WEST DOVER, VERMONT: AN INI-TIAL ASSESSMENT.

Cassell, E.A., et al, Apr. 1979, 38p., ADA-068 534, 26

leals, D.W., Boszoun, J.R.

33-3862

WASTE DISPOSAL, WATER TREATMENT, SOIL CHEMISTRY, WATER CHEMISTRY.

WATER DISPONAL, WATER CHEMISTRY.

Runoff from spray application of secondary wastewater efforms on a freested hillside in West Dorrer, Vermont, was monitored for a surveich gerold (11 July)? August 1977). Beth questity and quality of applied efforcit and side drainage were monetored. On-side groundwater and two adjuncts streams were sampled for mater quality. Drainage flows were relatively constant dreing the study, period in spous of Sphyl samble separts to the side. There is evidence that substitutial quartities of water may be leaving the specystic by maxing through the substrate fraginal layer. On a mass basis, 95% of the total integers, 95% of the attitute-integers, 95% of the attitute-integers, 95% of the originic natiogen, 95% of the total phosphorus, and 75% of the BODI were removed by apray application. Heavy precipies mass observed to finish most nativent forms, especially intrincentringers, from the spray size. Groundwater on the spray field contained lower concentrations than did the applied efforms, but higher concentrations than do the applied efforms, but higher concentrations than do the applied efforms, but higher concentrations than those found in total trainage. No hazardous mixtue levels were detected during the study period. However, there was some evidence of microact chierole concentrations in Elia Reads.

ENERGY REQUIREMENTS FOR SMALL FLOW WASTEWATER TREATMENT SYSTEMS. Middlebrooks, E.J., et al, Apr. 1979, \$2p., ADA-070

676, 16 refs. Middlebtooks, C.H.

WASTE DISPOSAL WASTE TREATMENT, PONDS, SEEPAGE, SEEPAGE, COST ANAL

This report summaries energy requerements for small wastewa-ter treatment systems (0.55 - 5 million gallous per day) applicable to military matalations. It compares tansons treatment combinations, and prevents the energy requirements for the most visible alternatives in talking form. It also receives general treatments of the most state of the tennici incriment shirem er y pennicunyet it consensit of nu-trenici incriment shirem er y pennicunyet it consensit of nutenier treatment systems in a formet making it convenient to calculate the energy requirements for many combinations of the components. In addition, it immunitures briefly energy estimates made by others. The report compares typical combinations of unit operations and processes used processes are produce a second quality efficients on the basis of corregions, and concludes that find application systems are the most energy-efficient uniterastic treatment systems and that their are capable of producing an equivalent or higher quality efficient than any other treatment systems.

DESIGN PROCEDURES FOR UNDERGROUND HEAT SINK SYSTEMS.

Stubstad, J.M., et al, Apr. 1979, 186p in var pagns. ADA-CAS 226, 65 refs

Quana, W.F., Grirenberg, M., Best, W.C., Rotros, 33.3427

UNDERGROUND FACILITIES, HEAT TRANS-FER, WASTE DISPOSAL, HEAT RECOVERY, HEAT SINKS This report presents criteria, engineering information and estimation procedures for the disposal of waste heat associated with the generation of power required to supply the needs of hardened defense underground installations. The major emphasis is placed on the temporary disposal of waste heat below ground while the installation is under attack and cannot rely upon aboveground disposal. A series of sample problems is included to illustrate the use of the estimation procedures presented in the report. All of the sample problems are based on the sizing of a heat sink system for an underground nuclear power plant. Under the design criteria which were assumed for the sample problems, it is shown that the combination ice/water type heat sink concepts provide the most cost effective solutions.

SR 79-09 ESTIMATED SNOW, ICE, AND RAIN LOAD PRIOR TO THE COLLAPSE OF THE HART-FORD CIVIC CENTER ARENA ROOF. Redfield, R., et al, Apr. 1979, 32p., ADA-069 323, 19

Tobiasson, W., Colbeck, S.C.

33-4673 ROOFS, LOADS (FORCES), SNOW LOADS, ICE LOADS, RAIN.

LOADS, RAIN.

The roof of the Hartford, Connecticut, Civic Center Arena collapsed under an unknown load of snow, ice and rain early in the morning on Jan. 18, 1978. Based on available meteorological and snow load measurements, estimates for the amount of load present at the time of failure are made using a number of techniques. In addition, previous maximum loads due to snow, ice or rain since the building was constructed are also estimated.

SR 79-10

RAPID DETECTION OF WATER SOURCES IN COLD REGIONS—A SELECTED BIBLIOGRA-PHY OF POTENTIAL TECHNIQUES. Smith, D.W., comp, May 1979, 75p., ADA-070 030. Smith, G.A., comp, Brown, J.M., comp, Schraeder, R.L., comp, Kosikowski, L., comp. 32.4405

BIBLIOGRAPHIES, GROUND WATER, WATER SUPPLY, DETECTION, ELECTRICAL RESIS-

TIVITY.

A review of current literature on existing techniques that could be utilized in the rapid location of water sources for field camp use in permafrost regions resulted in the selection of three non-ground contact methods of electrical resistivity and two radar methods as being the most effective techniques. The search included thousands of references, 77 of these were chosen to be included in the annotated bibliography. The interest level or pertinence of each entry to the study is indicated, and keywords are provided. The keyword index contains all keywords for all entries listed in alphabetical order.

SR 79-11

SEEKING LOW ICE ADHESION.

Sayward, J.M., Apr. 1979, 83p., ADA-071 040, 54 refs 33-4226

33-4220 ICE ADHESION, ADHESIVE STRENGTH, ICE PREVENTION, ICE SOLID INTERFACE, WETTABILITY, COHESION, POLYMERS, ICE REMOVAL, SURFACE PROPERTIES, SURFACE ENERGY.

ENERGY.

Icing impairs operation of helicopters and other aircraft, antennae, power and communication lines, shipping and superstructures, canal locks, etc. Prevention or easier removal of icing requires reduction of its add no strength. Literature study shows that adhesion results from secondary (van der Waais) forces yet exceeds normal cohesive strengths. It depends on free surface energy, low contact angle, good contact and wetting, cleanliness, and texture. Modes of adhesion testing are briefly discussed. Poor adhesion occurs with low energy surfaces or contaminants, e.g. hydrocarbons, fluorocarbons, wares, oils, etc., particularly when textured or porous. The resulting low contact angle, poor wetting and occlusion of air at the interface weaken the bond or provide stress loci which can initiate cracks and failure. Coefficient of expansion differences may help in release fie. Further ideas appear among the 100 abstracts presented. A survey of over 300 manufacturers produced over 100 replies. Half of them offered some 100 products deemed worth testing. These are listed with addresses and contacts. Besides simple resins and other release agents, they include composites which combine low surface energy and stronger materials as micromixture, interpenetrating-network, "plastic-alloy," or filler-matrix systems. About 15 to 20 products appear of special interest. Samples of liquid coating or supplier-prepared panels of many are available for the testing phase to follow.

SR 79-12 Icing impairs operation of helicopters and other aircraft.

SR 79.12

FREEZING PROBLEMS ASSOCIATED WITH SPRAY IRRIGATION OF WASTEWATER DUR-ING THE WINTER.

Bouzoun, J.R., May 1979, 12p, ADA-070 031, 5 refs.

WASTE TREATMENT, WATER TREATMENT, WASTE DISPOSAL, IRRIGATION, ICE PREVEN-TION.

During the winters of 1975-76, 1976-77 and 1977-78, biologically treated wastewater was applied to land in West Dover,

Vermont. The wastewater was applied using the spray irrigation method at ambient temperatures as low as OF. During the first winter, freezing was a major problem. Modified spray nozzles that were less susceptible to freezing were installed at both the low points and high points of the aboveground spray laterals. During the second and third winters, ice buildup along the spray laterals, particularly in the vicinity of the spray nozzles, caused serious damage to the pipes. Many man-hours were required to cut the ice repeatedly from the laterals. As an experiment to alleviate the problem, several 30- to 36-in risers were installed at an angle of approximately 30 degrees from the vertical on two of the spray laterals during the winter of 1977-78. They functioned well enough to warrant future installation on the entire system of spray laterals.

SR 79-13 PHOTOELASTIC INSTRUMENTATION— PRINCIPLES AND TECHNIQUES. Roberts, A., et al, May 1979, 153p., ADA-072 011, 83 refs. Hawkes, I.

MEASURING INSTRUMENTS, OPTICAL PROP-ERTIES, STRESSES, ELASTIC PROPERTIES, IN-DICATING INSTRUMENTS, PHOTOELASTICI-

TY.

This report contains a detailed review of the theory and design of photoelastic transducers for measuring loads, strains, stresses and pressures. The measurement of engineering parameters under the adverse conditions normally encountered in the mining and civil engineering industries presents great problems, particularly where such measurements are to be made over long periods of time Photoelastic transducers have distinct advantages over competing equipment in this respect in that the parameters to be measured are revealed as light interference fringes, and the measuring gage itself often need consist of nothing ore than simple steel and glass components Examples of such gages are given in the report. The majority of the work reported here was carried out by the staff and students of the Postgraduate School of Mining, Sheffield University.

SR 79-14

33-4424

ELECTROMAGNETIC GEOPHYSICAL SURVEY AT AN INTERIOR ALASKA PERMAPROST EX-POSURE.

Sellmann, P.V., et al, May 1979, 7p., ADA-071 065, 5 refs.

Delaney, A.J., Arcone, S.A. 33-4227

PERMAFROST PERMAFROST PHYSICS, PERMAFROST STRUCTURE, GROUND ICE, ICE WEDGES, SOIL STRENGTH, ELECTROMAGNETIC PROS-PECTING, GEOPHYSICAL SURVEYS, SEASON-AL FREEZE THAW.

AL FREEZE THAW.

Road construction activity near Fairbanks, Alaska, in the late fall of 1977, revealed a large exposure of Fairbanks silt containing numerous massive ice features. These exposures are typical of those found in this region. Thaw, during the summer of 1978, caused the upper ice-rich sections to retreat several meters. Geophysical techniques were utilized over these exposures to determine if restauce anomalies of ice wedge dimension could be detected. Magnetic induction measurements at three interioil spacings and low-frequency surface impedance measurements were made about 6 m from the edge of each exposure in April 1978 before thaw commenced. The results agree well with observations of the layering, but most individual anomalies are difficult to interpret because the lateral extent of the ice is unknown

IMPROVED DRAINAGE AND FROST ACTION CRITERIA FOR NEW JERSEY PAVEMENT DESIGN. PHASE 2 (DATA ANALYSIS). Berg, R.L., May 1979, 51p., ADA-071 041, 7 refs. 33-4228

FROST PENETRATION, SUBSURFACE DRAIN-AGE, MOISTURE, FREEZING INDEXES, PAVE-

MENTS.

Before constructing actual highway pavements with opengraded drainage layers, frost penetration depths and moisture
content profiles were measured beneath several pavements
in New Jersey. Air and surface freezing indexes were
measured at three locations during the 1975-1976 and 19761977 winters. All freezing indexes were considerably greater
during the 1976-1977 winter. The modified Berggere equation was used to compute the maximum frost depth at
30 test sites Measured maximum frost depths ranged
from 20.5 in to 52.0 in, while computed maximum values
ranged from 14.0 in to 61.0 in The mean difference
between observed and computed maximum frost penetration
depths was 3.8 in. Maximum frost penetration depths
were computed for hypothetical pavements with open-graded
drainage at four of the test sites It was concluded that
open-graded drainage layers would not significantly change
the frost penetration beneath highway pavements in New
Jersey It was recommended that test pavements be installed
to verify the computations

ROOF MOISTURE SURVEY—U.S. MILITARY

ACADEMY. Korhonen, C., et al, May 1979, 8 refs. Tobiasson, W.

33-4229

ROOFS, WALLS, LEAKAGE, INSULATION, MOISTURE, INFRARED EQUIPMENT, MEASURING INSTRUMENTS.

SURING INSTRUMENTS.

The - "d upper story walls of buildings 745E, 752, and the U.S Military Academy, West Point, New York, surveyed with a hand-held infrared camera to locates. Les of reported wall leaks. An electrical resistance probe was used to determine the relative level of moisture in wall components. Several 3-in-diam core samples of each roof were obtained to verify suspected moisture conditions and to examine the roof membrane in cross section. Wet areas on each roof were outlined with white spray paint. Wall leaks are believed to becaused by wind-driven rain entering the parapet walls in locations where the decorative glaze-coat has spalled off Recommendations for mainternance of these buildings are based on information derived from the infrared survey, electric resistance readings, core samples and visual examinations.

SR 79-17 SMALL-SCALE TESTING OF SOILS FOR FROST ACTION AND WATER MIGRATION. Sayward, J.M., May 1979, 17 p., ADA-071 989, 25 refs.

33-4435 SOIL TESTS, FROST ACTION, SOIL WATER MI-GRATION, FROST HEAVE, ICE NEEDLES.

GRATION, FROST HEAVE, ICE NEEDLES.

A method is described by which frost action (soil heaving and and needle ice) and the use of soil additives for its control can be studied. The apparatus and procedure are simple and convenient, requiring no extensive space or services and using only small quantities of materials. The procedure could be useful in developing a standard test for such purposes where small scale and convenience are requisite. Also described are two simple, small-scale accessory tests that likewise relate to permeability of soils. These evaporation and wetting tests might also have similar use, particularly in the study of water migration-inhibiting additives.

SR 79-18

EVALUATION OF NITRIFICATION INHIBITORS IN COLD REGIONS LAND TREATMENT OF WASTEWATER: PART 1. NITRAPYRIN. Elgawhary, S.M., et al, May 1979, 25p., ADA-071 077, 21 refs.

Iskandar, I.K., Blake, B.J.

33-4230

WASTE TREATMENT, WATER TREATMENT, SOIL MICROBIOLOGY, LAND RECLAMA-TION, ARCTIC REGIONS.

TION, ARCTIC REGIONS.

A senes of laboratory and field tests was conducted to investigate the possibility that nitrapyrin could be useful as a intrification inhibitor in land treatment of wastewater. Laboratory tests included soil incubation and soil column studies. Variables were soil type, temperature, nitrapyrin concentration and method of application to the soil. Experimental designs included two soils, three temperatures (10 and 20C) and three levels of inhibitors in a complete factorial. Forage grasses were present in all treatments, and wastewater containing NH4+ was utilized. Weekly application of wastewater was 5 cm. Soil solution at depth and leachate at 160 cm were collected and analyzed weekly for NH4N and NO3N. That data indicate that nitrapyrin was not effective in inhibiting intrification when applied to the soil surface in soil columns simulating land treatment slow infiltration. The ineffectiveness of the compound under a mode of application where it is mixed and sprayed with wastewater is thought to be due to its volatility, sorption by organic matter, low water solubility and its immobility in soils. Other chemicals such as carbon disulfide and thiocarbonates, which have different characteristics than the intrapyrin, showed promising results. the nitrapyrin, showed promising results Research is under way to obtain conclusive data

SR 79-19 DRAINAGE NETWORK ANALYSIS OF A SU-BARCTIC WATERSHED: CARIBOU-POKER CREEKS RESEARCH WATERSHED, INTERIOR ALASKA

Bredtnauer, S.R., et al. June 1979, 9p. ADA-073 595. 14 refs.

Hoch, D. 34-137

WATERSHEDS, DRAINAGE, SLOPE PRO-CESSES, PERMAFROST.

CESSES, PERMAFROST.

A Strahler stream order analysis and an exterior link length distribution analysis were made of the Caribou-Poker Creeks Research Watershed near Pairbanks, Alaska The drainage network map used for analysis was produced using a 1 2250 scale aerial photograph mosaic Low drainage densities characterize the basins Bifurcation ratios indicate that the overall drainage network is not dominated by strong geologic controls Statistical analysis indicates that bifurcating source links and tributary source links do not belong to the same length population, a characteristic shared by watersheds in other climatic regions of the world Additional analysis indicates that exterior links originating on permafrost

alopes tend to be shorter than those originating on non-permafrost, well-drained slopes.

SR 79-20

INFRARED THERMOGRAPHY OF BUILD-INGS: 1977 COAST GUARD SURVEY. Marshall, S.J., June 1979, 40p., ADA-073 596, 9 refs.

BUILDINGS, HEAT LOSS, INFRARED PHO-TOGRAPHY, WINDOWS.

An IRTB (infrared thermography of buildings) field survey, producing 631 thermograms, 127 photographs, and weather data, was conducted during a 14-day study of 10 Coast Guard stations in Maine, New Hampshire and Massachusetts. This report discusses how the survey was initiated and performed with emphasis on details for the benefit of the reader formed with emphasis on details for the benefit of the reader wishing to plan a survey. One hundred twenty selected thermograms and photographs in this report illustrate many types of heat loss and compare thermally ineffective doors and windows with units designated as standards for thermal effectiveness. Radiator heat leakage through walls, mottled moisture patterns on brick walls, infiltration patterns on glass, and poorly covered openings are illustrated. Thermograms of severe heat losses through glass doors, glass transoms, and glass wall panels are also included, and several solutions for individual heat loss problems, such as fiberglass garage doors and porcelain insulated panels, are suggested. Unanticipated survey problems, such as difficulties in obtaining photographs to compare with thermographically discovered artifacts and adjustments to survey techniques for inclement weather, are also discussed. weather, are also discussed.

ICEBERGS: AN OVERVIEW.

Kovacs, A., July 1979, 7p., ADA-078 692, 9 refs. 34-1597

ICEBERGS, CLASSIFICATIONS.

lecbergs are discussed and categorized according to their size, shape, composition and color A general overview of iceberg-producing areas in the Arctic and Antarctic is given, and their dnft and deterioration are discussed (Auth)

SR 79-22 **DETERMINATION OF FROST PENETRATION** BY SOIL RESISTIVITY MEASUREMENTS. Atkins, R.T., July 1979, 24p., ADA-071 990. 33-4436

MEASURING INSTRUMENTS, FROST PENE-TRATION, ELECTRICAL RESISTIVITY, FROZ-EN GROUND PHYSICS.

EN GROUND PHYSICS.

Two sensors that depend on changes in soil resistivity were tested. Tests were conducted under a parking area with an asphalt-concrete suil see where salt was periodically applied as part of snow removal operations. For comparison, data were obtained from a resistivity probe, a thermocouple probe and a thermistor probe.

Results indicated that measuring temperature to determine frost penetration can lead to large errors under some conditions, for instance when salt has been applied or when frost is coming out of the ground in spring. The resistivity probe performed reliably during the entire measurement program. It was concluded that resustivity probes have definite advantages which should be has oeen applied or when frost is coming out of the ground in spring. The resistivity probe performed reliably during the entire measurement program. It was concluded that resistivity probes have definite advantages which should be considered when future frost penetration measurement programs are designed.

SR 79-23

DOCUMENTATION OF SOIL CHARACTERISTICS AND CLIMATOLOGY DURING FIVE YEARS OF WASTEWATER APPLICATION TO CRREL TEST CELLS.

Iskandar, I.K., et al, July 1979, 82p., ADA-074 712, 14 refs.

Quarry, S.T., Bates, R E , Ingersoll, J 34-743

WASTE DISPOSAL, WATER TREATMENT, SOIL CHEMISTRY, CLIMATOLOGY, METEORO-LOGICAL DATA.

Section 1 deals with physical properties of the two soils used and the changes in soil chemical characteristics. The physical properties of the soil are those most important in controlling the rate of water movement in soils, such as saturated and unsaturated soil hydraulic conductivity, particle size distribution, bulk density, void ratio, available water and specific gravity. The chemical characteristics of the soil that are of potential importance in assessing the short and long-term effects of wastewater application on land include free iron oxides, organic carbon, organic nitrogen, pH, conductivity, cation exchange capacity, exchangeable cations, total and extractable phosphorus, and total and extractable heavy metals. Section 2 summarizes climatic conditions at the CRREL site in Hanover, New Hampshire, and the changes that occurred during the period 1974 to 1978. Climatic parameters include temperature, precipitation, wind speed, and soil temperature at depth. Section I deals with physical properties of the two soils

SR 79-24

DETERMINATION OF DISSOLVED NITRO-GEN AND OXYGEN IN WATER BY HEADS-PACE GAS CHROMATOGRAPHY.

Leggett, D.C., July 1979, Sp., ADA-074 411, 25 refs 34-744

LAKE WATER, WATER CHEMISTRY

In this study dissolved oxygen and nitrogen were determined by shaking 20 to 25 ml of water with an equal amount of helium in a 50-ml gas-tight s; ringe and injecting 2 ml of the equilibrated headgas into a gas chromatograph Oxy

gen and nitrogen were separated on a 5-A molecular sieve column at ambient temperature and detected with a hot column at ambient temperature and detected with a hot wire detector, using atmospheric air for calibration. Advantages of this method over previously reported methods are 1) oxygen and nitrogen are determined in a single analysis, 2) no specifically fabricated stripping apparatus is needed, and 3) analysis can be done in the field with completely portable, battery-operated equipment. The method appears to be accurate and reproducible, several lake O2 and N2 profiles were obtained using this technique.

SR 79-25

BULLET PENETRATION IN SNOW. Cole, D.M., et al, July 1979, 23p., ADA-074 412, 14 refs.

Farrell, D.R.

SNOW (CONSTRUCTION MATERIAL), PRO-JECTILE PENETRATION, PENETRATION PENETRATION TESTS.

TESTS.

Three types of ammunition, the M193, M80, and M43, were tested. Rounds were fried into snow targets of various thicknesses up to that thickness required to fully stop the projectiles with the three training the training the projectiles. The maximum penetrations for the three rounds tested were 0.70 m. 1 26 m and 1 06 m, respectively. Velocity loss as a function of target thickness was determined by measuring projectile velocity before and after impact of the projectile with the target. The velocity loss vs thickness data showed a sigmoid shape common to the three types of rounds. The impact and early saw angles of the M193 rounds were estimated. Scatter in the test data was attributed, in part, to random variations in the impact yaw angle. The penetration required for a 90 deg yaw was determined by the exit yaw measurements. This was shown to correspond to the inflection point on the velocity loss vs penetration curve. This point is potentially significant in the design of composite fortifications. Discussions deal with basic concepts and definitions, the occurrence and significance of projectile tumbling and the use of laboratory tests for small arms evaluation in show targets. The validity of the methodology used was established by testing M193 rounds in gelatin targets. These results compared favorably with similar test results in literature SR 79-26

SR 79-26 APPLICATION OF HEAT PIPES ON THE TRANS-ALASKA PIPELINE.

Heuer, C.E., July 1979, 27p., ADA-073 597, 26 refs

PIPELINES, HEAT PIPES, HEAT TRANSFER.

PIPELINES, HEAT PIPES, HEAT TRANSFER.

The application of heat pipes on the Trans-Alaska Pipeline is reviewed. The subjects addressed include the general functioning of a heat pipe, the specific heat pipe design used, the different situations where heat pipes were employed, the methods used to develop the heat pipe were employed, the methods used to monitor the operating heat pipes, and the performance of the heat pipes. The discussion is qualitative in nature. Quantitative information is largely omitted to allow coverage of a broad area and because it may be considered proprietary. Nevertheless, the information presented here should give a good appreciation of the quality and complexity of the heat pipe design. The information should also be useful in developing heat pipes for use in other cold regions applications.

EXTENDING THE USEFUL LIFE OF DYE-2 TO 1986, PART 1: PRELIMINARY FINDINGS AND RECOMMENDATIONS.

Tobiasson, W., et al, July 1979, 15p., ADA-074 733, 3 refs.

Korhonen, C, Redfield, R.

COLD WEATHER CONSTRUCTION. SHEETS, STEEL STRUCTURES, STRESSES.

SHEETS, STEEL STRUCTURES, STRESSES.

DEW Line Ice Cap Station DYE-2 appears to need major work within the next few years to extend its useful life to 1986. The structural steel frame is overstressed in a few areas, and the lower portion of the subsurface timber russ enclosure is in bad condition. Additional performance measurements are needed during 1979 to determine the rate of secondary stress in the structural steel frame and the rate of deterioration of the truss enclosure. With this information, a decision can be made whether to move the building sideways onto a new undistorted foundation or to stabilize it in-place by encapsulating the lower 52 ft of the substructure in ice.

UTILIZATION OF SEWAGE SLUDGE FOR TER-RAIN STABILIZATION IN COLD REGIONS.

Gaskin, D.A., et al, Aug. 1979, 36p, ADA-074 725. 10 refs For Part 1 see 32-1368

Palazzo, A.J., Rindge, S.D., Bates, R.E., Stanley, L E 34-746

SLUDGES, SEWAGE DISPOSAL, SOIL STABILI-ZATION, VEGETATION

From June 1975 to Sep 1976, a research/demonstration study was conducted at CRRLL in Hanover, New Hampshire, to investigate the use of sewage sludge, commercial fertilizer and cultivation techniques for terrain stabilization in cold regions. Twenty-seven test plots on a 16-deg west-facing slope received various combinations of 1) surface preparation village. (tilling, buildozer tracking, or compacting), 2) nutrient source (sewage sludge or fertilizer), 3) mulching agent (wood fiber

mulch or peat moss), and 4) tacking agent (Terra Tack III or Curasol) The plots were seeded in either the spring or fall with a constant seed mixture. The effectiveness of the treatments was determined through vegetation yields and soil loss measurements

MASS WATER BALANCE DURING SPRAY IR-RIGATION WITH WASTEWATER AT DEER CREEK LAKE LAND TREATMENT SITE. Abele, G., et al, Aug. 1979, 43p., ADA-080 649, 3 refs.

McKim, H.L., Brockett, B.E.

WATER TREATMENT, WASTE TREATMENT, WATER BALANCE, SEWAGE TREATMENT, IR-RIGATION.

RIGATION.

The water budget for a 36-ha test area was calculated during and two days after a 27-cm (equivalent to 991,000 l) application of wastewater. By computing the water remaining in the soil from soil sample water content data, calculating the amount lost to evapotranspiration and measuring the underdrain flow rate, it was possible to calculate the water budget to within 95% of the actual amount applied. The accuracy in computing the soil water content is critical in this case, a 1% variation of error in the volumetric water content is equivalent to nearly one third of the total water applied. water applied.

SR 79.30

TUNDRA LAKES AS A SOURCE OF FRESH WA-TER: KIPNUK, ALASKA.

Bredthauer, S.R., et al, Sep. 1979, 16p., ADA-075 475, 12 refs.

Doerflinger, D.F.

34-740

LAKE WATER, TUNDRA, SNOWMELT, WATER SUPPLY, ARCTIC REGIONS.

A study of water quality in several small tundra lakes near Kipnuk, Alaska, was conducted to determine if the lakes were of sufficiently high quality during the snowmelt season to provide the village with enough water for a year-round supply Since the village is located just 4 miles inland from the Bering Sea, primary emphasis was placed on locating water sources with low chloride concentrations. The tundra lakes were of sufficiently high quality to be pumped into a storage area during early summer to be used as a yearround supply.

SR 79-31

USE OF 15N TO STUDY NITROGEN TRANS-FORMATIONS IN LAND TREATMENT.

Jenkins, T.F., et al, Sep. 1979, 32p., ADA-077 583.

Quarry, S.T., Iskandar, I.K., Edwards, A.P., Hare,

WASTE DISPOSAL, WATER TREATMENT, IRRIGATION, SOIL CHEMISTRY.

RIGATION, SOIL CHEMISTRY.

The objective of this study was to compare different strategies of using 15N as a tracer to describe the fate of wastewater. It is not soil columns were packed with Windsor sandy loam soil and covered with forage grass. The columns were treated with 75 cm of either tapwater or wastewater according to four experimental strategies. The strategies varied the treatment given the soil prior to application of the 15N label, the schedule and amounts of the applied 15N label, and the type of water used for subsequent column leaching. Soil solution at denth and leacher were analyzed weekly for connectration. and amounts of the applied 15N issel, and the type of a water used for subsequent column leaching at depth and leachate were analyzed weekly for concentration and 15N content of nitrate and ammonium. Plant samples were obtained periodically throughout the experiment and together with soil samples collected at the end of the experiment, analyzed for total nitrogen content and 15N/14N catter. ratios

SR 79-32

BACTERIAL AEROSOLS FROM A FIELD SOURCE DURING MULTIPLE-SPRINKLER IR-RIGATION: DEER CREEK LAKE STATE PARK,

Bausum, H T, et al. Sep 1979, 64p., ADA-077 632, 18

Bates, R.E., McKim, H L., Schumscher, P W., Brockett, B E., Schaub, S.A.

WATER TREATMENT, WASTE DISPOSAL, IRRIGATION, AEROSOLS, MICROBIOLOGY

An evaluation of microbiological aerosols resulting from the spray irrigation of wastewater under known atmospheric stability conditions was performed during July and August 1978 at the Deer Creek Lake land treatment system in Ohio In the experiment, ponded chlorinated wastewater was sprayed In the experiment, ponded chlorinated wastewater was sprayed onto a 6-acre test area with 96 impact sprinklers representing a multi-votree field aerosol distribution system. Approximately 99.9% of the wastewater applied to the 23-hectare test area fell within the area of influence of the sprinkler (about a 20-m diam circle around the sprinkler river) with only 0.10% of the applied wastewater aerosolized. Indigenous total aerosols bacteria in the wastewater and resultant aerosols were sampled and analyzed. Fluorescent dye studies were also performed to characterize the aerosol cloud without the effects of biological decay. During all of the aerosol tests continuous on-site meteorological measurements were made and wastewater chemical parameters monitored. SR 79-33

TEST OF SNOW FORTIFICATIONS.

Farrell, D.R., Oct. 1979, 15p., ADA-078 742, 16 refs.

PENETRATION TESTS, MILITARY ENGINEER-ING, SNOW (CONSTRUCTION MATERIAL), FORTIFICATIONS, SMALL ARMS AMMUNI-

A field study was conducted to 1) more accurately define the degree of protection offered by simple snow fortification and 2) evaluate the effort required by infantry troops to build such fortifications when only basic tools are available. A seven-man infantry squad, equipped with standard issue snow shovels and an arctic sled (Akhio), constructed several snow shovels and an arctic sled (Aknio), constructed several simple snow structures. Construction was made more difficult by the imposition of a camouflage discipline requirement. When completed, three positions were subjected to M16A1 file fire while the infantry squad executed a simulated tactical assault. A fourth and much larger position was tested with simulated covering fire from a M2HB 50-caliber machine gun. None of the 556-mm bullets fired by the squad from ranges of 200 m to as close as 10 m managed to penetrate the 1.8-m-thick snow embankments. The 127-mm-diameter bullets fired from the M2HB at a range of 250 m were all stopped by 3.0 m of packed snow. The camouflage considerations and the shallow snow conditions increased the construction time for the three small emplacements by almost a factor of four, and for the larger emplacement by almost a factor of three. But the squad still handled a volume of packed snow that was equal to 37 times the volume of unfrozen soil conditions the advantages of using snow would be significantly greater. simple snow structures Construction was made more difwould be significantly greater.

SR 79-34

UTILIZATION OF SEWAGE SLUDGE FOR TER-RAIN STABILIZATION IN COLD REGIONS.

Rindge, S.D., et al, Oct 1979, 33p, ADA-077 585. Gaskin, D.A., Palazzo, A.J.

34-2365

WASTE DISPOSAL, SEWAGE DISPOSAL, SOIL STABILIZATION

STABILIZATION

The authors have conducted a two-year revegetation study to assess the ability of sewage studge applications with or without supplemental fertilizer to promote plant growth and stabilize sloping soils

The study site was a west-facing, 16 deg alope at CRREL in Hanover, New Hampshire Eight revegetation treatments and one control were replicated three times

Treatments involved applications of dewatered, anaerohically digested sewage sludge at two rates (20 or 40 times Treatments involved applications of dewatered, anaerobically digested sewage sludge at two rates (20 or 40 tons/acre) The sludge was applied alone or in combination with commercial fertilizers which supplied introgen, phosphorus and potassium, or all three nutrients. The seed mixture in the treatments contained four grasses and one legume. The effects of the various treatments were determined through soil loss yields, visual grass ratings and plant vields. vields.

SR 79-35

PROTOTYPE OVERLAND FLOW TEST DATA: JUNE 1977-MAY 1978.

Jenkins, T.F., et al, Nov. 1979, 91p., ADA-078 743, 9

34-1599

WASTE TREATMENT, WATER TREATMENT, IRRIGATION, SOIL CHEMISTRY, ION EXCHANGE, METEOROLOGICAL DATA.

A prototype overland flow land treatment system was operated at Hanover, New Hampshire, over a one-year cycle from June 1977 to May 1978

The individual data points collected over this period for water quantity and quality are presented, as well as plant yields and nutrient uptake. The soil chemical and physical parameters measured are also presented along with a table of initial site characteristics

The meteorological measurements obtained in support of this effort are included to complete the data base

SR 79-36

PROCEEDINGS OF A MEETING ON MODEL-ING OF SNOW COVER RUNOFF, 26-28 SEP-TEMBER 1978, HANOVER, NEW HAMPSHIRE. Colbeck, S.C., ed, Jan 1979, 432p, ADA-167 767, For individual papers see 34-1002 through 34-1040. Numerous refs.

Ray, M., cd. 34-1001

MEETINGS, SNOW COVER, RUNOFF, MOD-

SR 80-01

DISINFECTION OF WASTEWATER BY MI-CROWAVES.

Iskandar, I.K., et al, Jan 1980, 15p, ADA-082 174, 36

Parker, L.V., Madore, K., Gray, C., Kumai, M. 35-2592

WASTE TREATMENT, WATER TREATMENT, MICROWAVES, BACTERIA

Results from a laboratory study show that microwave energy can be used for disinfection of wavtewater. The time required for destruction of bacteria by microwaves was reduced over that of conventional heating. Destruction of wastewater over that of conventional heating

bacteria and a cell-suspension of of E Coli B was logarithmic after an initial lag phase, which was dependent upon the volume used Themophilis B stearothermophilis cells were used to try to determine if the mechanism of destruction was thereof.

SR 80-02

ICEBREAKING CONCEPTS.

Mellor, M., Jan. 1980, 18p., ADA-082 175, 4 refs.

ICE BREAKING, ICEBREAKERS, ICE COVER THICKNESS, PENETRATION, ICE CUTTING, ICE BLASTING, MARINE TRANSPORTATION, OFFSHORE STRUCTURES.

OFFSHORE STRUCTURES.

Icebreaking concepts that have potential application in the protection of offshore stuctures and drillships are reviewed. The concepts dealt with include conventional icebreaking by ships, icebreaking by air cushion vehicles, breaking against fixed structures, mechanical cutting with drag bit tools, blasting by high explosives, blasting with compressed gases or propellants, ice melting, thermal cutting, cutting with lasers, cutting with high pressure water jets, and unproven novel concepts. Special emphasis is given to the specific energy requirements for the various methods. for the various methods.

SR 80-03 DANISH DEEP DRILL; PROGRESS REPORT: FEBRUARY-MARCH 1979.

Rand, J.H., Jan. 1980, 37p., ADA-082 206.

DRILLING, ICE CORING DRILLS, ICE CORES,

DRILLING, ICE CORING DRILLS, ICE CORLO, GLACIOLOGY, DESIGN, PERFORMANCE, MAINTENANCE.

The "Danish Deep Drill" was developed at the University of Copenhagen The drill, which will be used to obtain ice cores from the Greenland Ice Sheet, was tested at the US Army Cold Regions Research and Engineering Laborator The drill is battery-operated and has a down-hole US Army Cold Regions Research and Engineering Laboratory. The drill is battery-operated and has a down-hole microprocessor-based control section and a delicately balanced chip removal system—It is a lightweight, electro-mechanical drill designed to obtain a 10,2-cm-diameter core in 2-m lengths—There are potential problems in chip recovery and storage, malfunctions of the computer or batteries, leaks in the pressure chamber, spin-out or rotation of the drill, and the very close tolerances required by the drill design Tests are recommended that will help eliminate some of these potential problems and determine the drill's overall strengths and weaknesses—The drill is a very complex and delicate instrument that will require constant maintenance, modification and monitoring when in use modification and monitoring when in use

EVALUATION OF ICE DEFLECTORS ON THE USCG ICEBREAKER POLAR STAR. Vance, G.P., Jan. 1980, 37p, ADA-082 205.

ICEBREAKERS, PROPELLERS, ICE COVER THICKNESS, ICE NAVIGATION.

THICKNESS, ICE NAVIGATION.

Model tests were carried out in the CRREL Ice Engineering facility test basin on a 1-to-19 1 model of the USCG Polar Star (WAGB-10) to determine the effectiveness of several different devices that would eliminate or mitigate the ingestion of ice into the propeller slip stream Propeller RPM records and highspeed movies were obtained for each device in two thicknesses of ice and at two speeds Four devices were evaluated large bilge keels, small bilge keels, bossing fins and propeller cages (called bird cages) The most effective concept appeared to be the bilge keels. Open water power tests and structural analysis must now be carried out to determine the overall feasibility of these concepts

SR 80-05 COASTAL ENVIRONMENT, BATHYMETRY, AND PHYSICAL OCEANOGRAPHY ALONG THE BEAUFORT, CHUKCHI AND BERING

Gatto, L.W., Jan 1980, 357p., ADA-084 281, 56 refs. 34-3328

COASTAL TOPOGRAPHIC FEATURES, BATH-YMETRY, MARINE GEOLOGY, SHORELINE MODIFICATION, OCEANOGRAPHY. ENVI-RONMENTS.

The report compiles references, figures, and tables that are concerned with the coastal environment, bathymetry, and physical occanography along the Beaufort, Chukchi, and Bering Seas The text, intentionally minimized, describes the salient points with a minimum of detail. The extensive references and figures give direction to a reader seeking additional information

SR 80-06

POST OCCUPANCY EVALUATION OF A PLANNED COMMUNITY IN ARCTIC CANADA. Bechtel, R.B. et al, Feb. 1980, 27p., ADA-082 162, 4

refs. Ledbetter, C B.

35-2596 URBAN PLANNING, HOUSES, SITE SURVEYS, BUILDINGS, ECOLOGY

This report describes a post-occupancy evaluation of a small mining community in the high Arctic Providing superior housing, having wives work and integrating singles, limits (the indigenous people) and families successfully established a viable community. Lewer problems were encountered than is usual in other isolated cold regions communities.

The central focal point of the town, a large dome, was diluted by later construction of buildings housing separate recreational and social facilities.

Since the buildings are too costly to remove, the only method of restoring the focal point is to build connecting links at upper levels of the recreational buildings.

SOME ASPECTS OF SOVIET TRENCHING MA-CHINES

Mellor, M., Feb. 1980, 13p., ADA-082 176, 1 ref. 35-2597

TRENCHING, FROZEN GROUND, EARTH-WORK, EQUIPMENT, DESIGN.

WORK, EQUIPMENT, DESIGN.

Technical characteristics of Soviet trenching machines are assessed and compared with those of similar machines built in the United States and Europe. The report deals with transverse rotation machines and belt machines, considering rotor speeds and belt speeds, tool speeds, power/weight ratios, power density, traverse speeds, and effective mean cutting pressures. The probable capabilities of Soviet machines for cutting frozen ground are assessed. It is concluded that, while general design characteristics are satisfactory, construction and product development are weak, and performance in frozen ground is not expected to be impressive

DOCUMENTATION FOR A TWO-LEVEL DY-NAMIC THERMODYNAMIC SEA ICE MODEL. Hibler, W.D., III, Feb. 1980, 35p., ADA-084 273, 9 refs.

34-3329

SEA ICE, ICE THERMAL PROPERTIES, THER-MODYNAMIC PROPERTIES, HEAT TRANS-FER, ICE MECHANICS, ICE COVER THICK-NESS, MATHEMATICAL MODELS, COMPUTER PROGRAMS, RHEOLOGY.

A discussion of the numerics and computer code for a two-level dynamic thermodynamic sea ice model is presented. For interested users a listing of the computer code and results from a 21-day test run are included as appendices. results from a 21-day test run are included as appendices, To a large degree this report is meant to serve as an extended appendix to an article by the author in the Journal of Physical Oceanography (see 34-741) describing his model and a variety of simulation results. The model consists of a two-level ice thickness distribution coupled to the ice dynamics by a plastic rheology. In addition to the ice interaction, the momentum balance includes nonlinear wind interaction, the momentum balance includes nonlinear wind and water drag terms, Corolis force, and inertial and momentum advection terms. The numerical scheme is formulated in an energy-conserving manner in a fixed Eulerian gnd which allows simulation over unlimited time intervals. The momentum balance (including inertial terms) is numerically treated in a semi-implicit manner so that time steps of up to one day in length may be used if desired. The boundaries, grid size and time step magnitude are easily modified so that the model should have application to a variety of climate and forecasting problems

SR 80-09

THICKNESS-TENSILE STRESS RELA-TIONSHIP FOR LOAD-BEARING ICE Johnson, PR, Feb. 1980, 11p., ADA-084 274, 3 refs. 34-3330

ICE COVER STRENGTH, ICE LOADS, ICE CROSSINGS, ICE ROADS, TENSILE PROPERTIES, STRESSES, ICE COVER THICKNESS

The "bearing capacity" of a floating ice sheet is of considerable interest. The pattern of ice thickness vs tensile stress for a fixed load and fixed ice properties was examined and showed some constant relationships. It proved possible to completely describe the ice thickness-tensile stress pattern in terms of a single number.

When the load was changed by the constant the geometry the geometry. to completely describe the ice thickness-tensine sites patient in terms of a single number. When the load was changed by increasing the payload but not altering the geometry of the load pattern, other relationships were found that described the lensile stress in the ice sheet for any combination of payload and ice thickness. This provides a simple method of finding tensile stress in the ice that can be used in the field. Further studies are planned.

SR 80-10

OPERATION OF THE CRREL PROTOTYPE AIR TRANSPORTABLE SHELTER.
Flanders, S.N., Feb. 1980, 73p., ADA-084 275.

PORTABLE SHELTERS, COLD WEATHER PER-FORMANCE, TRAPLANES, LOGISTICS TRANSPORTATION

This report describes the operation of the CRREL prototype This report describes the operation of the CRREL prototype air-transportable shelter which was designed specifically for use in cold regions. The operating instructions cover moving the shelter on its own wheels or skis, loading it onto a truck or milit, by transport aircraft, slinging it from a helicopter or preparing it is shipment as an ISO container. The report details how to such this shelter and expand it to about double its transport size. The report also covers operation of the utility systems, including the on-board alternator set, the primary and auxiliary heating systems, the water system, and various safety systems.

SR 80-11 SNOW FORTIFICATIONS AS PROTECTION AGAINST SHAPED CHARGE ANTITANK PRO-

Farrell, D.R., Mar. 1980, 19p, ADA-084 276.

34-3322 SNOW STRENGTH, FORTIFICATIONS, COLD WEATHER CONSTRUCTION, COLD WEATHER OPERATION, SNOW (CONSTRUCTION MATERIAL), EXPLOSION EFFECTS, IMPACT TESTS, DETONATION WAVES, EMBANK-MENTS.

MENTS.

This report chronicles an investigation of the effectiveness of snow fortifications. The test was planned to observe and measure how packed snow absorbs the energy of high explosive antitiank (HEAT) ammunition. In the test plan both the possibility of non-detonation due to insufficient resistance in snow and the rate of deterioration of a snow embankment with repeated impacts were considered. The 90-mm M67 recoilless rifle was used because it has a relatively low velecity, and its charge was more likely to not detonate that snow can be used to good advantage for building expedient fortifications, particularly in situations where large volumes of snow have to be cleared from roads and airfields

DRILLING AND CORING OF FROZEN GROUND IN NORTHERN ALASKA, SPRING

Lawson, D.E., et al, Mar. 1980, 14p., ADA-084 277. 6 refs.

Brockett, B.E.

34-3333 DRILLING, PERMAFROST STRUCTURE, STRA-TIGRAPHY, GROUND ICE, PERMAFROST SAMPLERS, CORE SAMPLERS, EQUIPMENT

SAMPLERS, CORE SAMPLERS, EQUIPMENT Frozen samples of perennially frozen ground were obtained from 33 holes drilled at six locations in the National Petroleum Reserve, Alaska, in the spring of 1979 Total depth of drilling was 510 m (1670 ft), of which 178 m (584 ft) was cored. The objectives of the program were to define the location and extent of segregated and massive tee at each location and to determine the origins and ages of the ground tee through studies of the hole stratigraphy and fixers between the control of the stratigraphy and future laboratory analyses of core samples

SR 80-13

EXTENDING THE USEFUL LIFE OF DYE-2 TO 1986. PART 2: 1979 FINDINGS AND FINAL RECOMMENDATIONS.

Tobiasson, W, et al, Apr. 1980, 37p., ADA-084 278,

Tilton, P.

RADAR, STATIONS, SNOW ACCUMULATION, ICE FORMATION, SNOW STRENGTH, LOADS (FORCES), STEEL STRUCTURES, STRESSES, COST ANALYSIS.

COST ANALYSIS.

A major construction effort is needed at Dew Line Ice Cap Station DYE-2 to extend its useful life to 1986. That work should be done as soon as possible because the trius enclosure is deteriorating rapidly. Although a 210-ft sideways move as was accomplished at DYE-3 in 1977 is technically feasible, the alternative of backfilling the truss enclosure with ice is expected to cost about \$2.7 million less. Unless there is a strong possibility that DYE-2 will be needed for many years beyond 1986, the ice backfill alternative is recommended.

CRREL ROOF MOISTURE SURVEY, PEASE AFB BUILDINGS 35, 63, 93, 112, 113, 120 AND

Korhonen, C., et al, Mar. 1980, 31p., ADA-084 279. 3 refs.

34.3335

ROOFS, MOISTURE TRANSFER, DETECTION, INFRARED SPECTROSCOPY, THERMAL INSU-LATION, MEASURING INSTRUMENTS

LATION, MEASURING INSTRUMENTS
We surveyed the roofs of seven buildings at Pease AFB
with a hand-held infrared scanner to detect wet insulation.
We used white spray paint to outline the wet areas and
took core samples of the built-up membrane and insulation
to verify our findings. Flashing defects around penetrations
and bordering walls appear to be the major cause of the
wet insulation found on these roofs. Since most problem
areas are localized, we directed expansive most problem
toward salvaging as much of each roof as is economically
possible.

SR 80-15

REGIONAL DISTRIBUTION AND CHARAC-TERISTICS OF BOTTOM SEDIMENTS IN ARC-TIC COASTAL WATERS OF ALASKA.

Sellmann, P.V., Apr. 1980, 50p., ADA-084 922, Refs.

35-2598
SUBSEA PERMAFROST, PERMAFROST DISTRIBUTION, BOTTOM SEDIMENT, MARINE GEOLOGY, SEDIMENT TRANSPORT, PERMAFROST DEPTH, ICE SCORING, OFFSHORE STRUCTURES, ARTIFICIAL ISLANDS, CONSTRUCTION MATERIALS, OFFSHORE DRILLING

This report includes a discussion of some of the properties This report includes a discussion of some of the properties and characteristics of offshore manne sediments found in the U.S. Beaufort Sea that could influence aspects of offshore development. A collection of references is also included in an appendix Pernansily and seasonally frozen sediments are extremely common, with variable distribution and properties. The depth to the top of icebonded permafrost can be as little as 7 m below the seabed many kilometers from the sea coast. The subsea permafrost can contain visible ground ice is similar to that observed on land, and can be anticipated to cause problems at least as great as those experienced on land.

SR 80-16

NITROGEN TRANSFORMATIONS IN A SIMULATED OVERLAND FLOW WASTEWATER TREATMENT SYSTEM.

Chen, R.L., et al, Apr 1980, 33p., ADA-084 280, 36

Patrick, W.H, Jr. 34-3365

WASTE TREATMENT, WATER TREATMENT, NUTRIENT CYCLE, SOIL CHEMISTRY.

NUTRIENT CYCLE, SOIL CHEMISTRY.

Treating wastewater in properly designed and operated overland flow systems results in significant amounts of N being removed through nitrification-denitrification reactions. Application of wastewater containing NH4-N in a simulated overland flow model led to the disappearance of ammonium and the formation of nitrate in oxidized surface soil. The N balance in the simulated overland flow system was estimated by using labeled 15 N. The amount of N removed in the system depends upon dentitrification rates of this study indicated that N adsorption on the soil complex and uptake of applied ammonium by vegetation accounted for the N removed in the overland flow systems. The adsorbed ammonium on the acrated surface soil mass was attiffied and converted to oxidized forms of N. The intrate thus formed diffused downward to the reduced zone during subsequent wastewater applications. Some of this nitrate thus formed diffused downward to the reduced zone during subsequent wastewater applications. Some of this nitrate then denitrified and converted to gaseous form of N or was assimilated and reduced by plant life. Results of the overland flow studies indicated that approximately 55-68% of wastewater NH4-N added to the simulated overland flow system was unaccounted for in controlled laboratory environments. This NH4-N was presumably returned to the atmosphere

INFLUENCE OF NOSE SHAPE AND L/D RATIO ON PROJECTILE PENETRATION IN FROZEN SOIL.

Richmond, P.W., Apr 1980, 21p., ADA-085 398, 10 refs.

FROZEN GROUND, PROJECTILE PENETRA-TION, SOLUTIONS, EXPERIMENTATION

TION. SOLUTIONS, EXPERIMENTATION
This report presents the results of a laboratory test program designed to determine the applicability of two analytical solutions to projectile penetrations in fiozen soils. The test program consisted of firing small caliber cylindrical projectiles into frozen soil targets. Four types of 7.9-min-diam projectiles were tested. Two with a hemispherical nose the other two flat-nosed, with both long flength/diameter + 4) and short (L/D=2) versions of each nose shape to determine the control of the versus impact velocity data are presented. Comparisons of the data indicate that a flat-nosed projectile is a less efficient penetrator than one of equal weight with a hemispherical nose. A small increase in resistance to penetration is observed for an increased I. D. ratio.

DEICING A SATELLITE COMMUNICATION ANTENNA.

Hanamoto, B., et al. Apr. 1980, 14p., ADA-085 397 Gagnon, J.J., Pratt, B.

ICE PREVENTION, ANTENNAS, SPACECRAFT, PROTECTIVE COATINGS. HEATING, THER-MAL EFFECTS, POLYMERS

Ice buildup on communication antenna dishes begins to cause signal reception problems when the thickness exceeds 0.64 cm (0.25 m.). CRREL's copolymer coating which reduces the adhesive force between ice and the coated surface, was tested on antenna dish panels to facilitate ice removal. A combination of the copolymer coating and heat proved to be an effective method of removing ice from the panel lee buildup on communication antenna dishes begins to

SR 80.19

WINTER ENVIRONMENTAL DATA SURVEY OF THE DRAINAGE BASIN OF THE UPPER

SUSITNA RIVER, ALASKA.
Bilello, M.A., Apr 1980, 30p, ADA-086 931, 6 refs.

CLIMATE ICE COVER, SNOW COVER, METEOROLOGICAL DATA, WINTER, UNITED STATES—ALASKA—SUSITNA RIVER.

Basic data on the winter climate and measurements on all available snow and ice cover conditions were compiled for an area in and around the upper Sustina River basin of Alaska The 10 years of tabulated data (from Sep 1964 to May 1974) for 16 locations include average monthly values of air temperature, precipitation amounts (including total snowfall) and maximum depth of snow on the ground. Ice thickness measurements and other related winter surface conditions on rivers in the basin are included in the report Detailed observations on physical properties of the snow cover and the rate at which soil thaws in the spring are also provided for selected stations near the area under study

SR 80-20

SEDIMENT DISPLACEMENT IN THE OT-TAUQUECHEE RIVER—1975-1978. Martinson, C.R., May 1980, 14p., ADA-089 787, 3

35-974

SEDIMENT TRANSPORT, BOTTOM SEDI-MENT, ICE SCORING, ICE EROSION, BANKS (WATERWAYS), RIVER ICE, HYDROLOGY.

(WAIEKWAYS), RIVER ICE, HYDROLOGY.

A three-year study of sediment displacement was conducted on a short section of the Ottauquechee River in Vermont that has erosional problems caused by ice. The results of cross-sectional surveys showed large quantities of the bank eroded and deposition in the bed within the study area. The erosion appears to have been caused by 1) the ice seouring the banks and 2) ice plugging the channel and diverting the flow toward the banks.

SR 80.21

CONSTRUCTION OF AN EMBANKMENT

WITH FROZEN SOIL.
Botz, J.J., et al, May 1980, 105p., ADA-086 877, 44

Haas, W.M.

34-3873 EMBANKMENTS, FROZEN GROUND STRENGTH, COLD WEATHER CONSTRUCTION, SOIL COMPACTION, SETTLEMENT (STRUCTURAL), FROST PENETRATION, EARTHWORK, ENGINEERING, EXCAVATION, STABILITY, SOIL PHYSICS, SOIL TEMPERATURE, TESTS.

This paper presents the construction procedure, data and analysis from an experimental field program to determine the rippability and compaction characteristics of frozen soil Also investigated was the stability upon thawing of the frozen soil compacted in the field From the results of Also investigated was the stability upon thawing of the forcers only compacted in the field from the results of the experimental program, several important conclusions concerning winter earthwork were obtained 1) Ripping frozen soil can be accomplished with heavy equipment which will produce a large range of chunk sizes of field compaction of frozen material is highly dependent on the moisture content of the soils 3) The magnitude of settlement in embankments constructed of frozen material is closely existed to the compacted dividently of the placed. is closely related to the compacted dry density of the placed

ESTIMATING COSTS OF ICE DAMAGE TO PRI-VATE SHORELINE STRUCTURES ON GREAT LAKES CONNECTING CHANNELS.

Carcy, K L, May 1980, 33p., ADA-089 781. 35-2599

STRUCTURES, DAMAGE, ICE LOADS, IMPACT STRENGTH, ICE PRESSURE, ICE NAVIGA-TION, COST ANALYSIS.

TION, COST ANALYSIS.

The possible extension of the navigation season through the entire winter or a portion thereof has been under consideration for the Great Lakes and the St Lawrence Seaway for a number of years. To balance the benefits and costs of such an extension it is necessary to determine the damage costs to shore structures that might result from ice loosened by ship passage. This paper is concerned with the interconnecting channels of the Lakes where there is estimated to be \$18,000,000 (1976 dollars) worth of small, private, vulnerable, shore structures. ble shore structures

SR 80-23

RADIO-ECHO SOUNDING IN THE ALLAN HILLS, ANTARCTICA, IN SUPPORT OF THE METEORITE FIELD PROGRAM.

Kovacs, A., May 1980, 9p. ADA-086 858, 3 refs

24-36/4
RADIO ECHO SOUNDINGS, GLACIER THICKNESS, GLACIER SURVEYS, ICE COVER THICKNESS, POLLUTION, ANTARCTICA ALLAN HILLS

Radio echo sounding measurements made on Ross Island and in the Allan Hills, Antarctica, indicate that radio echo sounding may offer the unique possibility of detecting a buried meteorite in glacial ice. The results also revealed

internal layering within the snow on Ross Island and in the snow filling an ice depression west of Allan Nunatak Radio-echo sounding also gave the depth to bedrock near the west side of Allan Nunatak. The greatest ice depth measured was 310 m

SR 80-24 1979 GREENLAND ICE SHEET PROGRAM. PHASE 1: CASING OPERATION. Rand, J.H., June 1980, 18p., ADA-089 699, 5 refs.

ICE DRILLS, THERMAL DRILLS, GLACIOLO-GY. LININGS. GREENLAND.

A modified CRREL thermal drill was use 1 at DYE-3 in Greenland to drill a 8 75-in-diameter hole 251 ft deep for Oreenland to drill a 8 /5-in-diameter hole 251 ft deep for the installation of a steel casing. This activity was accomplished by a drill team from CRREL in preparation for the Danish deep drill tests. Included in this report is a description of both the drilling and easing operation as well as a description of the equipment used.

ROOFS IN COLD REGIONS: MARSON'S STORE, CLAREMONT, NEW HAMPSHIRE. Tobiasson, W, et al, June 1980, 13p., ADA-089 788.

Korhonen, C.

ROOFS, BITUMENS, COLD WEATHER PER-FORMANCE.

FORMANCE.

A reinforced, single-ply PVC membrane was examined five years after being applied over a leaky, built-up, bituminous membrane. The bare PVC membrane was dirty, poorly drained and littered with broken glass, nails and such, yet no flaws were evident on leaks reported.

Fig. 12 Even at 0 Fig. 12 Fig.

WORKING GROUP ON ICE FORCES ON STRUCTURES

Carstens, T., ed, June 1980, 146p., ADA-089 674, Refs passim For individual articles see 35-508 Refs passim For individual articles see 35-508 through 35-511

35-307 ICE PRESSURE, ICE LOADS, HYDRAULIC STRUCTURES, DAMS, LOADS (FORCES), ICE SOLID INTERFACE, TEMPERATURE VARIA-TIONS, FLOATING ICE, ICE WEDGES, ICE SHEETS

DYNAMICS OF NH4 AND NO3 IN CROPPED SOILS IRRIGATED WITH WASTEWATER. Iskandar, I K, et al, June 1980, 20p, ADA-090 575,

Parker, L.V., McDade, C., Atkinson, J., Edwards, A.P.

WASTE DISPOSAL WATER TREATMENT, IR-RIGATION, SOIL CHEMISTRY, NUTRIENT CY-CLE, AGRICULTURE

CLE, AGRICULTURE

The objectives of this field study were 1) to obtain information on the dynamic behavior of wastewater NH4 and NO3 in soils, 2) to determine the relative abundance of NH4 and NO3 in soils receiving wastewater, and 3) to evaluate the seasonal effect on the fate of wastewater NH4 applied to soils in a slow infiltration system. The study was conducted using an on-going test plot which contained two soil types and was covered with forage grass. Samples were collected in June and October to study the seasonal effect on the dynamic of N. The concentrations of NH4 and NO3 in the soil reached a daily, quasi-steady state condition. The seasonal effect on the relative amounts of NH4 and NO3 was similar but there was always more NH4 than NO3. The concentrations of both NH4 and NO3 in soil profile were high at the surface and decreased with depth, consistent with the higher CEC, the slow movement of NH4 in soils, and the higher organic matter content in the surface. Both NH4 and NO3 concentrations were higher in the finer texture Charlton silt loam soil than in in the surface Both NH4 and NO3 concentrations were higher in the finer texture Charlton silt loam soil than in the coarser texture Windsor sandy loam soil

ICE ADHESION TESTS ON COATINGS SUB-JECTED TO RAIN EROSION. Minsk, L.D., July 1980, 14p. ADA-089 698.

ICE ADHESION, ICE PREVENTION, PROTECTIVE COATINGS, HELICOPTERS, TESTS

TIVE COATINGS, HELICOPTERS, TESTS
Screening tests to select keephobic constings displaying low
tee release forces, both before and after exposure to rain
erosion in a whirling arm simulator, were performed on
approximately 60 commercial materials. A unique linear
ball-slide shear test apparatus was designed to provide pure
shear forces. No coating survived the erosion test to
give an interfacial shear strength as low as 15 psi (103
kPa), an arbitrarily established goal
showed shear strengths between 30 and 45 psi (20° and
310 kPa) after rain crosson.

SR 80-29
POST OCCUPANCY EVALUATION OF A
REMOTE AUSTRALIAN COMMUNITY: SHAY GAP, AUSTRALIA.

Bechtel, R.B., et al, July 1980, 57p., ADA-089 675, 8

Ledbetter, C.B.

35-2600
URBAN PLANNING, HOUSES, BUILDINGS, SITE SURVEYS, ECOLOGY.

SITE SURVEYS, ECOLOGY.

A post occupancy evaluation (POE) was made of Shay Gap, an iron mining community in Westeria Australia More than 50 design hypotheses were tested with results favoring the original design. Selecting a townsite surrounded by hills was deemed successful by residents. Keeping automobiles out of the living areas increased the safety of children and made residents walk and socialize more. A centrally located building housing the shopping facilities, beauty parlor, bank, post office, and snack bar served as the foal point of the community. Bland, off-white interiors allowed residents to express themselves when decorating. Shay Gap was a successful design concept for communities designed for remote areas in either hot or cold regions.

SR 80-30

DYNAMIC TESTING OF FREE FIELD STRESS GAGES IN FROZEN SOIL.

Aitken, G.W., et al, July 1980, 26p., ADA-089 676, 6

Albert, D.G., Richmond, P.W. 35-2601

FROZEN GROUND MECHANICS, STRESSES, IMPACT TESTS, SHOCK WAVES, SOIL ME-CHANICS, WAVE PROPAGATION.

CHARICS, WAVE PROPAGATION.

This report describes an attempt to develop a procedure for dynamic calibration of free-field soil stress gages embedded in a soil sample. The method presented utilizes a dropative impact testing machine and a small, instrumented container of soil. The velocity history of a shock pulse applied to the soil sample is measured and the applied stress computed, this value is then compared with data obtained from stress gages embedded in the soil. The results showed that the procedure is adequate for unfrozen soil, but for frozen soil the accuracy in the measurement of compressional wave velocity needs to be increased to obtain useful results

REVIEW OF TECHNIQUES FOR MEASURING SOIL MOISTURE IN SITU.

McKim, H.L., et al, Aug. 1980, 17p., ADA-089 974, Refs. p.13-17.
Walsh, J.E., Arion, D.N.

SOIL WATER, ELECTROMAGNETIC PROPERTIES, TENSILE PROPERTIES, CLIMATIC FAC-

Recently there has been an increased interest in the in-situ measurement of soil moisture content in the areas of situ measurement of soil moisture content in the areas of hydrology, meteorology, agriculture and environmental studies. Current methods generally have limitations, depending upon the use of the data, that greatly influence acquisition and reliability of the soil moisture determination. This report discusses gravimetric nuclear, electromagnetic, tensiometric, and hygroscopic techniques and the advantages and disadvantages of using the techniques. Emphasis is placed on the tensiometric and electromagnetic techniques. These two measurements when coupled would supply information on the wetting and drying soil moisture characteristic curves and thereby provide a means of tracing moisture movement under field conditions in cold climates.

CHARACTERISTICS OF ICE IN WHITEFISH BAY AND ST. MARYS RIVER DURING JANUARY, FEBRUARY AND MARCH 1979.

Vance, G.P., Aug 1980, 27p., ADA-089 950, 12 refs.

ICE BREAKING, ICE COVER THICKNESS, ICE COVER STRENGTH, FLEXURAL STRENGTH, ICE DENSITY, METAL ICE FRICTION, METAL SNOW FRICTION, SNOW DENSITY, SNOW DEPTH, AIR TEMPERATURE

DEPTH, AIR TEMPERATURE
This report presents data on the full-scate trials of the U.S.
Coast Guard Icebreaker Ratimal Bay, which was tested in
plate use that saried in thickness from 10 to 33 in (25.4
to 15.24 cm). In January the average temperature was
-5C, and the use flexural strength was 13,363 lb.sq.ft (640
kPa). In March the average temperature was -2C and
the use flexural strength was 11,643 lb.sq.ft (560 kPa).
The specific weight (density) of the use was 0.894 g cu
cm. The specific weight of the snow was in the area
of 0.32 g cm. The coefficient of friction between the
use snow and steel plate (coated and uncoated) sarred from
a low of 0.02 in the dynamic case of use on the Inerta
160 coating to 0.47 for the static case of snow on a rusty
steel plate.

SR 80-33 NEW HAMPSHIRE FIELD STUDIES OF MEM-BRANE ENCAPSULATED SOIL LAYERS WITH ADDITIVES.

Eaton, R A., et al, Aug. 1980, 46p., 20 refs.

Berg, R.L 35-977

SOIL FREEZING, FROST PENETRATION, SOIL STABILIZATION, SOIL WATER, FROST RESIST-ANCE, PAVEMENTS, ADMIXTURES, LIMING, DESIGN

This report describes the construction, instrumentation, and performance of membrane encapsulated soil layer (MESL) pavement test sections at the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, from 1973 to 1978. Membrane encapsulated soil layer and Engineering Laboratory in Hanover, New Hampshire, from 1973 to 1978 Membrane encapsulated soil layer construction involves using a waterproof membrane to protect low grade soils from absorbing moisture, especially during the freezing process Most of these lower grade soils are frost-susceptible; in these soils water can be drawn to the freezing zone to form toe lenses, which in turn cause heaving of the surface. Lime, flyash, and sodium chloride were added to a silt material prior to encapsulation. These additives were incorporated to add strength to the silt, absorb excess moisture, and increase its load-supporting capabilities Results show that 1) the moisture content within the MESL sections remained relatively constant over the five years of testing, 2) a nonencapsulated lime-flyash-stabilized silt material heaved 8 8 times as much as the identical material which was encapsulated, 3) the lime-flyash-stabilized MESL, had twice the strength of the plain or salt-stabilized MESL, 4) the silt with the additives had less frost heave within the MESL than the untreated silt. In summary, MESL's can be constructed to perform well in cold regions, thereby replacing high quality aggregates which are being depleted.

DESIGN AND CONSTRUCTION OF FOUNDA-TIONS IN AREAS OF DEEP SEASONAL FROST AND PERMAPROST.

Linell, K A, et al, Aug 1980, 310p, ADA-090 324, Refs p 307-310.

Lobacz, E.F. 35-886

PILE STRUCTURES, FOUNDATIONS, PERMA-FROST PRESERVATION, FROZEN GROUND MECHANICS, COLD WEATHER CONSTRUC-TION, FROST PENETRATION, FROST ACTION, FROST HEAVE. ENGINEERING, SOIL ME CHANICS, DESIGN.

This report presents engineering guidance for the design and construction of foundations in areas of deep seasonal frost and permafrost as developed up to the early 1970's Attention is given to basic considerations affecting foundation design, site investigations, survey datum points, construction considerations, and monitoring performance the main text are 17 tables, 141 figures, and 213 selected references A bibliography presents 45 additional references

RESINS AND NON-PORTLAND CEMENTS FOR CONSTRUCTION IN THE COLD. Johnson, R., Sep. 1980, 19p., ADA-092 952, 6 refs. 35-1725

CEMENTS, COLD WEATHER CONSTRUCTION. CONSTRUCTION MATERIALS. POLYMERS.

A laboratory investigation was conducted to assess the potential A laboratory investigation was conducted to assess the potential of some reviews and non-portland cements for structural concrete at low temperatures. The resins investigated were urethane (non-hydrophilic), epoxy and polyester, as well as a polysulfide polymer. Two non-portland (modified) cements were also tested. The curability of the resins, when mixed with fine aggregate, showed that they had potential for low temperature use in the following decreasing order urethane, polyester, and epoxy. Of the non-portland cement materials, mixed as individual near sturies one showed potential for low temperature use at -10 C (using 3.9 C water).

INFILTRATION CHARACTERISTICS OF SOILS AT APPLE VALLEY, MINN.; CLARENCE CANNON DAM, MO; AND DEER CREEK LAKE,

OHIO, LAND TREATMENT SITES.
Abele, G, et al. Oct. 1980, 41p., ADA 093 350, 5 refs.
McKim, H L., Brockett, B E, Ingersoll, J. 35-1726

SOIL WATER MIGRATION, PERMEABILITY, SOIL MECHANICS, SEEPAGE, WASTE TREAT-MENT, DENSITY (MASS VOLUME), GRAVITY, TESTS

Large-scale, 3- to 6-m diameter infiltration tests provide sarge-scare, 3- to 6-m drameter infilitation tests provide realistic data for determining soil infiltration rates. Tensometers can be used to monitor the relative degree of saturation during the test. At Apply Valley, Minnesota, the saturated infiltration rate is inoderately rapid, at Clarence Cannon Dam, Missouri, the rates range from moderate to slow, and at Deer Creek Lake, Ohio, from moderately slow to slow.

EFFECTS OF A TUNDRA FIRE ON SOILS AND PLANT COMMUNITIES ALONG A HILLSLOPE IN THE SEWARD PENINSULA, ALASKA. Racine, C, Nov. 1980, 21p., ADA-094 6607, 21 refs.

35-2602

TUNDRA, FIRES, DAMAGE, SOILS, PLANTS (BOTANY), VEGETATION, SLOPES.

(BUTANY), VEGETATION, SLOPES.

During summer 1977, wildfires burned extensive areas of low arctic tundra in the Seward Peninsula, Alaska. The present study was initiated in July 1978 to determine the effects of these fires on tundra soils and vegetation Nine 10- x 1-m permanent transects were established at regular intervals along the topographic gradient of a burned hillslope in the central Seward Peninsula near Imuruk Lake Soil characteristics and plant species density and cover were determined in each of the 90 1- x 1-m plots on this slope during July of both 1978 and 1979

SR 80.38

THERMAL DIFFUSIVITY OF FROZEN SOIL. Haynes, F D, et al, Dec 1980, 30p., ADA-094 605, 10

Carbee, D.L., VanPelt, D.J.

35-2603

35-2603
FROZEN GROUND PHYSICS, THERMAL DIF-FUSION, THERMAL CONDUCTIVITY, SPECIF-IC HEAT, HEAT TRANSFER, TEMPERATURE EFFECTS, DENSITY (MASS/VOLUME), SOIL WATER, PERMAFROST PHYSICS.

WAIER, PERMAFROST PHYSICS.

Knowledge of the thermal diffusivity of frozen soils is necessary for transient heat transfer analysis. The specific heat, thermal conductivity and density for a sand, a silt and a clay were obtained experimentally and used to calculate their thermal diffusivity. These properties were measured over a range of temperatures from .50 C to +45 C and for moisture contents from dry to saturated. The use of a differential scanning calorimeter for obtaining specific heat values was proven to be a reliable technique.

STRUCTURAL EVALUATION OF POROUS PAVEMENT TEST SECTIONS AT WALDEN POND STATE RESERVATION, CONCORD, MASSACHUSETTS.

Eaton, R.A., et al, Dec. 1980, 43p. ADA-094 606, 5

Marzbanian, P.C.

BITUMINOUS CONCRETES, PAVEMENTS, POROUS MATERIALS, BEARING STRENGTH, CONCRETE STRENGTH, STRUCTURAL ANALYSIS, COLD WEATHER PERFORMANCE, LOADS (FORCES), DEFORMATION, TESTS

LOADS (FORCES), DEFORMATION, TESTS
This report presents the results of repeated load tests upon various porous pavement test sections constructed in an overflow parking lot at Walden Pond State Reservation in Concord. Massachusetts From the fall of 1977 to the spring of 1979, the veasonal structural responses of the sections were monitored with a repeated plate bearing apparatus where the first set of fall and spring tests, some sections were reconstructed because the asphalt concrete pavement was not porous enough. Test points were added or replaced to accommodate the reconstructed sections. Results show that the dense asphalt concrete distributed the load over a greater area than the porous asphalt concrete, thicker pavements were stronger for both dense and porous asphalt concrete, and the deflection basin depth and diameter changed proportionately to applied loads. proportionately to applied loads

SR 80-40

BUILDING UNDER COLD CLIMATES AND ON PERMAFROST; COLLECTION OF PAPERS FROM A U.S. SOVIET JOINT SEMINAR, LENINGRAD, USSR.

U.S.-Soviet Joint Seminar on Building under Cold Climates and on Permafrost, Leningrad, June 24-29, 1979, Dec 1980, 365p. ADA-097 516, Refs passim For individual papers see 35-1966 through 35-1986 U.S. Department of Housing and Urban Development. Army Corps of Engineers. 35-1965

COLD WEATHER CONSTRUCTION, BUILD-INGS, PERMAFROST BENEATH STRUCTURES, CLIMATIC FACTORS. MEETINGS

SR 80-41 EMBANKMENT DAMS ON PERMAFROST IN THE USSE

Johnson, TC, et al, Dec. 1980, 59p. ADA-095 141. 24 refs

Sayles, F.H. 35-2005

DAMS, PERMAPROST, EMBANK-EARTH MENTS, THERMAL REGIME, USSR SIBERIA The report documents a study tout of the USSR to determine the current practices in analyzing the thermal regime of embankment dams on permafrost and in application of these practices in designing dams. The results of visits to earth and rockfill dams on permafrost in Siberia are summarized Discussions with the designers of the dams, and with a

onstruction manager and an operations manager, are recorded The leading Soviet engineers and scientists specializing in analysis of the thermal regime of embankment dams on permafrost were consulted, and the discussions are summarized. Experimental facilities of institutes concerned with this questions. tion also were inspected.

SR 81-01

OVERLAND FLOW: REMOVAL OF TOXIC VOLATILE ORGANICS

Jenkins, TF, et al, Feb. 1981, 16p., ADA-097 576, 34

Leggett, DC, Martel, C.J, Hare, HE

35-2581 WASTE TREATMENT, WATER TREATMENT, FLOODING, LAND RECLAMATION, WATER CHEMISTRY.

A small-scale overland flow system was studied to determine its effectiveness in reducing the levels of volatile trace organics in municipal wastewater. Chlorinated primary wastewater, water collected from the surface at various points downslope, water collected from the surface at various points downslope, and runoff were analyzed by gas chromatography/mass spectrometry using a purge and trap sampler. The results indicated that overland flow was effective in reducing the levels of these substances by 80-100% depending on the specific substance and the application rate. The removal mechanism was found to follow first order kinetius. The most likely mechanism to explain the observed behavior is volatifization. Comparison of the experimental results with theoretical prediction using published models resulted in reasonable agreement considering the complexity of the system compared to the model systems.

SR 81-02

METHOD FOR COINCIDENTALLY DETER-MINING SOIL HYDRAULIC CONDUCTIVITY AND MOISTURE RETENTION CHARACTERIS-

Ingersoll, J., Mar. 1981, 11p., ADA-099 136, 3 refs.

SOIL WATER, WATER RETENTION, PERMEA-BILITY, HYDRAULICS, CONDUCTION, DENSI-TY (MASS/VOLUME), TENSILE PROPERTIES, GLACIAL DEPOSITS, EQUIPMENT

GLACIAL DEPOSITS, EQUIPMENT

A constant-head permeameter has been modified to include the essential components of a Tempe cell moisture extractor. With this equipment, tests for saturated hydraulic conductivity and moisture retention characteristics of the soil can be conducted using the same soil sample. The procedure can be used for both absorption and desorption phases. Test results from four different soils (a glacial till, a fine sand, a silt and a coarse sand) are presented. The effects of density on hydraulic conductivity and moisture retention characteristics are shown.

SR 81-03

INVESTIGATION OF THE SNOW ADJACENT TO DYE-2, GREENLAND. Ucda, H.T., ct al, Mar. 1981, 23p., ADA-099 139, 8

Goff, MA, Niclsen, KG 35-3651

SNOW STRENGTH. COMPRESSIVE PROPERTIES, SNOW DENSITY, LOADS (FORCES), SNOW DEPTH, DRILL CORE ANALYSIS

SNOW DEPTH, DRILL CORE ANALYSIS

snow samples from five 50-ft (152m) deep holes, augered adjacent to the west side of DEW line Station Dye-2 in Greenland, were investigated for density and unconfined compressive strength. Forty-two percent of the recovered cores were tested. Ninety-three percent of the samples tested had a length/diameter ratio greater than 2.1. The loading rate was 2 in min (51 mm/min). Sample end-effects appeared to influence a high percentage of the failures. The heavily disturbed nature of the material is evidenced in the widely scattered values of density and strength with depth. A minimum and maximum strength value of 31 psi (0.21 MPa) and 1065 psi (** 34 MPa) respectively were obtained from a hole located 50 ft (15.2 m) from the structure ching an approach similar to that used prior to the Dve-Using an approach similar to that used prior to the Dye-3 move in 1976, a safety factor exceeding 6.5 is obtained against a brittle bearing failure based on a maximum footing design load of 2000 lb sq ft (96 kPa)

SR 81-04

PLANT GROWTH ON A GRAVEL SOIL: GREEN-HOUSE STUDIES.
Palazzo, A.J., et al, Mar. 1981, 8p., ADA-098 598, 9

Graham, J.M. 35-3692

GRASSES, GROWTH, SOIL STABILIZATION, GRAVEL NUTRIENT CYCLE

GRAVEL NUTRIENT CYCLE.

Two greenhouse studies were performed with gravel soils to determine the requirements for mitrogen (N), phosphorus (P), and potassium (K) for grave establishment and to assess the establishment performance of 18 types of graves. The fertilizer study consisted of 40 treatments, each representing a different combination of apphiation rates of N, P, and K. A seed mixture containing "Sugget Kenticks bluegrass" (Pennlaw), ted fescue, and annual regrass was sown, and the plants were harvested 133 days after sowing. Plant teal and root weights were measured, and soil samples were analyzed for pH, P. K and soluble saits. In the grass study, 15 grasses were grown for 76 days. All treatments

were fertilized at the beginning of the study. Plant establishment was periodically assessed and yields were measured at the end of the study. In the fertilizer study, N and P were shown to be limiting to leaf growth on this soil Applications of P were the most beneficial for root growth Needs for K were less evident, but it was required for maximum leaf growth at the higher application rates of N and P. The greatest yields were recorded when all three elements were applied, while at the lower application rates only N and P were required to promote growth.

UPPER OCEAN TEMPERATURE, SALINITY AND DENSITY IN THE VICINITY OF ARCTIC DRIFT STATION FRAM 1, MARCH TO MAY 1979

McPhee, M.G., Mar. 1981, 20p., ADA-098 597, 2 35-3706

OCEANOGRAPHY, SALINITY, TEMPERATURE GRADIENTS, DENSITY (MASS/VOLUME), DRIFT STATIONS, ARCTIC OCEAN.

DRIFT STATIONS, ARCTIC OCEAN.

A program designed to measure temperature and conductivity in the upper 270 m of the Arctic Ocean within a 150-km radius of Drift Station FRAM I is described, and data in the form of profiles of temperature, salimity, and density as functions of depth are presented for each of 104 casts made with a portable, self-contained conductivity-temperature-depth instrument. Seventy-five of the casts were made away from the ice station at sites reached by helicopter Details of sampling procedure, instrument calibration, and data organization are given.

CD 21.06.

SR 81.06

INTRODUCTION TO THE BASIC THERMODY-NAMICS OF COLD CAPILLARY SYSTEMS. Colbeck, S C, Mar 1981, 9p., ADA-099 138, 9 refs 35-3712

THERMODYNAMICS, CAPILLARITY, FROZEN GROUND THERMODYNAMICS, WET SNOW, ICE CRYSTAL GROWTH, ENTHALPY, ANAL-YSIS (MATHEMATICS).

The basic principles of phase equilibrium thermodynamics are reviewed. These principles are used to derive several useful relations such as osmotic pressure and Kelvin's equation. Several examples are given of the application of thermodynamics to cold regions materials such as grain growth in wet snow and capillary condensation in rocks.

SR 81-07

LABORATORY AND FIELD USE OF SOIL TEN-SIOMETERS ABOVE AND BELOW 0 DEG C. Ingersoll, J., Apr. 1981, 17p., ADA-101 561, 8 rcfs. 35-3796

SOIL MECHANICS, SOIL WATER, WATER RETENTION, DENSITY (MASS/VOLUME), TENSILE PROPERTIES, FROST PENETRATION, TEMPERATURE EFFECTS, MEASURING IN-STRUMENTS.

Methods for using tensioneters in conjunction with moisture retention characteristic curves for non-destructive soil water measurements are presented for above- and below-freezing situations of engineering interest. Four methods for determining moisture retention characteristics, three tensioneter types and several methods of recording soil suction are discussed. Procedures for preparing, modifying and installing tensioneters for field use in cold climates are explained. Several examples of moisture retention characteristics are shown, including the effect of soil density on water retention Examples of soil tension ahead of and behind a frozen soil zone are also presented

SR 81-08 SUBLIMATION AND ITS CONTROL IN THE

CRREL PERMAFROST TUNNEL.
Johansen, N. J., May 1981, 12p., ADA-101 555, 3 refs Chalich, P.C., Wellen, E.W. 35-3736

SUBLIMATION, PERMAFROST PRESERVA-TION, DUST CONTROL

TION, DUST CONTROL.

The US Army Cold Regions Research and Linguiering Laboratory's permafrost tunnel at Lox, near Lairbanks. Alaxka, was used to investigate the sublimation process in permafrost layer from sublimation was found to be approximately 0.023 in (0.058 cm) in 1 month and closely related to the relative humidity in the tunnel. Sublimation presention studies consisted of evaluation of various membranes to impede the sublimation. Ice was found to show promise as an easily installed, effective membrane when applied as a fine water mist and subsequently left to freeze.

SR 81-09

ICE JAM PROBLEMS AT OIL CITY, PENNSYL-VANIA.

Deck, D.S., et al. May 1981, 19p., ADA-103-736, 9 refs

Gooch, G

ICF JAMS, FLOOD CONTROL, ICF CONDI-TIONS

On City, Pennysivania, is at the confluence of Oil Creek and the Aliegheny River—The basiness district fies within the flood plain of Oil Creek, and as of the winter of 1930, 25 ite jam flooding events had occurred since the mid.

1800's. An investigation was done to determine why Oil City was subject to perennal ice jam fande blemial ice jam floods. Ice conditions were analyzed and it was determined how and why the jams occurred. By controlling where the initial ice cover forms, Oil City's ice jam floods can be alleviated. Ice control structures will be used to encourage the early formation of ice cover and hence climinate frazil ice. This will greatly reduce the amount of ice which currently develops in both Oil Creek and the Allegheny River.

SR 81-10
FABRIC INSTALLATION TO MINIMIZE REFLECTION CRACKING ON TAXIWAYS AT
THULE AIRBASE, GREENLAND.

Eaton, R.A., et al, May 1981, 26p., ADA-103 737, 2 refs.

Godfrey, R. 36-407

RUNWAYS, CRACKING (FRACTURING), COUNTERMEASURES, BITUMENS, CON-CRETE DURABILITY, CONCRETE STRENGTH. In August 1978 two types of fabrics were placed on sections of taxiways 1 and 3 of Thule AB, Greenland, to study the ability of fabrics with an AC 2.5 overlay to minimize reflection cracking an severe climates Both fabrics should retain durability and mechanical strength under Thule's arctic

METHOD FOR MEASURING BRASH ICE THICKNESS WITH IMPULSE RADAR.

Martinson, C.R., et al, June 1981, 10p., ADA-103 738,

Dean, A.M., Jr.

ICE FLOES, ICE COVER THICKNESS, LAKE ICE, RADAR ECHOES.

During March 1980 a subsurface impulse radar system was successfully used on board a U.S. Coast Guard cutter to measure brash ice thickness in the Great Lakes. Manual ice thickness measurements were made in the test area to calibrate the radar data and to determine radar range settings. Radar-collected data were recorded on magnetic tape and later played back to a graphic recorder for interpretation Most of the usable data were collected when the ship's speed was 3-4 knots.

SR \$1-12 SEVEN-YEAR PERFORMANCE OF CRREL SLOW-RATE LAND TREATMENT PROTO-TYPES

Jenkins, T.F., et al, July 1981, 25p., ADA-103 739, 6

Palazzo, A.J., Schumacher, P.W., Hare, H.E., Butler, P.L., Diener, C.J., Graham, J.M. 36-776

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, WATER CHEMISTRY, NUTRIENT CYCLE, STATISTICAL ANALYSIS. SOIL WATER

A set of six outdoor, slow-rate land treatment prototypes was operated from June 1973 through May 1980. Water quantity and quality data are presented for the wastewater applied to and the percolate leaving the 5-foot soil profile Average concentration, mass loading and mass and percentage removal of wastewater constituents are presented on a yearly basis Tabulations of crop production and nutrient uptake are also presented. Nutrient balance sheets summarize the relative amounts emoved by obstativates deep percentage. the relative amounts removed by plant uptake, deep percolation and other removal mechanisms for nitrogen and phosphorus

SR \$1-13 EFFECTS OF ICE ON COAL MOVEMENT VIA THE INLAND WATERWAYS. Lunardini, V.J., et al, June 1981, 72p., ADA-103 740,

Minsk, L.D., Phetteplace, G

ICE COVER EFFECT, CHANNELS (WATER-WAYS), COAL, FUEL TRANSPORT, LOCKS (WATERWAYS), MARINE TRANSPORTATION, COLD WEATHER PERFORMANCE, DAMS.

COLD WEATHER PERFORMANCE, DAMS. The part of the Inland Waterways which carries significant coal and which may experience significant toe problems includes the following rivers or waterways. Ohio, Monogahela, Allegheny, Kanawha, Upper Mississippi, and Illinois. Coal transportation along these rivers may be locally interrupted for periods up to 30 days or more every three to five years. Coal handling facilities, navigation channels, and lock and dam sites along the see prone rivers were surveyed by sist or telephone to ascertain the scope of the see problems. The importance of ice as a barrier to increased coal movement on the waterways studied manifests itself differently for each link of the flow system. In order of importance the ice will affect the navigation channels, locks and dams, and finally the coal loading unloading facilities. The coal handling facilities will not be significantly slowed down by ice problems associated with winter navigation.

LOSSES FROM THE FORT WAINWRIGHT HEAT DISTRIBUTION SYSTEM.

Phetteplace, G., et al, June 1981, 29p., ADA-103 741, 6 refs.

Willey, W., Novick, M.A.

36-351 HEAT LOSS, ELECTRIC POWER, PIPELINES, STEAM, THERMAL INSULATION, COMPUTER APPLICATIONS, ANALYSIS (MATHEMATICS). This report estimates the heat losses from the heat distribution system at Fort Wainwright, Alaska. Specific data on the Fort Wainwright heat and power plant are given and a method is then developed to calculate the heat losses from method is then developed to calculate the heat losses from buried utilidor systems, such as the one at Fort Wainwright. This method is programmed for computer execution and estimates are made for the Fort Wainwright system, where heat losses are found to be 204,500 MBtu/yr. Possible improvements to the system to reduce heat losses are examined. Of the possible combinations of additional pipe insulation investigated, the addition of 1 in of insulation to the steam pipe only is the most economically favorable. The results also indicate that insulating only the generally larger pipes found in larger utilidors would be the most economically favorable approach. Possible reductions in heat losses due to reduced steam temperature are also given, as well as recommendations for refinement of the predictions.

SR 81-15

LIMNOLOGICAL INVESTIGATIONS: LAKE KOOCANUSA, MONTANA. PT. 5: PHOS-PHORUS CHEMISTRY OF SEDIMENTS. Iskandar, I.K., et al, July 1981, 9p, ADA-107 049, 13

Shukla, S.S. 36-1122

LIMNOLOGY, LACUSTRINE DEPOSITS, CHEMICAL COMPOSITION, BOTTOM SEDI-MENT.

This study characterizes the sediments from Lake Koocanusa this study characterizes the sequents from Lake Koocanusa (Libby Dam reservoir). Montana, in terms of their ability to sorb and release P. Sediment samples were collected at 12 stations located between the U.S.-Canadian border and Libby Dam (42 miles downstream of the border) during July 1977. The sediments from Lake Koocanusa are raleared. July 1977. The sediments from Lake Koocanusa are ralcareous, low in organic matter (< 2.3%), and have a sity loam or loam texture. Most of the P associated with these sediments was in the inorganic form (> 85%), which was highly correlated (r=0 89) with oxalate extractable Fe in the sediment. Sorption tests, with concentrations of either I or 10 mg P/g sediments, showed that these sediments have limited ability to sorb additional P from concentrate solutions. The maximum amount sorbed at the lower P concentrations was 67% of the added P and was highly correlated with oxalate extractable Fe in the sediments. Desorption studies showed that very small amounts of both the originally bound P (1 to 2%) and the added P (< 6.3%) were released. Koocanusa act as a P sink.

PROCEEDINGS OF THE INTERNATIONAL SO-CIETY FOR TERRAIN-VEHICLE SYSTEMS WORKSHOP ON SNOW TRACTION MECHAN-

ICS, ALTA, UTAH, JAN. 29-FEB. 2, 1979. Harrison, W.L., ed, July 1981, 71p., ADA-106 972, Refs. passim. For individual papers see 36-1391 through 36-1397. 36-1390

SNOW MECHANICS, SNOW COMPRESSION, TRACTION, TRAFFICABILITY, VEHICLE WHEELS, TRACKED VEHICLES, MEETINGS. MATHEMATICAL MODELS.

This report reviews the state of the art of snow traction mechanics and presents the results of a limited field exercise that allowed participants to observe and practice current snow measurement processes and vehicle test procedures. The prime recommendations of the workshop attendees were 1) the use of parameters basic to the laws of physics for the classification of snow strength, and 2) the use of instrumented tracked and wheeled vehicles for snow strength measurements.

CD \$61.17

SR 81-17 MACROSCOPIC VIEW OF SNOW DEFORMA-TION UNDER A VEHICLE.

Richmond, PW., et al, July 1981, 20p., ADA-107 038, 10 refs.

Blaisdell, G.L.

SNOW DEFORMATION, SNOW COMPRESSION, LOADS (FORCES), VEHICLES, SNOW DENSITY, STRESSES, SNOW COMPACTION, TESTS.

TESTS. In this report the deformation of snow under a vehicle is discussed. For snow with an initial density of less than 0.45 Mg cu m, load transfer through shallow snow is shown to be attenuated by an interfacial boundary force. Evidence is presented that shows the existence of a density distribution in the deformed area. Results of a laboratory plate-sinkage test on sintered snow support this analysis Maximum values obtained for the interfacial boundary force range from 1355 to 2670. S when the average density of the deformed area is about 0.5 Mg/cu m.

BOTTOM HEAT TRANSFER TO WATER BO-DIES IN WINTER.

O'Neill, K., et al, Sep. 1981, 8p., ADA-106-977. Ashton, G.D.

WATER TEMPERATURE, FREEZING POINTS, HEAT FLUX, HEAT TRANSFER. BOTTOM SEDIMENT, LIMNOLOGY, LAKES, PONDS, WINTER.

In many surface water bodies, water temperature closely follows ambient air temperature. This means that warmer water in winter absorbs heat from below. The extent and pattern of winter heat gain is constrained by the fact that the water temperature does not fall below the freezing point. On the basis of a few simple assumptions, governing equations are solved here pertaining to heat flow in bottom sediments. The results are presented in general nondimensionalized curves. These allow estimation of water/sediment heat flure for each waterships. sionalized curves. These allow estimation of water/sediment heat flux for any particular case, given truncation of the water temperature curve at the freezing point. The user must supply pertunent yearly air temperature mean and amplitude of variation, together with the thermal diffusivity for the bottom material. The governing equations are solved using a higher order finite element method which solves directly for temperature gradients and hence for heat flux. Thus the method provides particularly accurate flux values at high efficiency. The results illustrate in detail how winter water heat gain is less in cases where mean air temperatures are lower.

SR 81-19 MIZEX—A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION; EXPERIMENTS IN ARCTIC MARGINAL ICE ZONES. 1. RE-SEARCH STRATEGY.

Wadhams, P., ed, June 1981, 20p., ADA-107 046, 59

Martin, S., ed, Johannessen, O.M., ed, Hibler, W.D., III, ed, Campbell, W.J., ed. 36-1310

ICE AIR INTERFACE, ICE WATER INTERFACE, ICE EDGE, SEA ICE DISTRIBUTION, RE-SEARCH PROJECTS, CLIMATIC FACTORS, SEA WATER, WATER TEMPERATURE.

This document describes the research strategy for a series of mesoscale studies of arctic marginal ice zones. The main goal of this program is to gain a better understanding of the processes occurring at the ice margin. These processes are relevant to climate, weather forecasting, petroleum exploration and production, marine transportation, naval operations, and commercial fisheries. In addition MIZEX will aid in determining what modifications to existing tee-ocean-atmospheric models are needed for better prediction near the

SR 81-20 MINE/COUNTERMINE PROBLEMS DURING WINTER WARFARE. FINAL REPORT OF A WORKSHOP.

Lunardini, V.J., ed, Sep. 1981, 43p., ADA-107 047.

EXPLOSIVES, COLD WEATHER PERFORM-ANCE, SNOW COVER EFFECT, BLASTING, FROZEN GROUND, RESEARCH PROJECTS.

FROZEN GROUND, RESEARCH PROJECTS.

The possibility of modern warfare being waged under cold weather condutions has raised questions about the effectiveness of conventional and new mine systems during the winter A workshop on mine/countermine winter warfare was held at the U.S. Army Cold Regions Research and Engineering Laboratory, 21-23 October 1980, to define problems related to cold climates. The designer, developer and user communities sent 22 representatives from 16 organizations outside of CRREL. I scussion papers were prepared by four groups, covering emplacement of mines, mine performance, detection of mines, and neutralization of mines is was on the unique problems of the whater environment. It appears that the U.S. has the capability to conduct defensive warfare during the summer but is not adequately prepared for mine/countermine winter warfare. Test and research programs are called for to compensate for the prior lack of consideration of the winter environment, to adequately winterize new mine/countermine systems, and to formulate appropriate doctrine for defensive winter warfare.

POTHOLE PRIMER—A PUBLIC ADMINISTRATOR'S GUIDE TO UNDERSTANDING AND MANAGING THE POTHOLE PROBLEM. Eaton, R.A., et al. Sep. 1981, 24p., ADA-107 294, 11

Joubert, R.H., Wright, E.A.

36-1114

PAVEMENTS, DEFECTS, ROAD MAINTE-NANCE, FREEZE THAW CYCLES, DAMAGE. FATIGUE.

SR 81-22

SURFACE DRAINAGE DESIGN FOR AIR-FIELDS AND HELIPORTS IN ARCTIC AND SU-BARCTIC PEGIONS.

Lobacz, E.F., et al, Sep. 1981, 56p., ADA-107 293, 40

F# KS

AIRPORTS, SURFACE DRAINAGE, ROAD ICING, PERMAFROST DISTRIBUTION, COLD WEATHER CONSTRUCTION, DESIGN CRIT-ERIA, ENVIRONMENTAL IMPACT, HELICOPT-ERS ENGINEERING

This report presents engineering guidance and design criteria for drainage facilities at Army and Air Force airfields and heliparts in arctic and subarctic regions. Attention is given to hydrologic criteria, icings, environmental impact, storm drains and design computer programs. A design example and a list of 40 references are included in two

ELECTROMAGNETIC SUBSURFACE MEAS-

Dean, A.M., Jr., Oct. 1981, 19p., ADA-108 192.

36-1037

36-1037
ICE COVER, PROFILES, ELECTROMAGNETIC PROSPECTING, AIRBORNE RADAR, SUBGLACIAL OBSERVATIONS, REMOTE SENSING, ICE BOTTOM SURFACE, FRAZIL ICE, ICE JAMS, PERMAFROST, OIL SPILLS.

BOTTOM SURFACE, FRAZIL ICE, ICE JAMS, PERMAFROST, OIL SPILLS.

In 1974 personnel at the US Army Cold Regions Research and Engineering Laboratory (CRREL) began using an impulse radar system to profile accumulations of ice forms. Through field experience the system has been modified so that it can be effectively used as a profiling system, in a ground or airborne configuration, in certain high-noise environments. The system can penetrate fresh water and media with a high water content. For instance, frazil and brash ice accumulations with approximately 50% water have been profiled to a depth of 25 to 35 ft. As a result of the CRREL modifications, the system has found extensive and vaned applications as a low-level remote sensing tool. Applications include profiling ice accumulations (including ice jams), river beds, sheet ice, permafrost, subsurface ice masses, river bank revetements through air-entrained water, snow covers, sea ice, icebergs, and peat bogs. Limited laboratory work has also shown that the impulse radar system may be able to detect oil and gas under sa ice. Selected applications and data are presented used mainly for research, the CRREL system needs further development to make it useful to operational units. Additional development of hardware and software is recommended.

SITE INVESTIGATIONS AND SUBMARINE SOIL MECHANICS IN POLAR REGIONS. Chamberlain, E.J., Oct. 1981, 18p., ADA-108 269, 44

refs 36-1644

30-1044 SUBSEA PERMAFROST, SOIL MECHANICS, FROZEN GROUND MECHANICS, OCEAN BOT-TOM, OFFSHORE DRILLING, OFFSHORE STRUCTURES, SITE SURVEYS, POLAR RE-GIONS, BEAUFORT SEA.

CHONS, BEAUFORT SEA.

Placing oil exploration and production structures offshore in the Alaskan Beaufort Sea will require careful site investigation and evaluation of submanne soil mechanics. Ice-bounded permafrost occurs widely under the Beaufort Sea floor. Its engineering properties are important to the design of offshore structures. If they overconsolidated clays also occur widely and interfere with access to gravels for constructing artificial islands. Sites should be selected to avoid ice-rich permafrost. Laboratory tests may need to be conducted to determine the potential hazards of thaw consolidation and weakening.

FOUNDATIONS OF STRUCTURES IN POLAR

Chamberlain, E.J., Oct. 1981, 16p., ADA-108 344, 29 refs.

36-1410

OFFSHORE STRUCTURES, FOUNDATIONS. HYDRAULIC STRUCTURES, OFFSHORE DRILLING, ARTIFICIAL ISLANDS, ICE LOADS, SUBSEA PERMAFROST, SEA ICE, SEASONAL FREEZE THAW, PILE STRUCTURES, SITE SUR-VEYS, BEAUFORT SEA.

VEYS, BEAUFORT SEA.

Artificial islands and gravity- and pile-founded towers used for the exploration and production of petrofeum resources in the Alaskan Beaufort Sea will be affected by conditions not found in more temperate waters. The force of sea ice, the thawing of subsea permafrost, and seasonal freezing and thawing all may cause failure of the foundations of these structures. To ensure the stability of foundations and fill structures, special precautions must be taken in selecting sites and evaluating the engineering properties of sea bed and fill materials.

SR 81-26

IDENTIFYING AND DETERMINING HALO-CARBONS IN WATER USING GAS CHROMA-TOGRAPHY.

Leggett, D.C., Oct. 1981, 13p., ADA-108 345, 50 refs.

WASTES, WATER CHEMISTRY, HYDROCAR-BONS, CHEMICAL ANALYSIS.

BONS, CHEMICAL ANALYSIS.

Since the discovery that chloroform and other haloforms are produced during water chlorination, methods have been needed for their routine analysis. This report describes application of the multiple equilibration headspace technique for the determination of halocarbons in water. This method has certain advantages over solvent extraction and direct injection techniques, including greater sensitivity because of the favorable gas/liquid distribution ratios. It is simpler and faster than purge and trap and resin sorption methods and gives more information about compound identity than single headspace analysis because gas/liquid distribution ratios are determined experimentally. The method is absolute, unlike solvent extraction, resin sorption, purge and trap, and conventional headspace analysis, which require standard additions to correct for incomplete recovery. The use of the technique to analyze chlorinated water samples for haloforms revealed a potential problem in their analysis Haloforms continued to form for 24 hours, even after destruction of chlorine residuals with thiosulfate. Maximum haloform concentrations were observed in undechlorinated samples only after a 48-hour aging period. only after a 48-hour aging period.

SYNOPTIC METEOROLOGY DURING THE SNOW-ONE FIELD EXPERIMENT.

Bilello, M.A., Nov. 1981, 55p., ADA-109 080, 3 refs. 36-1821 SYNOPTIC METEOROLOGY, METEOROLOGI-

CAL DATA, SNOWFALL, MEASURING IN-STRUMENTS, MAPPING.

STRUMENTS, MAPPING.

The daily atmospheric pressure systems and weather fronts that traversed the northeastern United States during the SNOW-ONE Field Experiment from 11 January through 20 February 1981 are summarized. This experiment is first in a planned series of measurements to study the influence of atmospheric obscurants on electro-optical system performance. The analysis of the large-scale synoptic patterns that developed during the field test period constitutes a critical component of the research program. The weather during the measurement period included nine new daily high temperature records. January was one of the driest and February was one of the wettest ever observed. These conditions were caused in part by two high pressure cells and two major low pressure systems that crossed the region One of these lows brought warm air and heavy rain to New England, and the other produced significant snowfall in northern Vermont.

SITE SELECTION METHODOLOGY FOR THE LAND TREATMENT OF WASTEWATER Ryan, J.R., et al, Nov. 1981, 74p., ADA-108 636, Refs.

p.46-49.

Loehr, R.C.

36-1853 WASTE DISPOSAL, WATER TREATMENT, LAND RECLAMATION, SITE ACCESSIBILITY. AND RECLAMATION, SITE ACCESSIBILITY. A methodology is presented that covers facets of site selection from preliminary screening to field data acquisition for the preparation of a final design for a land treatment system. The basic assumption underlying the methodology is an approach to site selection in which the entire study area is investigated for potential sites while considering the whole spectrum of land treatment processes. Due to the extensive nature of such a study, several iterations are required to determine the most feasible site and land treatment alternatives. The methodology is presented in three parts. Level I defines the technical feasibility of implementing land treatment of a particular wastewater problem. The boundaries of the study area are defined and available land areas are rated for their suitability for land treatment based on topography, land use, hydrogeology and soil characteristics. A preliminary design for each suitable level I site candidate is prepared in the level II site analysis. The design is based on an evaluation of soil 'waste interactions that consider responses to limiting soil conditions. A cost-effectiveness evaluation of waste treatment alternatives and site candidates. responses to limiting soil conditions. A cost-effectiveness evaluation of waste treatment alternatives and site candidates is developed in level II. The most cost-effective site candidate is the selected for intensive level III field investigations. Data acquired in the level III field investigations will determine the design requirements of the land treatment

SR 81-29

MOBILITY BIBLIOGRAPHY Liston, N., comp. Nov. 1981, 313p. ADA-108 228. Hutt, M., comp. White, L., comp.

36-1491
TRAFFICABILITY, VEHICLES, BIBLIOGRAPHIES, TRANSPORTATION, SNOW VEHICLES,
AIR CUSHION VEHICLES, TRACKED VEHICLES, SNOW STRENGTH, SOIL STRENGTH.

This bibliography is an international compilation of literature relating to terrain vehicles, amphibious vehicles, snow vehicles, air cushion vehicles, tracked vehicles, wheeled vehicles, and off road vehicles. It also covers the related subjects of

rolling resistance, traction, snow strength measurement, soil toling resistance, traction, show strength measurement, soil strength measurement, terrain analogs, vehicle models, and the overall topic of vehicle mobility. It is not comprehensive but begins at about 1970 and ends in 1980. The European but organs at about 1970 and ends in 1980 The European coverage is lacking because much of this material is not accessible by computerized literature searching, which was the mechanism used for compiling this bibliography

SR 81-30

30-872

PREDICTING WHEELED VEHICLE MOTION RESISTANCE IN SHALLOW SNOW.

Blaisdell, G.L., Dec. 1981, 18p., ADA-147 117, 14

RUBBER SNOW FRICTION, SNOW COMPACTION, VEHICLE WHEELS, SNOW DEPTH, SNOW COVER EFFECT, TRAFFICABILITY, VELOCITY, FORECASTING, MATHEMATICAL

MODELS.

A vehicle traveling through snow is required to expend a greater amount of energy than is necessary when traveling on a rigid surface. Visually, this energy difference can be explained by the formation of a rut. Various attempts have been made in the past to equate the energy of compaction to vehicle motion resistance. However, many of the previous models use information gathered through the application of a vertical force (with a plate-sinkage device) to predict the horizontal motion resisting force. In an attempt to more accurately quantity the relationship between snow compaction and vehicle motion resistance, a vectorial analysis of compaction by a wiicel is performed. A method of using this compaction due to vehicle weight and forward thrust (horizontal propulsion) is suggested. Two methods of using this compaction force breakdown with field-generated data are proposed for the calculation of vehicle motion resistance in shallow snow.

SR 81.31

ROOF MOISTURE SURVEY: RESERVE CENTER GARAGE, GRENIER FIELD, MANCHES-TER. N.H.

Tobiasson, W., et al. Dec. 1981, 18p, ADA-110 135,

Coutermarsh, B.A., Greatorex, A. 36-2430

36-2430
ROOFS, WATERPROOFING, MOISTURE, THERMAL INSULATION, WETTABILITY, BITUMENS, INFRARED EQUIPMENT, DRAINS, TEMPERATURE MEASUREMENT, MEASURING INSTRUMENTS.

An insulated roof with a badly blistered bituminous builtup membrane was surveyed with a hand-held infrared camera to locate areas of wet insulation. Several thermal patterns were observed. Core samples were taken to determine moisture contents. Core samples verified that one thermal moisture contents

Core samples verified that one thermal
anomaly was caused by the increased thickness of bitumen.

All other anomalies were caused by wet urethaneperlite commore moisture near the edges than at the center, but others
were more uniformly wet. Dramatically different thermal
patterns resulted A few nuclear and capacitance readings,
taken for companison purposes, showed that extra bitumen
adversely affects such sensing methods Because of the
amount of wet insulation and the condition of the membrane,
both should be removed The new roofing system for
this building should have internal drains and be provided
with a sloped surface

SR 81-32

SR 81.32 AUTOMOTIVE COLD-START MONOXIDE EMISSIONS AND PREHEATER EVALUATION.

Coutts, H.J., Dec. 1981, 37p, ADA-112 170, 7 refs.

ENGINE STARTERS, VEHICLES, COLD WEATHER OPERATION, AIR POLLUTION, TEMPERATURE EFFECTS.

TEMPERATURE EFFECTS.
Fairbanks and Anchorage, Alaska, experience high wintertime ambient levels of carbon monoxide (CO) Emissions from starting automobile engines in cold weather are thought to be a major source of CO. A quantitative procedure for determining startup CO was developed. The startup emissions were measured as a function of soak time at several low ambient temperatures. The performance of engine preheaters in reducing the startup CO at the various soak times and temperatures was estimated. The data scatter was too great to draw any firm conclusions, however, the length of cold-soak time appeared to have a stronger effect on cold-start CO emissions than dot soak temperatures (0 to -30C). Compared to no preheat, continuous preheat during an overnight cold soak can reduce the cold-start CO emissions by 20 to 90°C.

SR #1-33 SK 61-35 EFFECT OF SOIL TEMPERATURE AND PH ON NITRIFICATION KINETICS IN SOILS RE-CEIVING A LOW LEVEL OF AMMONIUM EN-RICHMENT.

Parker, L.V., et al, Dec. 1981, 2°p. ADA-112 171, Refs. p.17-20.

Iskandar, I K., Leggett, D C

SOIL CHEMISTRY, SOIL TEMPERATURE, NU-TRIENT CYCLE, WASTE TREATMENT, SOIL MICROBIOLOGY.

Two soil samples from an on-going field study of land applica-tion municipal wastewater were spiked with low levels of ammonium to determine the effect of temperature on nitrificaammonium to determine the effect of temperature on nitrification kinetics. The concentrations of ammonium and nitriteplus-nitrate, and the number of autotrophic ammonium and
nitrite oxidizers were monitored periodically during the study.
There was a lag period prior to nitrite-plus-nitrate production
at all temperatures, and the length of this lag period was
temperature-dependent, with the longest period occuring at
the lowest temperature. The maximum rate of nitrification
increased with temperature as expected. While intriteplus-nitrate production appeared logarithmic, suggesting a
growing nitrifier population, the MPB counts of the nitrifiers
did not exhibit logarithmic growth. To study the effect
of soil pH on nitrification kinetics, soil samples from field
plots having the same soil type but different pHs (4 5, 5, 5,
and 7,0) were spiked with low levels of ammonium and
the rate of nitrite-plus-nitrate production was measured. The
maximum rate of nitrification was greater at pH 5.5 than
at 4.5. Unexpectedly rapid disappearance of ammonium,
nitrite and nitrate, caused by immobilization, obscured the
expected effects of pH on the nitrification rate at the highest
pH.

SEA ICE RUBBLE FORMATIONS IN THE BER-ING SEA AND NORTON SOUND, ALASKA. Kovacs, A., Dec. 1981, 23p., ADA-113 773, 22 refs.

PRESSURE RIDGES, ICE PRESSURE, SEA ICE, OFFSHORE STRUCTURES, ICE LOADS, ICE FORMATION, ICE SURFACE, OFFSHORE DRILLING, GROUNDED ICE, FLOATING ICE. The occurrence of large, compact, grounded pressure ridge formations up to 15 m high in the coastal waters of Norton Sound and the Bering Sea is discussed. These formations periodically float free and drift about, gouging the seabed. Their mass makes them a severe threat to both floating and bottom-founded structures in these waters

SR 82-01

OVERVIEW OF MODELS USED IN LAND TREATMENT OF WASTEWATER.

Iskandar, I K., Mar. 1982, 27p., ADA-114 403, Refs. p.22-27. 36-2910

LAND RECLAMATION, WASTE TREATMENT, WATER TREATMENT, NUTRIENT CYCLE, MATHEMATICAL MODELS, SOIL MICROBIOLOGY, SOIL WATER, SOIL CHEMISTRY.

This report summarizes the state of the art of the modeling of wastewater renovation by land treatment. The models discussed are classified based on their use for planning, site selection and cost analysis, and for predicting 1) water and salt transport in soils, 2) nitrogen transport and transformations, 4) virus movement in soils, and 5) toxic metal and trace organic movement in soils. This report compares the different models as to their purpose, input and output data, and status of validation. In addition, the report includes a section on research needs for modeling land treatment of

TESTING SHAPED CHARGES IN UNFROZEN AND FROZEN SILT IN ALASKA.

Smith, N., Mar. 1982, 10p., ADA-113 670, 2 refs 36-2742

EXPLOSION EFFECTS. BLASTING, FROZEN GROUND STRENGTH, SOIL STRENGTH, BOREHOLES, TESTS

SR 82-63

SECOND NATIONAL CHINESE CONFERENCE ON PERMAFROST, LANZHOU, CHINA, 12-18 OCTOBER 1981.

Brown, J., et al, Mar 1982, 58p. ADA-114 445 Yen, Y.-C.

GROUND, RE-FROZEN GROUNI JECTS, MEETINGS, PERMAFROST. SEARCH PROJECTS. CRYOLOGY, CHINA.

CRYOLOGY, CHINA.

The Second National Chinese Conference on Permafrost was attended by the authors, and visits were made to two research institutes in Lanthou, the Northwest Institute of the China Academy of Railway Sciences and the Institute of Glaziology and Cryopedology. Appreut sately 100 papers were presented at the conference and 180 abstracts were presented at The papers were presented during three sessions 1). Distribution, Characteristics and Formation of Frozen Ground, 2) Basic Physico-Mechanical Properties and Processes in Frozen Soils, and 3). Engineering Design and Construction in Permafrest.

Sixty nine institutions conducting frozen ground research in China were represented. It was planned to present selected papers from this conference at the Foarth International Conference on Permafrost in Fairbanks, Alaska, in 1813.

SR 82-04 PRELIMINARY ASSESSMENT OF THE NUTRI-ENT FILM TECHNIQUE FOR WASTEWATER TREATMENT.

Bouzoun, J.R., et al, Mar. 1982, 15p, ADA-115 425,

Palazzo, A.J.

36-3112

WASTE TREATMENT, WATER TREATMENT, SANITARY ENGINEERING, PLANTS (BOTANY), GROWTH, STATISTICAL ANALYSIS.

An experiment was conducted to determine the feasibility An experiment was conducted to determine the feasibility of using a solar powered, self-regenerating plant growth system, called the nutrient film technique (NFT), to treat primary effluent (average temperature, 11 C) Primary effluent was pumped onto the elevated end of a sloping waterproof 2-x40-ft plywood tray and trickled through the root mat of reed canary grass. The quantity of influent and effluent was measured as well as temperature, pH, total suspended solids, volatile suspended solids, BODS, total introgen, amounts nitrogen prirate attracts to the photonic absorbance in circumstant programments. solids, volatile suspended solids, BOD5, total nitrogen, ammonia nitrogen, nitrate nitrogen, total phosphorus, phosphate phosphorus, and fecal coliform organisms. The quantity and quality of the reed canarygrass was determined from samples taken from six harvests. Mass balances are presented for BOD5, total suspended solids, total nitrogen, ammonia nitrogen, total phosphorus, and phosphate phosphorus. The removal of several volatile trace organic compounds was determined on two separate dates.

SR 82-05

PLANT GROWTH AND MANAGEMENT FOR WASTEWATER TREATMENT IN OVERLAND FLOW SYSTEMS.

Palazzo, A.J., Apr. 1982, 21p., 25 refs.

36-3113 WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, PLANTS (BOTANY), GROWTH, GRASSES.

Domestic wastewater was applied over a four-year period at various rates to three overland flow test slopes to study forage grass growth and nutrient removal. The annual application rates of nitrogen and phosphorus ranged up to 2026 and 226 kg/ha, respectively. The forage grasses were harr-seted three times per season. Plant yields, composition and uptake of nutrients were determined. The results show that reed canary grass, quackgrass and Kentucky bluegrass were the most persistent grasses on the slope over the four

SR 82-06

METEOROLOGICAL CONDITIONS CAUSING ING ON THE OTTAUQUECHEE RIVER, VER-MONT.

Bates, R., et al, May 1982, 25p., ADA-116 386, 15

Brown, M.-L. 39-873

JOE JAMS, FLOODING, METEOROLOGICAL FACTORS, ICE BREAKUP, RIVER ICE, RIVER FLOW, PRECIPITATION (METEOROLOGY), UNITED STATES—VERMONT—OTTAUQUE-CHEE RIVER

This report discusses wintertime meteorological conditions This report discusses wintertime meteorological conditions that can induce rapid see breakup, see jam formation and subsequent flooding. These conditions, described for the Ottauquechee River in Vermont, should be representative of those for similar unregulated river systems in northern temperate regions. Summer flood conditions are compared to those during winter flows, when river is the main imposition to water flow. Companions are made for total precipitation, stage height and the synoptic meteorological structure.

SR 82-07

MOISTURE DETECTION IN ROOFS WITH CELLULAR PLASTIC INSULATION—WEST POINT, NEW YORK, AND MANCHESTER, NEW HAMPSHIRE.

Korhonen, C., et al. May 1982, 22p., ADA-117 872, 6 refs

Coutermarsh, B A

16.1974

MOISTURE DETECTION, ROOFS, CELLULAR PLASTICS, THERMAL INSULATION, THERMAL REGIME, INFRARED PHOTOGRAPHY

NAL REGULE, INFRARED PROTOGOORDETS
New roofs with cellular plastic insulation and a bituminous
built up membrane we - surveyed with a hand heid infrared
camera to determine its effectiveness in detecting damp and
wet insulation. Wet areas were found and defined with
the help of 2 in diam core samples. The results of the
cests showed the infrared camera can be useful and effective
as an inspection tool within the time constraints of the
typical one year warrants period. The tests also indefined
the importance of core samples for verification.

SR 82-08 SNOW-ONE-A: DATA REPORT.

Aitken, G.W., ed, May 1982, 641p., ADB-068 569, For selected papers see 37-1095 through 37-1107. 37-1094

SNOWFALL SNOWSTORMS, SNOWFLAKES, ELECTROMAGNETIC PROPERTIES,
METEOROLOGICAL DATA, WAVE PROPAGA-TION, MILITARY OPERATION, VISIBILITY.

TION, MILITARY OPERATION, VISIBILITY.
This report contains the data obtained during the SNOW-ONE-A Field Experiment. All of the data suitable for presentation in this format are included with the exception of the results from a very few measurement programs whose data could not be provided in time. The report includes meteorological measurements made by CRREL and ASL; snow characterization data from CRREL AFGL and ASL, OptiMetines, NRL, AFGL and Photometines; millimeter wavelength propagation measurements made by BRL, and target/background data from Optimetries. The SNOW-ONE-A Field Experiment was the second in a planned series conducted by the Cold Regions Research and Engineering Laboratory for the Directorate of Research and Development of the U.S. Army Corps of Engineers 1 twas conducted at CEATC, Jericho, Vermont from 30 Nov. 1981 to 23 Feb 1982.

CRREL 2-INCH FRAZIL ICE SAMPLER. Rand, J.H., May 1982, 8p.

FRAZIL ICE, WEDDELL SEA. SAMPLERS, ANTARCTICA-

The CRREL 2-inch frazil ice sampler is a tubular device The CRREL 2-inch frazil ice sampler is a tubular device for obtaining undisturbed samples of frazil ice from beneath a floating ice cover. It fits through a 2 1/2 in-diameter hole drilled in the ice. A liquid-tight seal at the bottom of the sampler prevents the loss of frazil ice and/or water from the tube while the unit is being raised. The sampler was used for the first time in the floes in the Weddell Sea, Antarctica in austral summer, 1980-1981. (Authmod.)

EVALUATING THE HEAT PUMP ALTERNA-TIVE FOR HEATING ENCLOSED WASTEWA-TER TREATMENT FACILITIES IN COLD RE-

Martel, C.J., et al, May 1982, 23p., ADA-116 385, 11 refs.

39-1259
HEAT RECOVERY, WASTE TREATMENT, WATER TREATMENT, PUMPS, COST ANAL-YSIS

This report presents a five-step procedure for evaluating the technical and economic feasibility of using heat pumps to recover heat from treatment plant effluent. The procedure is meant to be used at the facility planning level by engineers who are unfamiliar with this technology. An example of the use of the procedure and general design information are provided. Also, the report reviews the operational experience with heat pumps at wastewater plants located in Fairbanks, Alaska, Madison, Wisconsin, and Wilton, Maine.

SNOWPACK PROFILE ANALYSIS USING EXTRACTED THIN SECTIONS.

Harrison, W.L., May 1982, 15p., ADA-117 839, 3 refs.

SNOW SURVEY TOOLS, PROFILES, EQUIP-MENT.

A method is presented for obtaining show profiles for analysis. The method and required equipment replace former methods such as the "roating bonfire" technique and the use of

EFFECTS OF INUNDATION ON SIX VARIE-TIES OF TURFGRASS. Erbisch, F.H., et al. May 1982, 25p., ADA-117 838.

Refs. p.17-25. Stark, K L.

36-4002

GRASSES, GROWTH, FLOODING, DAMAGE, PLANT PHYSIOLOGY, TESTS

PLANT PHYSIOLOGY, TESTS
Sis cold-adapted grasses were given ten-day dark and inundation stress treatments. Nugget Kentucky Nucgrass grown
in soil or gravel exhibited the best survival. Sydsport
bluegrass did well in gravel. Meadew fostail and manchar
brome survived the treatments when grown in silt soil, but
did not when grown on gravel soil. Ritionies were regenerated by most of the grasses. Root transverse sections
did not show any stress-related damage, but leaf sections
did. The damage in the sections paralleled that observed
macroscopically. Electrophoretic analysis for the perovidase
enzyme complex showed significant banding pattern differences before external damage was visible. This technique
may prove to be a diagnostic toos for determining stress
damage. Seedlings of all grasses except sydsport Niuegrass
survived. a 15-day inundation.

SR 82-13 IMPROVING ELECTRIC GROUNDING IN FROZEN MATERIALS.

Delaney, A.J., et al, June 1982, 12p., ADA-117 873, 14 refs.

Selimann, P.V., Arcone, S.A.

PERMAFROST PHYSICS, ELECTRICAL GROUNDING, ELECTRICAL RESISTIVITY, SA-LINE SOILS, GRAIN SIZE, ELECTRIC CHARGE, FROZEN GROUND PHYSICS, TESTS.

FROZEN GROUND PHYSICS, TESTS.

This study shows that resistance to ground of a simple vertical electrode in frozen fine-grained soil can be lowered significantly by placing it in a hole backfilled with a conductive soil-salt mixture. These tests were performed near Fairbanks, Alaska, in perennially frozen silt. Three electrodes were installed in holes created by detonating standard military shaped charges placed at the ground surface. The backfill contained varying amounts of salt. Measurement of resultance to ground was lowered by an order of magnitude by the addition of a water-saturated salt-soil backfill. Improvement persisted six months after the backfill was placed and allowed to freeze. The degree of improvement provided by this technique will be a function of grain size and permeability of the surrounding soil.

EVALUATION OF A SIMPLE MODEL FOR PREDICTING PHOSPHORUS REMOVAL BY SOILS DURING LAND TREATMENT OF WAS-TEWATER.

Ryden, J.C., et al, June 1982, 12p., ADA-117 848, 35

Syers, J.K., Iskandar, I.K. 36-4092

WASTE TREATMENT, WATER TREATMENT, SOIL CHEMISTRY, FORECASTING, LAND RECLAMATION, MATHEMATICAL MODELS.

This report evaluates a simple P balance model to predict site longevity with respect to P removal during land treatment of wastewater. The model is based on measured inputs and outputs of P at the treatment site and on an estimate of the P storage capacity of the soil profile. Sorption of P by three soils used for land treatment conformed to of P by three sous used for land treatment conformed to the P sorption model based on a generalized isotherm Laboratory sorption tests were used to predict P storage capacity of the soil profiles at a solution P concentration equivalent to that in the effluent applied to the soil. For two soil profiles the P balance model predicted site longerates of approximately 50 and 210 years. The existing depth of P enrichment in these profiles predicted from the model agreed closely with measurements of P enrichment based on amounts of NaOH-extractable P and on measured soil rolution P concentrations

LIMNOLOGICAL INVESTIGATIONS: KOOCANUSA, MONTANA. PART 4: FACTORS CONTROLLING PRIMARY PRODUCTIVITY. Woods, P.F., et al, June 1982, 106p., ADA-119 328, Refs. p.54-63.

Falter, C.M. 37-173

BIOMASS, RESERVOIRS, LIMNOLOGY, DAMS, PHOTOSYNTHESIS, LAKE WATER, WATER TEMPERATURE.

TEMPERATURE.

Postimpoundment loadings of total nitrogen and total phosphorus delivered to Lake Koocanusa by the principal inflowing stream, the Kootenai River, were predicted to be large enough to cause cutrophication of the lake; however, measured annual primary productivity for 1972 through 1075 was relatively low, and characteristic of oligotrophic values because phytoplankton photosynthesis was suppressed by physical limnological factors. The predominant flood-control function of the reservoir necessitates substantial reductions in volume during the autumn and winter. These large-scale water movements weakened the thermal structure of the reservoir

SR 82-17

PROCEEDINGS].
Snow Symposium, 1st, Hanover, NH, August 1981,
June 1982, 324p., ADB-091 442, Refs passim For individual papers see 40-1928 through 40-1946 40-1927

SNOW SURVEYS, SNOWFALL, BLOWING SNOW, MILITARY OPERATION, SNOW OP-TICS, SNOW ACOUSTICS, TRANSMISSION, MEETINGS, SCATTERING, SNOW WATER EQUIVALENT, INFRARED RADIATION, VISI-

PROCEEDINGS OF A WORKSHOP ON THE PROPERTIES OF SNOW, 8-10 APRIL 1981, SNOWBIRD, UTAH.

Brown, R.L., ed, 1982, 135p., ADA-120 517, Refs. passim. For individual papers see 36-2530 through 36-2535 and 39-1718. Includes committee chairmen's reports.

Colbeck, S.C., ed, Yong, R.N., ed.

39-1717

SNOW PHYSICS, SNOW SURVEYS, METAMOR-PHISM (SNOW), SNOW MECHANICS, SNOW ACCUMULATION, SNOW OPTICS, SNOW ELECTRICAL PROPERTIES.

SR 82-19

CHEMICAL OBSCURANT TESTS DURING WINTER; ENVIRONMENTAL FATE.

Cragin, J.H., Aug. 1982, 9p., ADB-068 594, 3 refs.

AEROSOLS, SNOW COMPOSITION, SNOW SURFACE, AIR POLLUTION, CHEMICAL PROP-ERTIES, SMOKE GENERATORS.

Concentrations of orthophosphate, IR1 and IR2 obscurants were measured in surface snow samples after a winter test of white phosphorus (WP) smoke and the two infrared screeners. Sample concentrations of IR1 and IR2 decreased ers. Sample concentrations of 1R1 and 1R2 decreased exponentially downwind from the smoke release point. Orthophosphate concentrations were all lower than the analytical detection limit of 0.15 mg/L. Quantities of smoke released pose no hazard to the public or environment Snow was found to provide a clean non-contaminating surface upon which to collect the deposited aerosol.

BIBLIOGRAPHY OF LITERATURE ON CHINA'S GLACIERS AND PERMAFROST. PART 1: 1938-1979.

Shen, J., ed, Sep. 1982, 44p., ADA-122 399. Zhang, X., ed. 37-2371

GLACIER SURVEYS, PERMAFROST, GLACI-OLOGY, SNOW SURVEYS, ICE SURVEYS, BIB-LIOGRAPHIES, AVALANCHES, MUDFLOWS, REMOTE SENSING, MAPPING, ISOTOPE ANALYSIS, CHINA.

This report is a translation of a book received by USACRREL as part of its cooperative program with the Institute of Glaciology and Cryopedology, Academia Simica, People's Republic of China. The bibliography covers the following repusite of Crima. The bibliography covers the following topics, glaciers by geographic regions, applied glaciology including snow, avalanches, and river ice, permafrost (cryopedology), mud flows, and survey techniques including mapping, remote sensing, and isotope analyses. A list of Chinese journals is included.

SR \$2-21

LIMNOLOGICAL INVESTIGATIONS: KOOCANUSA, MONTANA. PART 1: PRE-IM-POUNDMENT STUDY, 1967-1972.

Bonde, T.J.H., et al, Oct. 1982, 184p., ADA-119 632, Refs. p.76-78. Bush, R.M.

39-1260

LIMNOLOGY, LAKE WATER, DAMS, WATER POLLUTION, RESERVOIRS, NUTRIENT CYCLE, UNITED STATES—MONTANA— KOOCANUSA, LAKE.

KOOCANUSA, LAKE.

This report documents the effects of the construction of Libby Dam upon the water quality of the United States portion of the Kootenai River during the pre-impoundment phase of a long-term water quality study. Water quality problems during dam construction appeared to be restricted to short-term increases in suspended sediment and turbidity which suppressed the aquatic insect population in the rier downstream. Abnormally high background concentrations and abrupt chemical changes in water quality during the course of the study were attributed to industrial discharges from a fertilizer plant and mining operation located on an upstream inhutary to the river. Nutrent loadings of nitrogen and phosphorus were found to be of sufficient magnitude to grediet the development of cutrophic conditions following impoundment suggesting that effects in controlling nutrient impoundment suggesting that efforts in controlling nutrient point sources be continued

SR 82-22

SN 82-22 SUPPRESSION OF ICE FOG FROM THE FORT WAINWRIGHT, ALASKA, COOLING POND. Walker, K.E., et al. Oct 1982, 34p., ADA-123 069, 28 rcfs.

Brunner, W

39-1729

39-1729
ICE FOG, VISIBILITY, COUNTERMEASURES, PONDS, COOLING SYSTEMS, AIR TEMPERATURE, VEHICLES, ACCIDENTS
Ice fog near the Ft Wanningth cooling pond creates a subshift hazard. Observations show a substantial reduction in subshift along both private and public roadways in the path of the cooling ponds size fog plume. This reduction in visibility along both private and public roadways in the path of the cooling ponds size fog plume. This reduction in visibility increases as the ambient and temperature decreases. Visibility was less than 213 m (*00 ft) on the Richardson Highway on the average of # days for each of the 1 data years. Data collected during the winters of 1979-30, 1930-

81 and 1981-82 statistically show that use of a monomolecular film evaporation suppressant, hexadecanol, on the pond to reduce ice fog is ineffective. There is an immediate need for a driver warning system when visibility is affected by for a driver the ice fog.

LIMNOLOGICAL INVESTIGATIONS: LAKE KOOCANUSA, MONTANA. PART 3: BASIC DATA, POST-IMPOUNDMENT, 1972-1978. Storm, P.C., et al, Nov. 1982, 597p., ADA-124 454, 8

Bonde, T.J.H., Bush, R.M., Helms, J.W.

LIMNOLOGY, LAKE WATER, WATER CHEMISTRY, WATER POLLUTION, RESERVOIRS, RIV-ERS, STATISTICAL ANALYSIS, WASTE DISPOS-AL, WATER TREATMENT, WATER TEMPERA-TURE, UNITED STATES—MONTANA— KOOCANUSA, LAKE.

Study of Lake Koocanusa, Montana (the reservoir formed by impoundment of the Kootenai River by Libby Dam in 1972), was undertaken in 1972 as a continuation of pre-impoundment studies of the Kootenai River underway since impoundment studies of the Kootenar Kiver underway since 1967. This report presents the water quality-immological data compiled by the Corps of Engineers from 1972 through 1978. Additional information was provided by the British Columbia Ministry of Environment, Waste Management Branch, and the Water Survey of Canada. The data are presented in tabular form No analyses are included.

SR 82-24

ENERGY CONSERVATION AT THE WEST DOV-ER, VERMONT, WATER POLLUTION CON-TROL FACILITY.

Martel, C.J., et al, Nov. 1982, 18p., ADA-123 170, 4

Sargent, B C, Bronson, W.A. 37-2372

WATER TREATMENT, WATER POLLUTION, SEWAGE TREATMENT, WASTE TREATMENT, ENVIRONENTAL PROTECTION, COST ANAL-YSIS.

An energy audit was conducted at the West Dover, Vermont, water pollution control facility. The audit revealed that aeration, not pumping to the land treatment site, was the agration, not pumping to the faind treatment site, was the Energy Conservation Opportunities (EOC) were evaluated. Three-of-the ECOs were recommended for implementation; these could result in annual savings of more that \$6000. The remaining two ECOs were not recommended because of a large capital investment required and a long payback seriod.

SR 82-25

METHOD FOR MEASURING ENRICHED LEV-ELS OF DEUTERIUM IN SOIL WATER.

Oliphant, J.L., et al. Nov. 1982, 12p., ADA-123 070, 10 refs.

Jenkins, TF, Tice, AR. 38-4039

38-4039
SOIL WATER, HYDROGEN, ISOTOPES, HEAVY WATER, SPECTROSCOPY, ACCURACY.
This report describes procedures for analyzing hydrogen isotope ratios. Hydrogen is separated from liquid water or soil water by reacting the water with heated uranium. An isotope-ratio mass spectrometer determines the atom 4 deuterium in the hydrogen to a precision of 0 0075. Ways of ungrading the mass spectrometer to obtain better precision are also discussed.

USER'S INDEX TO CRREL LAND TREATMENT COMPUTER PROGRAMS AND DATA FILES. Berggren, P.A., et al., Nov. 1982, 65p., ADA-123-172, Refs p.56-65 Iskandar, I.K.

37-2373

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, COMPUTER PROGRAMS

This user's index is a directors for the computer programs and data files developed at CRRH on land treatment of wastemater. Two computers are used, a Prime 400 located at CRRH and the Dattmouth Time Shating System (DTSS) located at Dattmouth College, Hanner, New Hampshire The objective of this directory is to allow users to locate The objective of this directory is to allow users to togate and use or request desired programs of data files, to maintain a permanent record of programs and data files developed under the land treatment program, and to assist in technology transfer. Appendix A contains a not of published papers and technical reports related to the computer programs and the data files. The program or file of concern is listed at the end of each citation. SR 82-27

PILOT-SCALE EVALUATION OF THE NUTRI-ENT FILM TECHNIQUE FOR WASTEWATER TREATMENT.

Bouzoun, J.R., et al, Nov. 1982, 34p., ADA-123 429,

12 refs. Diener, C.J., Butler, P.L.

WASTE TREATMENT, WATER TREATMENT, CHEMISTRY, NUTRIENT CYCLE, PLANT PHYSIOLOGY, WATER RETENTION.

PHYSIOLOGY, WATER RETENTION.

An experiment was conducted to determine the feasibility of using several plant species in a pilot-scale nutrient film technique (NFT) installation to further treat primary-treated effluent. The reduction of biochemical oxygen demand, total suspended solids, and nitrogen and phosphorus concentrations by the NFT is discussed. Tracer studies showed that the hydraulic retention time of the wastewater in the NFT trays was inversely related to the wastewater application rate, and that for a given flow, plants with fine root systems (such as reed canarygrass) had a much longer detention time than plants with coarse tuberous rhizomes (such as cattails). The BOD reduction could be described using the plug-flow reactor model with first-order kinetics.

PHYSICAL PROPERTIES OF THE ICE COVER OF THE GREENLAND SEA.

Weeks, W.F., Nov. 1982, 27p., ADA-123 712, 3 refs.

ICE PHYSICS, SEA ICE, ICE STRUCTURE, ICE COMPOSITION, ICE MECHANICS, ICE FRICTION, ICE ADHESION, ICE ELECTRICAL PROPERTIES, ICE THERMAL PROPERTIES, FAST ICE, PACK ICE, GREENLAND SEA.

There is very little information available on the physical properties of the ice cover of the Greenland Sea. This pager reviews what is known about the different types of ice that are believed to occur in this area. It also discusses ice that are believed to occur in this area. It also discusses how the internal structure and composition of these ice masses may differ from those of the more extensively studied ice of the Beaufort Sea and identifies gaps in the present knowledge of the properties of such ice masses (regardless of places of origin). Finally a strategy is outlined for efficiently studying the properties of the ice in the Greenland Sea by combining structural and compositional characterization with limited property determinations.

SR 82-30

BASELINE WATER QUALITY MEASURE-MENTS AT SIX CORPS OF ENGINEERS RESERVOIRS, SUMMER 1981.

Parker, L.V., et al. Dec. 1982, 55p., ADA-125 440, 13 refe

Jenkins, T.F., Brockett, B.E., Butler, P.L., Cragin, J.H., Govoni, J.W., Keller, D.B. 37-3495

RESERVOIRS, WATER CHEMISTRY, WATER POLLUTION, CHEMICAL ANALYSIS, WATER TEMPERATURE, SUSPENDED SEDIMENTS.

TEMPERATURE, SUSPENDED SEDIMENTS.
Water quality Information was collected at six reservoirs
of the New England Division, U.S. Army Corps of Engineers,
during the summer and fall of 1981. The reservoirs tested
included Bell Mountain in Jamaica, Vermont, Everett and
Hopkinton-Elm Brook in Hopkinton, New Hampshire, North
Hartland in North Hartland, Vermont, Stoughton Pond and
North Springfield in North Springfield, Vermont, and Townshend in Townshend, Vermont. Field measurements includtemperature and Academy of the sheep over a feet. seems in townstend, vermoni. From measurements incused temperature, pH, conductivity, dissolved oxygen, depth, and the point of visual extinction. Laboratory analyses included determination of total suspended matter, turbulity, alkalinity, ammonium, nitrate, orthophosphate, total pheashborus, total nitrogen, total organic carbon, heavy metal (Zn. Pb, Cd and Cr), fecal coliforms, and chlorophyll a

SR 82-31

RESERVOIR BANK EROSION CAUSED AND INFLUENCED BY ICE COVER.

Gatto, L.W., Dec. 1982, 26p. ADA-124 508, Refs. p.20-26

BANKS (WATERWAYS), SOIL EROSION, ICE EROSION, RESERVOIRS, ICE COVER EFFECT, EROSION, WATER LEVEL, BEACHES.

EROSION. WATER LEVEL BEACHES.
The purpose of this stud, was to evaluate the importance of reservoir bank crosson caused by an see over. The evaluation is based on a literature review and on inferences made from field observations and experience. Very little is known about the amount of reservoir bank crosson caused by the actions of an see cover, although considerable information is available on the processes of see-related erison along the shorelines of beaches of occani, mers or lakes. The importance of see-related erison along a reservoir bank seems to be determined primarily by water level. If the reservoir water level is high enough for see to act directly on the bank face, the amount of erisons caused by see could be substantial. If the water level is below the bank, ice would have no direct effect on it. However, see could indirectly increase bank instability by disrupting and erising nearsbore and brach zones, which could lead to bank crosson.

SR 82-32 DEVELOPING A WATER WELL FOR THE ICE BACKFILLING OF DYE-2.

Rand, J.H., Dec. 1982, 19p., ADA-125 503, 11 refs.

WATER SUPPLY, ICE MELTING, WELLS, LOG-ISTICS, GREENLAND.

ISTICS, ORCEPALAIND.

One proposal to extend the useful life of DEW Line Ice
Cap Station DYE-2 is to backfill the lower 50 feet of the
truss enclosure with ice
This report discusses a method
by which 2.8 million gallons of water would be collected
and stored by melting ice. Also included is a description
of required components, their costs and the logistical requirements to establish such a system.

INFRARED INSPECTION OF NEW ROOFS. Korhonen, C., Dec. 1982, 14p., ADA-125 502, 9 refs.

ROOFS, MOISTURE DETECTION, INFRARED PHOTOGRAPHY, THERMAL INSULATION, BUILDINGS.

BUILDINGS.

The feasibility of using infrared cameras to detect wet insulation during the typical 1-year warranty period for new Army roofs was studied. Both the ability to gain moisture and the manner of wetting of insulations were of major concern. Although some insulations take on moisture much slower that others, \$ to 10 months usually is ample time for most insulations to absorb enough moisture to be detectable by an infrared camera. However, the early signs of this moisture as seen with the infrared camera differ with insulation type. Basically, boards of slower-westing cullular plasticmosture as seen with the intrared camera differ with insulation type. Basically, boards of slower-wetting cullular plastic insulations initially wet at their perimeters, whereas highly absorbent fibrous insulations tend to wet more or less uniformly. An infrared camera is well suited for finding the typically small and sometimes irregularly shaped wet areas on a new roof. A specification incorporating this technology should be now tested.

SR 23-01

USING THE DWOPER ROUTING MODEL TO SIMULATE RIVER FLOWS WITH ICE

Daly, S.F., et al, Jan. 1983, 19p., ADA-125 439, 10 refs

Ashton, G.D. 37-2487

RIVER FLOW, RIVER ICE, ICE COVER EFFECT. ICEBOUND RIVERS, FLOODS, FLOW RATE, MATHEMATICAL MODELS.

MATHEMATICAL MODELS.
The flow routing model of the National Weather Service entitled DWOPER (Dynamic Wave Operational Forecast Program) is examined with regard to the modifications required to include the effect of river ice on the flow variables of water level and discharge the ice effects are described.

Difficulties in modeling the ice effects are described. Example model output is presented showing the transient effects introduced by imposition of removal of the ice cover from and otherwise uncovered flow.

CRREL INSTRUMENTED VEHICLE: HARD-WARE AND SOFTWARE.

Blaisdell, G.L., Jan. 1983, 75p., ADA-128 713.

18-4041 TIRES, VEHICLES, LOADS (FORCES), SURFACE PROPERTIES, TESTS, COMPUTER PROGRAMMEASURING INSTRUMENTS, MAIN MAINTE. NANCE, VELOCITY.

NANCE, VELOCITY.
This report gives a detailed description of the CRREL Instrumentate white (CIV) — The CIV is equipped with instrumentation to measure three mutually perpendicular forces acting at the interface between the front tires and any surface material. In addition, accurate wheel and white speed and rear sale torque are measured. The vehicle is equipped for front-wheel, rear-wheel of four-wheel drive. A dual brake system allows front-, rear- or four-wheel braking. A minisomputer-based data acquisition system is installed in the vehicle to control data gathering and to process the data. The software for data acquisition and manipulation and the interfacing techniques required are described.

SE 43-04

SR 43-04
SNOW SYMPOSIUM 2; U.S. ARMY COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NEW HAMPSHIRE, AUGUST 1982, VOL.1.

Snow Symposium, 2nd, Hanover, NH, August 1982, Mar 1983, 295p., ADB-073 046, Refs. passim. For individual papers see 38-4305 through 38-4325 38-4304

SNOW PHYSICS, SNOW CRYSTAL STRUCTURE, SNOWFALL, BLOWING SNOW, SNOW OPTICS, INFRARED RADIATION, LIGHT OPTICS, INFRARED RADIATION, LIGHT TRANSMISSION, LIGHT SCATTERING, VISI BILITY, MODELS, MEETINGS.

SR 83-05

FROZEN SOIL CHARACTERISTICS THAT AF-

FECT LAND MINE FUNCTIONING. Richmond, P.W., Apr. 1983, 18p., ADA-144 308, 10 refs. 39.96

MILITARY OPERATION, FROZEN GROUND MECHANICS, EXPLOSION EFFECTS, LOADS (FORCES), MINES (ORDNANCE), FREEZE THAW CYCLES, STRESSES, FROZEN GROUND TEMPERATURE, TENSILE PROPERTIES, WATER CONTENT.
This record in

This report discusses the results of an experiment to determine the effect of five factors on the load transferred through frozen soil to a buried land mine. The five variables examined were load, temperature, number of freeze-thaw cycles, soil, and water content. Analysis of a half-fraction factorial experiment shows that no one variable can be used as a predictor of mine functioning performance.

SR \$3-06

OPTIMIZATION MODEL FOR LAND TREAT-MENT PLANNING, DESIGN AND OPERA-TION. PART 1. BACKGROUND AND LITERA-TURE REVIEW.

Baron, J.A., et al. Apr. 1983, 35p., ADA-134 554, Refs. p.31-35. Lynch, D.R., Iskandar, I.K.

38.887 JAND RECLAMATION, WASTE TREATMENT, WATER TREATMENT, MODELS, DESIGN, NUTRIENT CYCLE, SEASONAL VARIATIONS,

AGRICULTURE.

AGRICULTURE.

The material presented in Part 1 is intended to provide insight into the possible land treatment planning objectives, the status of land treatment research and implementations of these systems, and the potential for optimizing the configuration of these components.

The structure and application of nine models, which include methods to optimize the regional planning, design and operation of slow-rate land treatment systems, are briefly discussed. General comments follow on the overall status of research in land treatment modeling and design and directions for future work,

SR 83-07

OPTIMIZATION MODEL FOR LAND TREAT-MENT PLANNING, DESIGN AND OPERA-TION. PART 2 CASE STUDY. Baron, J.A., et al, Apr. 1983, 30p., ADA-134 513, 14

refs. Lynch, D.R., Iskandar, I.K.

38-883 WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, DESIGN, MODELS, NUTRIENT CYCLE, AGRICULTURE.

NUTRIENT CYCLE, AGRICULTURE.

A procedure to evaluate design and operating options for slow-rate land treatment systems is demonstrated. The nonlinear optimization model LTMOD is used to generate optimization model LTMOD is used to generate optimization model LTMOD is used to generate optimizations of storage capacity and irrigation area). The model is applied to a hypothetical slow-rate land treatment system in a cool, humid area with a forage crop, where the operation and design of the system is constrained by the potential for introgen removation in the storage facility and in the seel-crop system. The cost properties over the trange of optimal design alternatives are examined to deduce some general cost characteristics of slow-rate systems ranging from 0.5 to 10 mgd.

SR 83-08

OPTIMIZATION MODEL FOR LAND TREAT-MENT PLANNING, DESIGN AND OPERA-TION. PART 3. MODEL DESCRIPTION AND USER'S GUIDE.

Baron, J.A., et al. Apr. 1983, 38p. ADA-134 461, 4 refs.

18.881

WASTE TPEATMENT, LAND RECLAMATION, WATER TREATMENT, MODELS, DESIGN.

WATER TREATMENT, MODELS, DESIGN.

A nonlinear estimatation model applicable to slow-rate land treatment systems in cool, humid regions is described. The model prescribes optimal design variables as well as an operating schedule for a facility comprising a storage lagoon with bypass and a single-error strigation system. The optimization is achieved by use of generatived, coonnectically available software that embodies the reduced gradient method. The model equations are presented. The computational structure as implemented on the CREFT Firmer System is described, with instructions for use. A sample problem illustrates model application, and a recentral list new approach. model application, and a program listing is appended

SR 83-09 \$

CORPS OF ENGINEERS LAND TREATMENT OF WASTEWATER RESEARCH PROGRAM: AN ANNOTATED BIBLIOGRAPHY.

Parker, L.V., et al, Apr. 1983, 82p., ADA-130 136. Berggren, P.A., Iskandar, I.K., Irwin, D., McDade, C., Hardenberg, M. 38-4042

WASTE TREATMENT, WATER TREATMENT, SANITARY ENGINEERING, LAND RECLAMA-TION, BIBLIOGRAPHIES.

This bibliography contains publications of research funded in whole or in part by the Corps of Engineers Land Treatment Research Program, conducted from January 1972 to May 1982. The program was officially complete in October 1980. Six types of publications are included: 1) publications in open literature (which may include papers in journals, chapters in books and books), 2) technical reports, 3) engineer technical letters, 4) draft translations (mainly from Russian), 5) theses and dissertations (M.S., Ph.D.), and 6) presentations at scientific conferences. at scientific conferences

SR #3-10

SYNOPTIC METEOROLOGY DURING THE SNOW-ONE-A FIELD EXPERIMENT.

Bilello, M.A., May 1983, 80p., ADA-134 888, 8 refs. 38-885

SNOWFALL, STORMS, FREEZING, SYNOPTIC METEOROLOGY, PRECIPITATION (METEOROLOGY), METEOROLOGICAL DATA.

The daily atmospheric systems and weather fronts that traversed the northeastern United States during the SNOW-ONE-A Field Experiment from 30 November to 20 December 1981 and from 3 January to 10 February 1982 are summarized. This experiment is the second of a series of winter measure-This experiment is the second of a series of winter measurements of the influence of atmospheric obscurants on electrooptical system performance. The analysis of the large-scale synoptic weather patterns that developed during the field test period constitutes a critical component of the research program. Precipitation in northern Vermont during SNOW-ONE-A was near normal for the region. Numerous separate snowfall events, including some with substantial amounts of snow, were recorded during the experiment period. Although the storms that produced more than 6 cm of snow resulted from coastal cyclogenesis or developing waves that deepened as they moved north or northeastward waves that deepened as they moved north or northeastward waves that deepened as they moved north or northeastward along the Atlantic coastline. The majority of the other events with lighter amounts of freezing precipitation were caused by less intense storm systems, troughs, or fronts that traversed the region from the west or northwest and often moved quite rapidly.

EFFECT OF VESSEL SIZE ON SHORELINE AND SHORE STRUCTURE DAMAGE ALONG THE GREAT LAKES CONNECTING CHAN-NELS

Wuebben, J.L., May 1983, 62p., ADA-134 887, 13

40-4677 SHORES, CHANNELS (WATERWAYS), ICE LOADS, SHIPS, STRUCTURES, DAMAGE, VELOCITY, GREAT LAKES.

In conjunction with the Great Lakes connecting channels In conjunction with the Great Lakes connecting channels and harbors study, this report examines the potential damage to the shore and shore structures due to an increase in vessel size. The areas considered in this report are the United States shorelines along the St. Marys, St. Clair and Detreit rivers. The potential for shoreline or shore structure domage due to an increase in vessel size was reviewed on both a conceptual and site-specific basis. Ship-induced warest were ruled out as a damage mechanism since the on both a conceptual and site-specific basis. Ship-induced waves were ruled out as a damage mechanism since the analysis showed that the contemplated increases in vessel size would not significantly affect wave heights in the nearshore zone. Propeller wash was discounted for similar reasons Ship-induced drawndown was determined to be the major potential damage mechanism. While larger ships potentially produce more damage, this potential is significant only in severely restricted channel sections for the size increase considered here. By far the most significant factor in sub-prelated damage potential is vessel speed. In almost all areas the effect of an increase in vessel size could be eliminated by a reduction in vessel speed of 1-2 mph.

SR 83-12
MIZEX—A PROGRAM FOR MESOSCALE AIRICE-OCEAN INTERACTION EXPERIMENTS
IN ARCTIC MARGINAL ICE ZONES. 2. A
SCIENCE PLAN FOR A SUMMER MARGINAL
ICE ZONE EXPERIMENT IN THE FRAM
STRAIT/GREENLAND SEA: 1284.
Johannessen, O. M., ed., May 1983, 47p., ADA-134
872, 866-819, 31.

872, Refs. p 19-21

Hibler, W.D. II., ed. Wadhams, P. ed. Campbell, W.J., ed, Hasselmann, K., ed, Pyer, L. ed, Dunbar, M., 38-876

ICE WATER INTERFACE, ICF AIR INTERFACE, ICE NAVIGATION, ICE EDGE, RESEARCH PROJECTS, GREENLAND SEA.

SR 83-13

REPORTS OF THE U.S.-U.S.S.R. WEDDELL POLYNYA EXPEDITION, OCTOBER-NOVEM-BER 1981, VOLUME 6: UPPER-AIR DATA Andreas, E.L., May 1983, 288p., ADA-134 871. 38-4498

MARINE METEOROLOGY, METEOROLOGICAL INSTRUMENTS, AN-TARCTICA—WEDDELL SEA.

This report summarizes the most extensive set of upper-This report summanzes the most extensive set of upper-air data ever collected over Antarctic sea ice in winter, the data obtained using radiosondes during the U.S.-U.S.S. R. Weddell Polynya Expedition. The report includes a descrip-tion of the two radiosonde systems used, a chronological listing of all 110 soundings made during the expedition, a discussion of measured and derived quantities, listings of all of the sounding data, and plots to 5 km of the potential temperature profile from each sounding.

SR \$3-14

REPORTS OF THE U.S.-U.S.S.R. WEDDELL POLYNYA EXPEDITION, OCTOBER-NOVEM-BER 1981 VOLUME 7: METEOROLOGICAL DATA. 7: SURFACE-LEVEL

Andreas, E.L., et al, May 1983, 32p., ADA-134 476, 11 refs.

Makshtas, A.P.

38-867

METEOROLOGICAL DATA, SEA ICE, ICE TEM-PERATURE, WIND VELOCITY, AIR TEMPERA-TURE, HUMIDITY, SOLAR RADIATION, AN-

TARCTICA—WEDDELL SEA.

This report summarizes a comprehensive set of surface-level meteorological data collected on the Mikhail Somov over sea ice in the southern ocean during the U.S.-U.S.S.R. Weddell Polynya Expedition in October and November of 1981. The rolynya Expedition in October and November of 1981. The data assembled here comprise three distinct sets of measurements: the standard meteorological observations at 3-hour intervals for 41 consecutive days, radiation and ice-surface temperature measurements every hour for 23 days while the Somov was within the Antarctic ice pack, and 23 sets of atmospheric surface-layer profiles of velocity, temperature and humidity for various sea-ice conditions. (Auth.)

SR 83-15

SHORELINE EROSION AND SHORE STRUC-TURE DAMAGE ON THE ST. MARYS RIVER. Wuebben, J.L., May 1983, 36p., ADA-134 863, 4 refs. 32.226

SHORELINE MODIFICATION, SHORE ERO-SION, FAST ICE, SEDIMENT TRANSPORT, STRUCTURES, DAMAGE, ICE NAVIGATION, ICE FLOES. PIERS.

ICE FLOES, PIERS.
From 1961 to 1970 navigation on the St. Marys River closed for the winter from mid-December to mid-April. Subsequent extension of the navigation season to include the winter months resulted in complaints of shoreline and dock damage along the navigation channels. Studies were initiated to examine the potential for navigation-caused damage, but information on damage during a navigation-free winter was lacking. Since limited navigation was planned during the 1979-80 winter, the St. Marys River System could be examined under relatively undisturbed conditions. The report examines potential navigation-related damage mechanisms and persents data from the closed navigation season. The results are compared with information collected during previous periods with winter navigation.

SNOW-ONE-B DATA REPORT.

Bates, R.E., ed. June 1983, 284p. ADB-088 224, Refs. passim. For individual papers see 39-1952 through 39-1961. For SNOW-ONE-A preliminary data report see 37-1094 (SR 82-8).

Bowen, S.L., ed.

39-1951

SNOWFLAKES, WAVE PROPAGATION, MILITARY OPERATION, SNOWFALL, SNOW-STORMS, METEOROLOGICAL DATA, VISIBILITY, ELECTROMAGNETIC PROPERTIES, OPTI-CAL PROPERTIES, TRANSMISSION

This is the third in a series of data reports on the SNOW field experiments of the U.S. Army Corps of Engineers Winter Battlefield Obscuration Research Program. It contains data obtained by the U.S. Army Cold Regions Research and Engineering Laboratory and other agencies during the SNOW ONE B field experiment at Camp Grayling, Michigan, between 30 Nowember and 17 December 1932. Included between 30 November and 17 December 1982. Included are data on meteorology, atmospheric turbulence, visible and IR transmission, snow characterization, millimeter wavelength radar propagation, transmittance through falling and Slowing snow, the lidar system, the SMART system, and preliminary smoke trials with snow as a contrast background SR 83-17

PROCEEDINGS OF THE FIRST INTERNA-TIONAL WORKSHOP ON ATMOSPHERIC ICING OF STRUCTURES, 1-3 JUNE 1982, HAN-OVER, NEW HAMPSHIRE.

Minsk, L.D., ed. June 1983, 366p., ADA-131 869, Refs. passim. For individual papers see 38-424 through 38-463.

38-423

36-423 ICING, STRUCTURES, ICE LOADS, SNOW LOADS, ICE ACCRETION, SNOW ACCUMULA-TION, TRANSMISSION LINES, POWER LINE ICING, MEETINGS, ICE REMOVAL, ICE PRE-VENTION

EFFECT OF UNCONFINED LOADING ON THE UNFROZEN WATER CONTENT OF MANCHES-TER SILT.

Oliphant, J.L., et al, June 1983, 17p., ADA-131 851, 13 refs.

Tice, A.R., Berg, R. 39-1370

FROZEN GROUND STRENGTH, LOADS (FORCES), UNFROZEN WATER CONTENT, SOIL WATER, TEMPERATURE MEASURE-MENT, NUCLEAR MAGNETIC RESONANCE, THERMODYNAMICS.

THERMODYNAMICS.

Frozen samples of a Manchester silt having various total water contents were subjected to several surcharge loads, and the unfrozen water content was measured with NMR as the temperature was gradually raised. The surcharge pressure had a greater effect on the unfrozen water content than had been predicted using the Clausius-Clappyron equation. This effect was explained by considering the loaded samples as nonequilibrium systems in which the surcharge pressures were concentrated in the ice phase.

SR 43-19

PREDICTING LAKE ICE DECAY. Ashton, G.D., June 1983, 4p., ADA-132 012, 4 refs.

LAKE ICE, ICE DETERIORATION. HEAT TRANSFER, FORECASTING, DEGREE DAYS, ANALYSIS (MATHEMATICS).

ANALTSIS (MATHEMATICS).

A nine-year record of the lake see decay pattern of Post Pond in Lyme, New Hampshire, is analyzed using a simple algorithm. Quite good correlations between decay rates and thaving degree-days are obtained using heat transfer coefficients on the order of 15-20 W/sq m/deg C.

SR 83-2

REPORTS OF THE U.S.-U.S.S.R. WEDDELL POLYNYA EXPEDITION, OCTOBER-NOVEM-BER 1981, VOLUME 5, SEA ICE OBSERVA-TIONS

Ackley, S.F., et al, Jan. 1983, 6p. + 59p., ADA-130 140, 4 refs.

Smith, S.J. 39-310

SEA ICE DISTRIBUTION, POLYNYAS, ICE

CONDITIONS.

Sea see conditions are presented in several formats. These include an ice conditions map prepared by the ship's meteorological crew, a narrative ice log supplemented by photographs taken by one of the authors, and daily satellite photographs. These are presented in a format compiling each day's conditions on one or two pages. These observations are being correlated with other satellite-based estimates of ice conditions, and with other consumeration and meta-conditional measurement. with other oceanographic and meteorological measurements made during the expedition (Auth)

SR 83-20

SNOW COVER AND METEOROLOGY AT AL-LAGASH, MAINE, 1977-1980.

Bates, R., June 1983, 49p., ADA-132 013, 4 refs.

SNOW COVER DISTRIBUTION, SNOW SUR-VEYS, SNOW WATER EQUIVALENT, PRECIPI-TATION (METEOROLOGY), WEATHER STA-TIONS, METEOROLOGICAL DATA, UNITED STATES-MAINE ALLAGASH

STATES—MAINE AILAGASH
A complete meteorological field station and a snow survey network were set up in the Allagash Biver Watershed to record baseline conditions prior to construction of the proposed Dickey-Lincoln Dam in the upper St. John River Basin Allagash, Maine. Nearly three years of daily data (Oct. 1977 May. 1990) are summarized and compared to long-term climatic conditions for nearby. National Weather Service stations. Air temperature values for Allagash are similar to those for the two nearest meteorological stations, water equivalent precipitation amounts and smoofall totals in the Allagash basin are inconsistent with those for nearby meteorological stations.

SR 83-21

EXAMINATION OF A BLISTERED BUILT-UP ROOF: O'NEILL BUILDING, HANSCOM AIR FORCE BASE.

Korhonen, C., et al, June 1983, 12p., ADA-133 042, 2 refs.

Greatorex, A

ROOFS, DEFORMATION, COLD WEATHER TESTS, MOISTURE, INFRARED SPECTROS-COPY.

Blisters are a common defect in built-up roofs. In January 1983 we examined a recently constructed built-up roof at Hanscom Air Force Base in Bedford, Massachusetts, to deter-mine the cause of its blisters. We used an infrared scanner, mine the cause of its blisters. We used an infrared scanner, took ten core samples, conducted visual examinations, and cut open three blisters. Our findings show that the membrane is essentially watertight and that the blisters were caused by voids that were built into the roof during construction. Poor workmanship and cold weather are the likely exauses of the voids. With proper maintenance reasonable performance can be achieved from this imperfect roof

SR 83-22 ESTIMATING TRANSIENT HEAT FLOWS AND MEASURING SURFACE TEMPERATURES OF

A BUILT-UP ROOF. Korhonen, C., July 1983, 20p., ADA-133 043, 4 refs.

HEAT TRANSFER, SURFACE TEMPERATURE, ROOFS, INFRARED EQUIPMENT, THERMAL INSULATION.

Transient heat flow through a multilayered building component can be estimated using the transfer function method presented in the ASHRAE (1977) Handbook of Fundamentals. Solin the ASHRAE (1977) Handbook of Fundamentals. Sol-air temperature is one parameter recommended for use in this method, but surface temperatures were shown to be a reasonable substitute. Although the magnitude of the heat flow as calculated with the transfer function appears to be reasonable, more testing should be carried out to determine its accuracy. An infrared camera can measure roof surface temperatures fairly accurately; the most accurate measurements were made at night.

AEROSTAT ICING PROBLEMS

Hanamoto, B., Aug. 1983, 29p., ADA-133 403.

BALLOONS, ICING, PROTECTIVE COATINGS, ICE PREVENTION, COATINGS.

This report describes laboratory tests to determine the effectiveins report describes isolation tests to determine the effectiveness of a copolymer coating on a balloon to minimize ice build-up problems when operating in sleet, freezing rain or other ice-forming conditions. Methods for descrip the surface after an see cover forms are also described. A small-scale bulloon was used for the laboratory tests. A full-scale prototype was also partially coated with the copolymer to test its effectiveness as an icing control measure.

SR 83-24

CURRENT PROCEDURES FOR FORECASTING AVIATION ICING.

Tucker, W.B., Aug. 1983, 31p., ADA-136 152, 23 refs. 38-2437

AIRCRAFT ICING, ICE FORECASTING, WEATHER FORECASTING, METEOROLOGI-CAL FACTORS.

CAL FACTORS. The tespecishelines for aircraft long forecasts in the U.S. he with the National Weather Service (NWS) for civilian operations and the U.S. Air Forece Air Weather Service (AWS) and Naval Weather Service for military operations. Forecasting technology is based upon empirical rules and techniques that were developed in the 1950s. The AWS is the only forecasting agency which issues explicit numerical sting products to aid the forecaster. These products are also based upon the application of techniques developed long ago. The NWS has no riporous guidelines for developing seing forecasts, thus individual forecasters adopt their own preferred methods. The tendency is generally to "overforecast." that is, to forecast too large an area of seing for too long a time. A major shortcoming in the ability to produce more accurate forecasts is that atmospheric parameters critical to using are not rostinely observed. stering for too long a time. A major shottcoming in the ability to produce more accurate forecasts is that atmospheri parameters critical to scing are not routinely observed.

SR #1.75

UNDERSTANDING THE ARCTIC SEA FLOOR FOR ENGINEERING PURPOSES.

National Research Council. Committee on Arctic Seafloor Engineering, 1982, Washington, D.C., Na-tional Academy Press, 1982, 141p., ADA-119, 773, Refs. p.115-141. 38-787

SUBSEA PERMAFROST FROZEN GROUND PHYSICS, PERMAFROST PHYSICS, FREEZE THAW CYCLES, OCEAN NOTTOM, ICE CONDI-THAW CYCLES, ICE AN AUTION, ICE CONDITIONS, EROSION, POLAN REGIONS, BOTTOM SEDIMENT, ENGINEERING, EXPLORATION, FROST HEAVE, PETROLEUM INDUSTRY, ICE SCORING, OFFSHORE STRUCTURES, HYDRATES, SEASONAL VARIATIONS, ARCTIC OCEAN.

This report identifies and assesses those arctic seafloor phenomena that influence the design and operation of facilities

and platforms for exploring and producing oil, gas, and hard minerals both on and under the sea floor. It also identifies knowledge that is needed of seafloor phenomena toentities knowledge that is needed of seatloof phenomena and conditions, and, for several areas of major concern, recommends special research. These recommendations are intended to enhance the ability of the engineer and operator to anticipate and avoid problems that may be posed by seafloor and coavial phenomena, and guard against the effects of such events as thaw subsidence and erosion.

LAND TREATMENT PROCESSES WITHIN CAPDET (COMPUTER-ASSISTED PROCEDURE FOR THE DESIGN AND EVALUATION OF WASTEWATER TREATMENT SYSTEMS). Merry, C.J., et al. Sep. 1983, 79p., ADA-134 766,

Refs. p.70-72. Corey, M.W., Epps, J.W., Harris, R.W., Cullinane, M.J., Jr.

38.887

LAND RECLAMATION, WASTE TREATMENT, WATER TREATMENT, SEEPAGE, COMPUTER-IZED SIMULATION, ANALYSIS (MATHEMAT-ICS).

A summary of the first, second, and third-order design steps for the three land treatment unit processes (slow infiltra-tion, rapid infiltration and overland flow) within the CAPDET model is presented. The first-order design, consisting of model is presented. The first-order design, consisting of the basic sanitary engineering processes for slow infiltration, rapid infiltration, and overland flow, is described in terms of the selected procedures and the computer format. The second-order design is a description of the quantities and sizes calculated for each land treatment process. The third-order design is the calculation of the unit process costs by applying prices to the quantities and sizes calculated during the second-order design step.

REVISED PROCEDURE FOR PAVEMENT DE-SIGN UNDER SEASONAL FROST CONDI-

Berg, R., et al, Sep. 1983, 129p., ADA-134 480, 7 refs. Johnson, T.C.

PAVEMENTS, FROST PROTECTION, FROST ACTION, SOIL STABILIZATION, FROST HEAVE, SEASONAL FREEZE THAW, ROADS, AIRPORTS, THERMAL INSULATION, DESIGN CRITERIA

This report presents engineering guidance and design entertal for parements at Army and Air Force facilities in seasonal frost areas. Design methods for controlling surface roughness and loss of subgrade strength during thawing periods are provided. Criteria for using thermal insulating materials and membrane encapsulated soil layers in seasonal frost areas are presented. See design examples are included.

SIMPLE BOOM ASSEMBLY FOR THE SHIP-BOARD DEPLOYMENT OF AIR-SEA INTERAC-TION INSTRUMENTS.

Andreas, E.L., et al. Sep. 1983, 14p., ADA-134-256, 21 refs.

Rand, J.H., Ackley, S.F.

38-868

METEOROLOGICAL INSTRUMENTS, SURING INSTRUMENTS, SHIPS, I MEA-BOOMS (EQUIPMENT). ANTARCTICA

(EQUIPMENT). ANTARCTICA

We have developed a simple boson for use in measuring meteorological variables from a shap. The main structural member of the boson, a triangular communications tower with rollers attached along its bottom side, is deployed horizon atth from a long, first deck, such as a holocopter deck, and will support a 100-lig payload at its outboard end. The boson is easy to deploy, requires minimal ship modifications, and provides ready access to the instruments mounted on it. And because it is designed for use with the ship recommand, occanographic work as an go on at the same time as the air-sea interaction measurements. We detectibe our use of the boson on the Mikhazi Somon during a crisic into antarctic sea see and present some representative measurements made with instruments mounted on it. Theory, experiment, and our data all imply that instruments deployed windward from a rear helicopter deck can reach air undisturbed by the ship. Such an instrument with has clear advantages over the more customary mast, bon, or busy locations (Auth.)

U.S. TUNDRA BIOME PUBLICATION LIST. Brown, J. et al, Sep. 1983, 29p. ADA-137 441 Liston, N., Murphy, D., Watts, J.

TUNDRA, VEGETATION, ECOSYSTEMS, NU-TRIENT CYCLE, BIBLIOGRAPHIES, PLANT PHYSIOLOGY, SOILS, ECOLOGY, CLIMATIC FACTORS. ENVIRONMENTAL IMPACT.

SR #3-30

HISTORICAL BANK RECESSION AT SELECT-ED SITES ALONG CORPS OF ENGINEERS RESERVOIRS.

Gatto, L.W., et al, Sep. 1983, 103p., ADA-138 030, Refs. p.76-79. Doe, W.W., III.

SOIL EROSION. RESERVOIRS, BANKS (WATERWAYS). ICE COVER EFFECT, FREEZE THAW CYCLES, SHORELINE MODIFICATION, ENVIRONMENTAL IMPACT, WATER WAVES, WIND FACTORS, CLIMATIC FACTORS.

WIND FACTORS, CLIMATIC FACTORS.
This analysis was done to improve our understanding of the patterns of reservoir bank recession as a preliminary step in a detailed study of reservoir bank erosion processes and environmental impacts. The specific objectives were to observe and document bank characteristics, conditions and changes along reservoirs with eroding banks, to estimate the amounts of historical bank recession, and to analyze its possible causes. Aerial photographs were used to observe the historical bank changes and to estimate bank recession. Site reconnaissance, discussions with Corps personnel, and published reports were used to evaluate possible relationships between the recession and reservoir bank conditions.

SR \$3-31

PROCEEDINGS, VOL.1.

Snow Symposium, 3rd, Hanover, NH, Aug. 9-10, 1983, Oct. 1983, 241p., ADB-079 265, Refs. passim. For individual papers see 38-2119 through 38-2138.

SNOW PHYSICS, SNOW CRYSTAL STRUCTURE, SNOW WATER EQUIVALENT, SNOW-FALL, HEAT TRANSFER, SNOW SURVEYS, MICROWAVES, REMOTE SENSING, ANALYSIS (MATHEMATICS), MEETINGS.

SR 83-32

MULTIVARIABLE REGRESSION AL-GORITHM.

Blaisdell, G.L., et al, Nov. 1983, 41p., ADA-136 630. Carpenter, T. 38-4043

DATA PROCESSING, ANALYSIS (MATHEMATICS), COMPUTER PROGRAMS, THEORIES.

ICS), COMPUTER PROGRAMS, THEORIES.

A BASIC algorithm has been developed that is capable of fitting a mer-defined regression equation to a set of data. This best-fitteners algorithm is unique in that it allows mitingle variables and multiple forms (exponential, ingonometric, legarithmic, etc.) to be present in a single regression equation. The least-squares regression epidemic determines the constants for each of the regression equation terms to provide a best-fit curve. Other programs within the algorithm set allow for data entry, editing and point-out, and plotting of the raw data and their best-fit regression curve. CETYC.

SR 84-01

INTEGRATION OF LANDSAT LAND COVER DATA INTO THE SAGINAW RIVER BASIN GEOGRAPHIC INFORMATION SYSTEM FOR HYDROLOGIC MODELING.

McKim, H.L., et al. Feb. 1984, 19p., ADA-140 185, 16

Ungar, S.G., Merry, C.J., Gauthier, J.F. 38-1011

HYDROLOGY, REMOTE SENSING, TERRAIN

HYDROLOGY, REMOTE SENSING, TERRAIN IDENTIFICATION. LANDSAT. MODELS, RIVER BASINS, ENVIRONMENTAL IMPACT, FLOOD FORECASTING, UNITED STATES-MICHIGAN SAGINAW RIVER.

A May 1977 Landsur-2 scene that covered approximately 55% of the Sagnas River Basin was classified into five final cover categories (urbas, agriculture, forest, freshwater weillands and open water) sting a coordicentrol disabler the Landsut digital data were geometrically corrected to conform to a UTM (I unversal Transvette Mercard) gradefore classification. The II-sere Landsut sand cover classification data base was converted to 40-acre grid cells (us-by-six Rocks of Landsut gracits) using an aggregation scheme and was integrated into the Detroet District's custing grid cell data base. A regression relationship between unit hydrograph parameters and the Landsut land cover data were suitable for the Curps of Engineers hydrologic model. hydrologic model

SR 84-02

ICE OBSERVATION PROGRAM ON THE SEMISUBMERSIBLE DRILLING VESSEL SEDCO 708.

Minsk, L.D., Feb. 1984, 14p., ADA-139 992, 5 refs 38-4045

SHIP ICING, ICE CONDITIONS, ICE FORMATION, ICE PREVENTION, PROTECTIVE COATINGS, OFFSHORE DRILLING, SHIPS, SEA SPRAY

A semishmerable dailing vessel (SFDCO 105) was equipped with see detectors and see accretion measurement devices, and showers attended the accretion measurement devices, and shower attended an exportatory well on the North Assurant Shelf. One significant storm

occurred 2-8 January 1983, which resulted in light spray ice accretion, estimated at 30 tons and a maximum thickness of 5 in. on understructure diagonal trusses. Only minor of 5 in. on understructure diagonal trusses. Only minor icing (less than 1 in.) occurred on the windward takin columns (30 ft diameter). Comparison with the 1979 Occan Bounty icing event suggests that wind speed is the significant parameter influencing icing severity, and that light icing will occur at average speeds around 30 knots and heavy icing around 88 knots, with undefined severity within the range. Four irephobic cruttings were exposed on test panels, one was effective

SR 84-03

U.S. AIR FORCE ROOF CONDITION INDEX SURVEY: FT. GREELY, ALASKA.
Coutermarsh, B.A., Mar. 1984, 67p., ADA-142 023, 6

38-4046

ROOFS, MOISTURE DETECTION, TESTS, DE-FECTS, CRACKING (FRACTURING).

The United States Air Force Roof Condition Index Survey (RCI) procedure was studied and used on the roofs of Fort Greely, Alaska. Approximately 93 roof sections were in spected using this procedure. The results will be used in a comparison study between this method and the Army's method of infrared roof surveys and core samples. This report details the RCI method, discusses various aspects of the procedure and presents the results of the Fort Greely SUCTEY.

SR 84-84

ASSESSMENT OF ICE ACCRETION ON OFF-SHORE STRUCTURES.

Minsk, L.D., Apr. 1984, 12p., ADA-141 996, 19 refs.

ICE ACCRETION, OFFSHORE STRUCTURES, SEA SPRAY, SHIP ICING, OFFSHORE DRILL-ING.

The literature on sea speny (superstructure) song is almost module hased on observations on moving steps. However, The literature on sea spray (superstructure) sorie is almost enderly based on observations on moving ships. However, iong on stationacy of there platforms with their fixed vertical columns will differ significantly from ship iong, which is influenced by slap movement and wind and wave directions. An observation program on offshere drilling vessels is proposed, doing I-lim, doam is I-la-long cylinders in atrays as a standard measuring technique for spray song. Atmospheric iong may be a source of fee accretion on deriods in some leathout, and the best commercial device currently available for measuring it is the Rosemount detector. Improved devices for both spray and atmospheric ion accretion measurements should be developed. Icepholic coatings have the potential for robusing (or accretion, and testing of candidate materials should be undertaken. Well-documented some reports by all types of shaps or platforms should be made and collected at a central cleanighouse. at a central cleanaghouse.

OPERATION OF THE U.S. COMBAT SUPPORT BOAT (USCSBMK 1) ON AN ICE-COVERED

Stubstad, J., et al. Apr. 1984, 28p., ADA-142 535, 8 tefs.

Rand, J.H., Jackson, L. 38-4048

MILITARY OPERATION, ICE BREAKING, RIVER CROSSINGS, CHANNELS (WATER-WAYS), ICE COVER EFFECT, FAST ICE, ICE COVER THICKNESS, PONTOON BRIDGES

From 15 January through 15 April 1932, the U.S. Combat Support Boat (USCSBMK I) was tested on the Connecticut River, in and around Hanover, New Hampsbure, to examine niver, in an amount element; were transporter, in examine the operation on an rescontered waterway. The objectives were to determine to what extent shoreline see a ould affect were to determine to what extent shortene are a-ordel affect limitch and recovery and if the boat could create an architectural across a river so that a ribbon-bodge could be floated. Shortene are can inhibit limitch and recovery, but several solutions were developed to reduce or chrimate these problems. The boat can, to a limited extent, he med as an expedient secheraler. It can break competent see shorts 35-4 in thick as well as significantly thicker than-weakened see shorts. Shorts of well degraded and of season, see up to 10 in thick were broken.

MODEL TESTS IN ICE OF A CANADIAN COAST GUARD R-CLASS ICEBREAKER.

Tatinelaux, J.C., Apr. 1984, 24p., ADA-141 995, 13

ICEBREAKERS, ICE COVER STRENGTH, ICE NAVIGATION, ICE FRICTION, STRENGTH, MODELS, TESTS, ICE SOLID INTERFACE, PRO-PELLERS, FORECASTING, VELOCITY

This report presents the results of resistance and propulsion tests in level see of a 1 Thirade model of the Rocassi scheeder of the Canadian Coast Guard. On the basis of the model of the Canadan Coast Grand. On the basis of the model test results, folloscale performance is predicted and compared with available find-scale trials data. Predicted or creastance and required peopoles spin, thrust and delivered power are lower than full-scale measurements. Dus disagreement was attributed to the fact that the ship model had a much lower see friction crefficient than the prototype. On the other hand, predictions of thrust and power for a given ship speed and propeller spin are in good agreement with corresponding full-scale measurements.

SR \$4-07

MIZEX-A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION EXPERIMENTS IN ARCTIC MARGINAL ICE ZONES. 3. MOD-ELING THE MARGINAL ICE ZONE.

ELEANG RIFE, MARGINAL ICE ZONE. Hibler, W.D., III, ed, Apr. 1984, 99p., ADA-145 351, Discussions, p.95-98. Refs. passim. For individual papers see 39-361 through 39-374. 39-360

39-360
ICE MODELS, ICE MECHANICS, ICE EDGE, SEA ICE DISTRIBUTION, ICE WATER INTERFACE, ICE AIR INTERFACE, WIND FACTORS, ICE CONDITIONS, OCEAN CURRENTS, RHEOLOGY.

CD SAME

ACCUMULATION, CHARACTERIZATION, AND STABILIZATION OF SLUDGES FOR COLD REGIONS LAGOONS.

Schneiter, R.W., et al. Apr. 1984, 40p., ADA-141 948, Refs. p.37-40.

Middlebrooks, E.J., Sletten, R.S., Reed, S.C. 38-4050

SEWAGE TREATMENT, SANITARY ENGI-NEERING, SLUDGES, FREEZE THAW CYCLES, MODELS, POLAR REGIONS.

Accumulated solids associated with the operation of aerasted and facultatine lagoons in cold climates were investigated to determine 1) the rate and extent of solids accumulation, 2) the characteristics of the accumulated solids, 3) the potential for in situ stabilization of the accumulated solids, and 4) for in situ stabilization of the accumulated solids, and 4) the effect of lime treatment upon the pathogenic population and utbrequent solids drying on sand and seel bods. Accumulated sludges from the Logan and Comme, Utah, facelinger lapoers and the Palmer and Galena, Alaska, partial mit serated lapoers were studeed. The rates of accumulation, determined by in situ measurement of the shadge laying in each lapoen, were found to vary with lapoen type and sweetife overstional and environmental conditions. securic eccusional and environmental conditions

SR 84-09

PROCEDURE FOR CALCULATING GROUND-WATER FLOW LINES.

Daly, C.J., Apr. 1984, 42p., ADA-141 947, 4 refs. 12051

GROUND WATER, WATER FLOW, FLUID FLOW, COMPUTER PROGRAMS, MATHEMATICAL MODELS, WATER TABLE, VELOCI-TY.

logy for the calculation of flow lines in steady two-dimensional velocity fields is described. Alor mitically involuntessonal venerity littles to described. Although the principal application to intended to be determined though the principal application to mitigate line, components of the methodology are relevant to more general problems of final flow. Two alternative numerical procedures form the core of the methodology. Each employs the method of characteristics to solve for the advection of frond partners. The first mess an effection, fourth-order Renge-Kutta, producted researcher Monthly Monthly mess or control from the first. corrector algorithm based upon a constant time step. The second was a fifth-order Runge-Kutta algorithm incorporating an embedded fourth-order result. This latter alternative an embedded feath-order result. This latter alternative meltides automatic time-step modification and guarantees as prescribed level of accuracy. Several utility roomines are provided in support of the method of characteristics.

SR 84-10

OBSERVATIONS DURING BRIMFROST VAL Bouzoun, J.R., et al. May 1984, 36p., ADA-142 559, 2 refs.

Haynes, F.D., Perham, R.E., Walker, K.E., Craig, J.L., Coilins, C M 31-4C52

MILITARY OPERATION, COLD WEATHER OP-ERATION, ELECTRICAL GROUNDING, SHEL-TERS, WASTE DISPOSAL, SANITARY ENGI-NEERING, WATER SUPPLY, MILITARY EQUIP-MENT, ICE CROSSINGS, TRAFFICABILITY

MENT, ICE CROMINON, TRAPPICABILITY During BRIMFROST 'B), a bermal joint training exercise conducted in Alaika by the US Readment Command, a team from the 1 S Army Cold Regions Receased and Engineering Laboratory made several trips into the exercise area to observe and document Army operations in the Artise. This report presents an oversion of the team's observations in the following areas electrical grounding, camouflage, field fortifications, from shelters, water supply point operations, see budges vehicular mobility and human and social water distoral. disposal!

SR 84.11

ANALYSIS OF INFILTRATION RESULTS AT A PROPOSED NORTH CAROLINA WASTEWA-TER TREATMENT SITE. Abele, G., et al. May 1984, 24p., ADA-142 598, 6 refs

14.2051

WASTE TREATMENT, WATER TREATMENT, SEFPAGE, FLOW RATE, SOILS, LAND RECLA MATION, SITE SURVEYS, TESTS

A 4-fit-diam flooding infiftration test was conducted at a proposed mattenates and treatment site near Chape. Ho-borth Caronna. The saturated infiftration rate of the see was 0.13 m for and the researchen rate of the saturated

soil was equivalent to 1.35 in. of water after six days. A conservative wastewater application rate at this site would be between 1 and 2 in./wk.

DETERIORATED CONCRETE PANELS ON BUILDINGS AT SONDRESTROM, GREEN-LAND.

Korhonen, C., May 1984, 11p., ADA-142 595, 4 refs. 38-4054 CONCRETE STRUCTURES. CONCRETE

STRENGTH, BUILDINGS, REINFORCED CON-CRETES, DAMAGE, MOISTURE TRANSPORT, THERMAL EFFECTS, FREEZE THAW CYCLES. GREENLAND.

GREENLAND.

On July 22 1983 a dozen reinforced concrete buildings, built in 1954 at Sondrestrom Air Base in Greenland, were examined to determine why their concrete wall panels were cracked, spalled and rest stained. The investigation determined that structural and thermal movements caused most of this deterioration. Very little freeze-than deterioration was evident on the omiside, but the most serious problem was that of frost damage within the wall cavities fed by moistine from the inside of each building. The visible surface defects can be repaired with breathable patching materials, but to achieve long-term success and to minimum wall-cavity frost damage, vapor impraison through the walls must be properly controlled.

PERFORMANCE OF THE ALLEGHENY FIVER ICE CONTROL STRUCTURE, 1983.

Deck, D.S., et al. May 1984, 15p., ADA-144 094, 3 refs.

Gooch, G. 39-381

ICE CONTROL, ICE BOOMS, RIVER ICE, FRA-ZIL ICE, ICE BREAKUP, ICE JAMS, UNITED STATES—PENNSYLVANIA—ALLEGHENY

RIVER.

Of City, Pennsylvania, is at the confinence of the Allegheny River and Oil Creek. The brainess distinct is located in the flood plans, and see jun flooding his been a persistent problem. A flooring see obetical structure was installed on the Assopheny River prior to the 1993 see season. The structure was a steel postioon see boom located spittenes of Oil City and was used to encourage early formation of oil city and was used to encourage early formation of as see cover at this location. This would suppress probinged frairly see generation, which in the past led to a massive freezeny jum downstream. This secundation would grevent the discharge of see from Oil Creek dering breaking when see jum flooding would occur. The performance of the structure during its field year is documented here. Oil City escaped see jum flooding during the whiter of 1993.

ON-SITE UTILITY SERVICES FOR REMOTE MILITARY FACILITIES IN THE COLD RE-

Reed, S.C., et al, May 1984, 66p., ADA-142 596, 20 refs.

Ryan, W.L., Cameron, J.J., Bouzoun, J.R. 35-4055

MILITARY FACILITIES, WASTE TREATMENT, WASTE DISPOSAL, WATER TREATMENT, WATER SUPPLY, UTILITIES, COLD WEATHER PERFORMANCE, THERMAL EFFECTS, DE-SIGN CRITERIA

Utility services (water, sewer, solid waiter) for small, remote minings facilities in conference require special considerations. This report percents concept and criteria for the planning and performant design of internal and existing solids switches. Also mainfield are some thermal aspects for design of these contents of authorizing and performance of these contents. Also milioled are some thermal water and wastewater systems

CALCULATING ROPEROLE CEOMETRY FROM STANDARD MEASUREMENTS OF BOREHOLE INCLINOMETRY.

Jerek, K.C., et as, June 1984, 18p., ADA-145 006, 9

BOREHOLES, ICF DRILLS, DRILLING, MEAS-UREMENT, GREENLAND

UREMENT, GREENLAND. This report is an extension of the authors earlier reintance for promise the authors earlier reintance. Here they supply additional information on the influence of usa irrated by Mills around ground any executions for reducing creatizance or ground. The results are hated on observations made over several seasons of treating and thaning at sites solveted for their stations of pass were us content and ground impressible. More than 20 test electrodes were monoscored at time soft uses and one alternal time. The diameter of the hatefulled rones, the sait contents and the hateful influence of the hatefulled rones, the sait contents and the hateful influence can add to the certified between means us a data collected at D15 in terminate. The methodic were found constructed as and it is claimed by the results represent physically reasonable, approximations in the boothore geometric.

SR 84-17
CONDUCTIVE BACKFILL FOR IMPROVING
ELECTRICAL GROUNDING IN FROZEN SOILS.

Sellmann, P.V., et al, June 1984, 19p., ADA-144 861, 14 refs.

Delaney, A.J., Arcone, S.A.

39-561

GROUNDING, ELECTRICAL RESISTIVITY FREEZE THAW CYCLES, FEB. 17007 PHYSICS, SALINE SOILS, GRAIN SIZE, SOIL TEMPERATURE, GROUND ICE, TESTS.

PERATURE, GROUND ICE, TESTS.

This report describes two new methods for computing borehole geometry from discrete measurements of borehole inclination and azimuth. Ir 'ee first method borehole inclination and azimuth are solved to vary linearly with arc length. This results in an analytic model of the borehole that is continuous but not smooth. The second model, which takes borehole inclination and azimuth to vary quadratically with arc length between three measuring points, improves the smoothness of the model but the analysis must be carried out numerically. These models were applied to the installations. In all cases salt backfilling reduced the resistance to ground, with 175 ohns being the lowest obtained. Reductions varied from very small to an order of magnitude, Resistance also decreased over several seasons. Generally, the greatest improvement and lowest values were obtained in t'e perennially frozen silt in interior Alaska. Data from older silt suggest that salt backfilling will not be effective in arctic settings. Measurements at a partially thaved, coarse-grained site indicate that salt was moving much more rapidly (approximately five times as fast) away from the treated backfill than at the silt site in the CRREL permafrost tunnel. permafrost tunnel.

SR 84-18

EFFECT OF SEASONAL SOIL CONDITIONS ON THE RELIABILITY OF THE M15 LAND MINE.

Richmond, P.W., et al, June 1984, 35p., ADB-085 452, In English and Korean. 2 refs. Ho. S.C., Dittemore, H.R.

40-3772

FROZEN GROUND STRENGTH, SOIL STRENGTH, MILITARY ENGINEERING, EXPLOSIVES, PLASTING, METEOROLOGICAL DATA, TESTS.

Inert M15 mines with live fuzes were tested for functioning under four soil conditions (immediately after installation in July, and in November, January and April). The mines were installed using current emplacement doctrine and initiated by driving a tank over them. Results showed significant degradation in functioning rates Juring writer, which was attributed to frozen soil. A change in installation doctring recommended. is recommended

SNOW-TWO/SMOKE WEEK VI FIELD EXPERI-MENT PLAN.

Redfield, R.K., et al, June 1984, 85p., ADB-089 502. Farmer, W.M., Ebersole, J.F. 39-3031

SNOWFALL, TRANSMISSIVITY, WAVE PROPAGATION, SCATTERING, SMOKE GENERATORS, FALLING BODDIES, VISIBILITY, EXPLOSIVES, SNOW COVER EFFECT, BLOWING SNOW, TESTS, HELICOPTERS.

SNOW-TWO DATA REPORT. VOLUME 2: SYS-

TEM PERFORMANCE.
Jordan, K., ed, June 1934, 417p., ADB-101 241, Refs.
passim. For Vol. 1 see 39-3031. For individual papers see 40-3773 through 40-3787.

SNOW PHYSICS, MILITARY OPERATION, WAVE PROPAGATION, TRANSMISCION, SMOKE GENERATORS, LIGHT SCATTERING, ELECTROMAGNETIC PROPERTIES, SNOW-FALL, BLOWING SNOW, VISIBILITY, DEFECTION, COLD WEATHER PERFORMANCE.

TION, COLD WEATHER PERFORMANCE.

the SNOW-TWO/Smoke Week VI Field Experiment held at Camp Grayling. Michigan, was a cooperative effort of the U.S. Army Cold Regions Research and Engineering Laboratory and the Office of the Project Manager Smoke/Obscurants the main objective of shich was to study the effects of manmade and natural obscurants on the performance of electro-optical and millimete, wavelength devices. This report prevents the results obtained by CRREL and some 20 other agracies during ine SNOW-TWO phase of the experiment, covering the periods 28 Now-mbet to 21 December 1983 and 4 January to 9 March 1984. It is the fourth in a series of data reports in the SNOW field "repriments in noced by the U.S. Army Corps of Engineers Winter Battlefield Obscuration Research Program. The report in two main volumes with a simplemental classified volume. The first volume covers the sential tops, of meteorole, and snow characterization, the second covers the topics of electromagnetic wave transmission through falling and blowing snow, target/background signatures, and system performance in snow.

SR 84-21 RELATIONSHIPS AMONG BANK RECESSION, VEGETATION, SOILS, SEDIMENTS AND PER-MAFROST ON THE TANANA RIVER NEAR FAIRBANKS, ALASKA.

Gatto, L.W., July 1984, 53p., ADA-152 332, 31 refs. 39-3030

39-3030
BANKS (WATERWAYS), SOIL EROSION, PER-MAFROST DISTRIBUTION, VEGETATION, LIVER FLOW, SEDIMENTS, HYDRAULICS UNITED STATES—ALASKA—TANANA RIVER. The objective of this analysis was to determine if available data are useful in identifying the characteristics that contribute to erodibility of the banks along two reaches of the Tanana River Existing data on bank vegetation, soils, sediments Because these data were general and permafrost were used. and permatrist were used. Because these data were general and not collected for the purpose of site-specific analysis, the analytical approach was simple and did not include any statistical tests. The data were visually commared to the locations and estimated amounts of historical recession to evaluate if any relationships were obvious. The results of this analysis showed no useful relationships.

MINE DETECTION USING NON-SINUSOIDAL RADAR. PART 1: SPATIAL ANALYSIS OF LABORATORY TEST DATA.

Dean, A.M., Jr., et al, Aug. 1984, 92p., ADA-150 471, 8 refs.

Martinson, C.R

41-462

MILITARY RESEARCH, COLD WEATHER TESTS, MINES (ORDNANCE), RADAR ECHOES, COUNTERMEASURES, GROUND GROUND THAWING.

THA WING.

The interaction among UHF radiation, winter roadway conditions and buried mines was investigated in a refrigerated facility. The near-field spatial return from each target was unique. When the target was not in the near field the spatial return was not at all unique Cobbles in the medium had little effect, but surface-thawed conditions significantly affected the carried returns and the effect of the effect o medium had little effect, but surface-thawed conditions significantly affected the spatial return, and the reflected signal strength and frequency content. The primary frequency content of the returned signal was either spread over a band broader than that of the transmitted primary frequencies, or simpletely outside of the primary detection band. We conclude that the complexity of winter roadway conditions requires 1) a much broader frequency band than is currently being considered, and 2) a more complex and edaptive background-removal, signal-enhancement scheme than is currently used. Further, more data are required describing the interaction of the winter media, UHF radiation, and buried mines so that adequate detection instrumentation can be developed

BUCKLING ANALYSIS OF CRACKED, FLOAT-ING ICE SHEETS.

Adley, M.D., et al, Aug 1984, 28p., ADA-147 330, 24

Sodhi D.S.

39-715

ICE LOADS, FLOATING ICE, OFFSHORE STRUCTURES, ICE SHEETS, ICE PRESSURE, ICE CRACKS, ANALYSIS (MATHEMATICS), TESTS, ICE DEFORMATION.

A buckling analysis of cracked, floating ice sheets is presented; both symmetrical and unsymmetrical shapes were investigated. The finite element method was used for the in-plane analysis ine inite element method was used for the in-plane analysis as well as the out-of-plane, analysis. The results of the analyses of symmetrically shaped ice sheets are compared to thost of previous analyses where a radial stress field was assumed for the in-plane stresses, and there is good agreement outween them. The results of theoretical analyses are compared to experimental data obtained in small-scale laboratory expert tents.

SR 84-24 CLIMATE AT CRREL, HANCVER, NEW HAMP-

Bates, R.E., Aug. 1984, 78p., ADA-148 400, 6 refs.

CLIMATE, METEOROLOGICAL DATA, SNOW-FALL, FREC'PITATION (METEOROLOGY), WEATHER STATIONS, FREEZING POINTS, DE-GREE DAYS, UN! IED STATES—NEW HAMP-SHIPE—HANOVER.

SHIRE—HANOVER.

A 10-year clima; alogical record of meteorological data collection at the CRREL meteorological station is presented for the period October 1972 through December 1982. Data presented include air temperature, heating and freezing degree-days, relative humidity, dew point, precipitation, snowfall, wind speed and direction, solar radiation and evaporation Air temperature and precipitation monthly and annually are compared statistically to the 30-year normal and the period-frie-ord normal for Hanovec, Vew Hampshire. The appendix gives oily and monthly values for the entire period of record. Some comparisons are made between the 10-year averages and the long-term normals.

SALT ACTION ON CONCRETE.

Sayward, J.M., Aug. 1984, 69p., ADA-147 812, Refs. 39-1046

39-1040
CONCRETE PAVEMENTS, SALTING, CORRO-SION, FREEZE THAW CYCLES, DAMAGE, REINFORCED CONCRETES, WEATHERING, BRIDGES, CHEMICAL ICE PREVENTION, CRACKING (FRACTURING).

CRACKING (FRACTURING).

Serious deterioration of concrete bridges by deicing salts is generally ascribed to depassivation and corrosion of reinforcing steel, as growth of its corrosion products causes spalling, there, simple evaporative tests simulated the salt weathering that slowly crumbles rocks in nature, where crystals growing from pore water fed from below stress the matrix just as do ice crystals in frost heaving soil. Like needle ice (surface frost action in soil) the salt columns exuded from concrete alro lifted tmy particles, signifying crumbling Microcracks developed in 1-3 years of after-test dry storage.

SECONDARY STRESS WITHIN THE STRUC-TURAL FRAME OF DYE-3; 1978-1983. Ueda, H.T., et al, Sep. 1984, 44p, ADA-148 401, 5

refs.
Tobiasson, W., Fisk, D., Keller, D., Korhonen, C.

SNOW LOADS, STRESSES, MILITARY FACILI-TIES, STRUCTURES, FOUNDATIONS, LOADS (FORCES), WIND FACTORS, COLD WEATHER

CONSTRUCTION, GREENLAND.

DEW line ice cap station DYE-3 was moved sideways 210 ft and placed on a new foundation in 1977, then raised 27 ft in 1978. Secondary forces within the structural steel framework were measured in 1978, 1981, 1982 and 1913. The overall level of secondary stresses had increased but through 1983 the columns were still within their stress limitations. Some localized overstress is expected in 1984. The concept of using above-surface trusses to resist wind loads and brace the eight columns has proven to be satisfactory. It has climinated the subsurface enclosures used in the past to protect subsurface trusses, enclosures that proved to be the structural weak link of the original facility, their elimination has resulted in a stronger facility that is easier to maintain The measurements and findings of this program were used in the development of the design to extend the life of DYE-3 to be implemented in 1984. That work should reduce the level of secondary stresses in the frame. CONSTRUCTION, GREENLAND.

DEUTERIUM DIFFUSION IN A SOIL-WATER-ICE MIXTURE.

Oliphant, J.L., et al, Sep. 1984, 11p., ADA-148 457, 7 refs

Tice, A R. 39-1139

FROZEN GROUND PHYSICS, ISOTOPES, SOIL WATER MIGRATION, PHASE TRANSFORMA-TIONS, TESTS, LABORATORY TECHNIQUES.

TIONS, TESTS, LABORATORY TECHNIQUES.

An experiment was performed to determine the rate of equilibration of deuterium between the ice and liquid phases of water in partially frozen soil. The results of this experiment are consistent with a diffusion rate of deuternum in ice of 1 or 2 ten-billionths sq cm/s. A method for calculating the approximate equilibration time, given the size of the ice crystals in the system, is provided. This calculation compares well with the experimental results.

MIZEX—A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION EXPERIMENTS IN ARCTIC MARGINAL (*** ONES. 4: INI-TIAL RESULTS AND ANA. ; FROM MI 83. Sep. 1984, 56p., ADA-148 255, Refs. passim. FROM MIZEX individual papers see 39-1124 through 39-1130.

MECHANICS. DRIFT STATIONS EDGE, SEA ICE DISTRIBUTION, RHEOLOGY, ICE CREEP, OCEANOGRAPHY, ICE WATER INTERFACE, ICE AIR INTERFACE, ICE CONDI-TIONS

MIZEX: A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION EXPERIMENTS
IN ARCTIC MARGINAL ICE ZONES. 5:
MIZEX 84 SUMMER EXPERIMENT PI
PRELIMINARY REPORTS.
Johannessen, O M, cd, Oct 1984, 1°6ρ., ADA-148
986, Refs passim For selected papers see 40-4691

986, Refs passim through 40-4703. Horn, D.A., ed.

40-4690

40-4690 ICE PHYSICS, DRIFT STATIONS, ICE EDGE, SEA ICE, REMOTE SENSING, OCEANOGRA-PHY, ACOUSTIC MEASUREMENT, MARINE BI-OLOGY, ICE FLOES

SR 84-30

CONVENTIONAL LAND MINES IN WINTER: EMPLACEMENT IN FROZEN SOIL, USE OF TRIP WIRES AND EFFECT OF FREEZING

Richmond, P.W., Nov. 1984, 23p., ADB-091 027, 9 refs.

MILITARY ENGINEERING, AUGERS, FROZEN GROUND, SNOW COVER, MINES (ORD-NANCE), RAIN, FREEZING, SEASONAL VARIATIONS.

This report presents information relating to land mine use in winter. Three areas are addressed: the emplacement of mines in frozen soil, the use of trip wires in snow, and the effect of freezing rain on anitiank mines. Data from a minefield installation exercise provide information on the installation of a 100-m minefield under summer and winter conditions.

COMPARISON OF THREE COMPACTORS USED IN POTHOLE REPAIR.

Snelling, M.A., et al, Nov. 1984, 14p, ADA-149 937, 2 refs.

Eaton, R.A. 39-2099

39-2099
ROAD MAINTENANCE, BITUMINOUS CONCRETES, COMPACTION, EQUIPMENT, DENSITY (MASS/VOLUME), TEMPERATURE EFFECTS.

FECTS.

This report is a summary of the results of a compaction study using recycled hot mix asphalt concrete conducted during August 1983 in an indoor facility at CRREL in Hanover, New Hampshire. This study compared three kinds of compactors for optimum performance, and also considered such factors as temperature of the asphalt concrete mix, number of passes, size and depth of patches, and the number of lifts to fill the holes Results showed that a vibratory roller and vibratory plate compactor could both compact patches to the desired 98% of laboratory density, but that a 200-lb lawn roller could not Temperature of the hot recycled mix is entical, with 205P being the cut-off temperature. It was shown that if the mix is not compacted promptly after placement and is allowed to cool below 250F, proper compaction may not be attained.

FROZEN PRECIPITATION AND CONCUR-RENT WEATHER: A CASE STUDY FOR MUN-CHEN/RIEM, WEST GERMANY.

Bilello, M.A., Nov 1984, 47p, ADA-149 227, 29 refs

39-131
WEATHER FORECASTING, SNOWFALL,
METEOROLOGICAL DATA, MILITARY OPERATION, PRECIPITATION (METEOROLOGY),
VISIBILITY, FREEZING, RAIN, WINTER, CLIMATE, GERMANY—MUNICH.

This study evaluates statistical data for two or more meteorological parameters, recorded concurrently, to improve prediction of atmospheric conditions that would obscure a winter battle-field. The analysis considers only freezing precipitation types that were categorized and correlated with simultaneously observed weather conditions, such as temperature, humidity and visibility, using 11 years of winter weather records for Munchen/Riem, Federal Republic of Germany. These results are an example of the unusual and essential environmental information that can be derived from available records is suggested that similar investigations should be conducted for other sites in central Europe.

SR 84.33

SR 84-33 [PROCEEDINGS]. Workshop on Ice Penetration Technology, Hanover, NH, June 12-13, 1984, Dec 1984, 345p., ADB-093 880, Refs. passim. Discussions, p.319-336. For individual papers see 40-1962 through 40-1965. 40-1961

PENETRATION TESTS. STRENGTH, ICE BREAKING, MILITARY OPER-ATION, ICE DRILLS, ICE COVER THICKNESS, MEETINGS, SEA ICE, SUBMARINES.

ICE DRILLING TECHNOLOGY.

Holdsworth, G, ed, Dec. 1984, 142p, ADA-156 733, Refs. passim For individual papers see 40-1176 through 40-1199 or F-32743 through F-32750 Kuivinen, K.C. ed, Rand, J.H., cd, International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 'ug 30-31, 1982.

ICE CORING DRILLS, ICE CORES, BOREHOLE INSTRUMENTS, ICE DRILLS, MEETINGS, DRILLING FLUIDS, TEMPERATURE EFFECTS The Symposium on ice Drilling Technology dealt with research on the operation and design of ice coring drills. Various types of drills, as well as drilling fluids used in the Arctic and Antarctic are described. The borcholes and accores are used to study ice physics and climatic changes.

SR 84-35

PROCEEDINGS, VOL.1.

Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984, Dcc 1984, 433p., ADB-090 935, Refs. passim. For individual papers see 39-2945 through 39-2981. 30-2044

SNOW PHYSICS, SNOWFALL, TRANSMISSIVI-TY, MILITARY OPERATION, SNOWFLAKES, SCATTERING, SMOKE GENERATORS, AEROSOLS, MEETINGS, REFLECTIVITY, LEMOTE SENSING, SPECTRA.

PERMAFROST, SEASONALLY FROZEN GROUND, SNOW COVER AND VEGETATION IN THE USSR. SR 84-36 PERMAFROST.

Bigl, S.R., Dec. 1984, 128p., ADA-153 628, Refs. p.26-31. 40-1052

40-1052
PERMAFROST DISTRIBUTION, ACTIVE LAYER, SNOW COVER, VEGETATION, PERMAFROST THERMAL PROPERTIES, PERMAFROST DEPTH, GROUND ICE, SEASONAL VARIATIONS, USSR.

VARIATIONS, USSR.

A survey of the Cold Regions Science and Technology Bibliography and other references in the CRREL library was conducted to compile recent information about several Soviet physiogeographic features: permafrost, seasonally frozen ground, snow cover and vegetation. The products of the study are 1) a series of maps presenting the general distribution of these features over the entire Soviet Union and 2) a collection of 57 maps showing the local distribution of ground ice and permafrost.

OVERVIEW OF TANANA RIVER MONITOR-ING AND RESEARCH STUDIES NEAR FAIR-

BANKS, ALASKA. Neill, C.R., et al. Jan. 1984, 98p. + 5 appends.. ADA-167 790, Refs. passim For individual articles see 38-4207 through 38-4211.

Buska, J.S., Cnacho, E.F., Collins, C.M., Gatto, L.W.

Buska, J S, Cnacho, E.F., Collins, C M, Gatto, L W
38-4206
BANKS (WATERWAYS), RIVER FLOW, SOIL
EROSION, SEDIMENT TRANSPORT, FLOOD
CONTROL, EMBANKMENTS, ENVIRONMENTAL IMPACT, AERIAL SURVEYS, PERMAFROST, COUNTERMEASURES, UNITED
STATES—ALASKA—TANANA RIVER

STATES—ALASKA—TANANA RIVER
The Tanana River changes character in the vicinity of Fairbanks, from the braided pattern upstream of North Pole to the anastomosing or irregular meander pattern downstream of the Chena River confluence. This transition in planform is accompanied by a marked decrease in gradient and a change. I dominant bed material from gravel to sand. Within the past 50 years the river has been affected by a variety of human activities, including flood control works, access causeways and gravel extractions. The Phase III in-river levee and groin construction constituted a strong local disturbance of the river system where local inver slove was steepend. levee and groin construction constituted a strong local disturbance of the river system where local river slope was steepened and large quantities of bed material were put into transport from pilot channel enlargement as the river adjusted to the new alignment. As of the end of 1982, the full and final effects of this disturbance were not clear. Recommendations are given regarding impacts from human activities, alleviation of impacts, levee protection, further interpretive analysis and future monitoring of river behavior.

CATALOG OF CORPS OF ENGINEERS STRUC-TURE INVENTORIES SUITABLE FOR THE ACID PRECIPITATION-STRUCTURE MATERI-AL STUDY.

Merry, C J, et al, Mar 1985, 40p, ADA-154 364, 4

McKim H.L., Humiston, N.H.

79-4034
PRECIPITATION (METEOROLOGY), CHEMICAL PROPERTIES, CONSTRUCTION MATERIALS, ENVIRONMENTAL PROTECTION, DAMAGE, BUILDINGS, COST ANALYSIS, COMPUTER APPLICATIONS.

This report contains a survey of Corps of Engineers floodplain This report contains a survey of Corps of Engineers floodplain inventories. Its purpose was to determine if enough building materials information was available in the Corps data base to be used for predicting the distribution of building materials across the country as part of the EPA and rain assessment program. The floodplain surveys were rated using the criteria of the date of the surveys, the number of buildings, the variety of building materials, the amount of dimensions data listed for the buildings the land cover types in the Jata and whether or in the data were computerized. Six structure inventories are recommended for further study

SR 85-02

SURVEY OF ICE PROBLEM AREAS IN NAVI-GABLE WATERWAYS.

Zufelt, J, et al, Apr. 1985, 32p., ADA-157 477. Calkins, D.J.

40-3360

40-3500 ICE NAVIGATION, ICING, LOCKS (WATER-WAYS), DAMS, ICE CONTROL, RIVER ICE, ICE CONDITIONS, ICE JAMS, ICE BREAKUP.

CONDITIONS, ICE JAMS, ICE BREAKUP.
This report presents the findings of a survey of ice problems encountered on the nation's major navigable waterways. A survey questionnaire was developed and, through a field review group, was distributed to lock and dam facilities on the Allegheny, Monongahela, Ohio, Kanawha, Kaskaskia, and Mississippi Rivers and the Illinois Waterway. Analysis of the completed questionnaires identified 13 ice problem categories. The report describes each category of ice problem encountered, as well as the cited methods, operational and/or structural, undertaken to reduce the impact of each ice problem.

PERIGLACIAL LANDFORMS AND PRO-CESSES IN THE SOUTHERN KENAI MOUN-TAINS, ALASKA.

Bailey, P.K., Apr. 1985, 60p., ADA-157 459, Refs. p 54-60. 40-764

PERIGLACIAL PROCESSES, LANDFORMS, PERMAFROST DISTRIBUTION, GEOMOR-PHOLOGY, PATTERNED GROUND, NUNATAKS, ALTIPLANATION, NIVATION, SOIL TEMPERATURE, UNITED STATES—ALASKAKENAI MOUNTAINS.

KENAI MOUNTAINS.

The distribution and characteristics of periglacial landforms in the southern Kenai Mountains, Alaska, were investigated during 1979 and 1980. The principal area of study was a 1300-m-high mountain mass that stood as a nunatak during the last general glaciation. Periglacial features in the area include gelifluction lobes, invation hollows, cryoplanation teraces, tors, a string bog, and such patterned ground as sorted circles, sorted polygons, earth hummocks, sorted steps, sorted stripes, and small ice-wedge polygons

USER'S GUIDE FOR THE BIBSORT PROGRAM FOR THE IBM-PC PERSONAL COMPUTER. Kyriakakis, T., et al, Apr. 1985, 61p., ADA-157 936. Iskandar, I.K. 39-4055

PROCESSING. BIBLIOGRAPHIES. DATA MANUALS, COMPUTER PROGRAMS, COM-PUTER APPLICATIONS.

PUTER APPLICATIONS.

This report is intended to provide the reader with step-by-step listructions on how to use the BIBSORT computer program on the IBM Personal Computer. The program allows storage and retrieval of bibliographic data. The program has been tested on an IBM-XT, using DOS 1.1 or 2.1. The program requires a monitor and a printer this user's guide discusses how to prepare diskettes to enter the data, how to name categories and files, how to open categories and files, and how to enter data. The guide also shows how to sort and store data, edit, delete, or append the data, and how to obtain a hard copy of the sorted data. Each data diskette can take up to 500 entiries, assuming 512 characters per entry. A section on how to change the program to fit specific needs is presented in Appendix A, and the program listing is in Appendix B.

SR 85-05

WORKSHOP ON PERMAFROST GEOPHY-SICS, GOLDEN, COLORADO, 23-24 OCTOBER 1984.

Brown, J., ed, May 1985, 113p, ADA-157 485, Refs. passim. For individual papers see 40-1290 through 40-1308

Metz, M.C., ed, Hockstra, P., ed 40-1289

40-1289
PERMAFROST PHYSICS, GEOPHYSICAL SUR-VEYS, PERMAFROST DISTRIBUTION, SUBSEA PERMAFROST, BOREHOLES, WELL LOGGING, MEETINGS, PERMAFROST THERMAL PROP-ERTIES, OIL WELLS

SR 85-06

MIZEX—A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION EXPERIMENTS IN ARCTIC MARGINAL ICE ZONES. 6: MIZEX-WEST.

Wadhams, P. ed. May 1985, 119p, ADA-167 310, Refs passim For individual papers see 40-4167 Refs passim through 40-4180

40-4166

SEA ICE DISTRIBUTION, ICE AIR INTERFACE, ICE WATER INTERFACE, ICE MECHANICS, REMOTE SENSING, ICE CONDITIONS, ICE EDGE, ICE FLOLS, WIND FACTORS, WATER TEMPERATURE

SR 85-07

ANALYSIS OF THE REVERE, QUINCY AND STAMFORD STRUCTURE DATA BASES FOR PREDICTING BUILDING MATERIAL DISTRI-BUTION

Merry, C.J., et al, May 1985, 35p, ADA-157 458, 8

LaPotin, P.J.

40-1010

CONSTRUCTION MATERIALS, PRECIPITA-TION (METEOROLOGY), CHEMICAL PROPER-TIES, BUILDINGS, RAIN, FORECASTING

TIES, BUILDINGS, RAIN, FORECASTING Data bases on buildings in Revere and Quincy, Massachusetts, and Stamford, Connecticut, were studied to determine if a measure of building maternal distribution could be calculated for a city using land use, census tract and the Corps' data on buildings. Statistical measures of chi-square, asymmetric lambda, uncertainty coefficient, F ordinate, as well as the correlation coefficient-squared and eta-swuared statistics were calculated for the three data bases The Corps definition of building type was found to be the best predictor of the building surface area. However, all indicators (including building type) explained only low percentages of the variability building type) explained only low percentages of the variability in the dependent variable (building surface area). These results indicate that other variables are required to explain the variability of building surface area adequately

SR 85-08

STEFA: S PROBLEM IN A FINITE DOMAIN WITH CONSTANT BOUNDARY AND INITIAL CONDITIONS: ANALYSIS.

Takarji, S., June 1985, 28p., ADA-158 558, 13 refs. 40-435

FRUST HEAVE, BOUNDARY LAYER, STEFAN PROBLEM, ANALYSIS (MATHEMATICS).

PROBLEM, ANALYSIS (MATHEMATICS). Stefan's problem in a finite domain is solved under constant boundary and initial conditions Starting in a semi-infinite domain, the solution passes infinitely many stages of lead times in a finite domain and finally becomes stationary. The singularity at the finite terminal necessitates introduction of lead times. Including lead times, parameters defining the solution vary with time Only the analytical result is reported in this paper.

SR 85-09

U.S. PERMAFROST DELEGATION VISIT TO THE PEOPLE'S REPUBLIC OF CHINA, 15-31 JULY 1984.

Brown, J., June 1985, 137p., ADA-158 535, 19 refs. 40-1051

PERMAFROST BENEATH STRUCTURES, PERMAFROST THERMAL PROPERTIES, PERMAFROST DISTRIBUTION, FROZEN GROUND MECHANICS, ORGANIZATIONS, ENGINEERING, FREEZE THAW CYCLES, DAMAGE, GEO-

CRYOLOGY, CHINA.

CRYOLOGY, CHINA.

A US delegation of 15 scientists and engineers representing federal and state agencies, industry, and universities specializing in problems of seasonally and perennially frozen ground usited China during the period 15-31 July, 1984 The trip was organized by the Ministry of Railways and was co-hosted by the Academia Sinica's Institute of Glaciology and Cryopedology in Lanzhou. The 16-day visit was in return for a US-hosted visit of a Chinese delegation to Alaska and the West Coast in July 1983 as part of the Fourth International Conference on Permafrost The US Committee on Permafrost of the National Research Council organized the US participation The facilities visited are descibed and technical information obtained is discussed

ACOUSTIC WAVES INCIDENT ON A SEAWA-TER/SEA ICE INTERFACE.

Jezek, K.C., July 1985, 10p., ADA-213 085, 9 refs. 43-4588

ICE WATER INTERFACE, UNDERWATER ACOUSTICS, SEA ICE, SEA WATER

Simple plane wave theory is used to compute the energies of reflected and transmitted elastic waves at a seawater/sea cic interface. The results indicate that for incident angles between 30 and 60 deg. most of the scattered energy is in the form of transmitted shear waves for typical values of sea ice and seawater densities and elastic wave velocities.

SR 85.11 PREVENTION OF FREEZING AND OTHER COLD WEATHER PROBLEMS AT WASTEWA-TER TREATMENT FACILITIES

Reed, S.C., et al, July 1985, 49p, ADA-160 727, 23

Pottle, DS, Moeller, WB, Ott, R, Peirent, R, Niedringhaus, E.L.

UNDERGROUND FACILITIES, FREEZING, COLD WEATHER PERFORMANCE, WASTE TREATMENT, WATER TREATMENT, FROST PROTECTION, COUNTERMEASURES, DE-SIGN.

Freezing and other cold weather problems are a major of poor performance at wastewater treatment plants in col climates This report, based on experience in Alaska, in the north central US and on a survey of over 200

treatment systems in northern New England, presents procedures and criteria so that designers can avoid cold weather problems in future systems It also contains detailed guidance for assisting operators in overcoming current problems and deficiencies The information is organized and presentand deficiencies The information is organized and present-ed in terms of the major process units that are likely to be found in a typical wastewater treatment system. A number of detailed case studies of problems and solutions at specific systems in northern New England are also included.

SR 85-12

SUITABILITY OF POLYVINYL CHLORIDE PIPE FOR MONITORING TNT, RDX, HMX AND DNT IN GROUNDWATER.

Parker, L.V., et al, Aug. 1985, 27p., ADA-160 733, Refs. p.19-22.

Jenkins, T.F., Foley, B.T. 40-1497

PIPES (TUBES), GROUND WATER, WATER POLLUTION, WATER CHEMISTRY, MATERIALS, TESTS, SALINITY.

POLLUTION, WATER CHEMISTRY, MAJERI-ALS, TESTS, SALINITY.

A number of samples of commercial PVC groundwater monitoring pipe, which varied in schedule, diameter or manufacturer, were placed in contact with low concentrations of aqueous solutions of TNT, RDX, HMX and 2.4-DNT for 80 days under nonsterile conditions. Results indicated that there was some loss of TNT and PMX in the presence of PVC pipe compared to glass controls but that for the most part concentrations of analyte were equivalent between types of pipe. A second experiment was performed to determine if the losses were due solely to sorption or if biodegradation was also a factor. This experiment was done under a variety of groundwater conditions by varying salinity, initial pH and dissolved oxygen. The only case where there was increased loss of any substance because of the presence of PVC pipe was in the TNT solution under nonsterile conditions. This increased loss was thought to be associated with increased microbial degradation rather than sorption. Therefore, given the length of time of this experiment and the small amount of loss attributable to sorption, PVC groundwater monitoring spipe is acceptable for monitoring groundwater for these munitions. Several samples of PVC pipe were also leached with groundwater for 80 days and no detectable interferences were found by reversed phase HPLC analysis.

CONSTRUCTION AND CALIBRATION OF THE OTTAUQUECHEE RIVER MODEL

Gooch, G., Aug. 1985, 10p., ADA-159 902.

ICE JAMS, ICE BREAKUP, RIVER ICE, ICE FOR-MATION, MODELS, FLOODING, WATER SUP-PLY. TESTS.

The Ottauquechee River is located in west-central Vermont. This river was chosen for a physical hydraulic model using real ice. The model was built at a scale of 150 horizontal and 1'20 vertical After problems with modeling bed rough-ness and operating the pump system were overcome, the tests went smoothly.

LOCATING BURIED UTILITIES.

Bigl, S.R., Sep 1985, 48p, ADA-213 084, 2 refs

UTILITIES. UNDERGROUND FACILITIES. MAGNETIC SURVEYS, DETECTION, EQUIP-

MENT.
This report describes, in basic language, how to operate buried-utility locators and what the locators' uses and limitations are. Its scope is limited to locators using the principles of magnetometry, induction balance, magnetic induction and radio-frequency tracking. Magnetometry and induction balance work best for near-surface isolated targets such as valve boxes and mainhole covers. Magnetic induction will locate all types of metallic utilities, including cast iron and steel pipe, power cables and communication lines. Radio-frequency tracking traces unpressurized non-metallic lines that have available access for introducing a floating transmitter into the line (e.g., sewer or storm drains made of plastic or vitreous tile pipe).

PROCEEDINGS OF THE ISTVS WORKSHOP ON MEASUREMENT AND EVALUATION OF TIRE PERFORMANCE UNDER WINTER CON-DITIONS, ALTA, UTAH, 11-14, APRIL 1983.

ISTVS Workshop on Measurement and Evaluation of Tire Performance under Winter Conditions, Alta, Utah, Apr 11-14, 1983, Sep 1985, 177p, ADA-161 129, Refs passim For individual papers see 40-3321

through 40-3335 Blassdell, G.L., ed. Yong, R.N., ed.

COLD WEATHER PERFORMANCE. TIRES MOTOR VEHICLES, ROAD ICING, MILITARY EQUIPMENT, SNOW COVER EFFECT, TRACTION, MEETINGS.

SAMPLE DIGESTION AND DRYING TECH. NIQUES FOR OPTIMAL RECOVERY OF MER-CURY FROM SOILS AND SEDIMENTS.

Cragin, J.H., et al, Sep. 1985, 16p., ADA-161 948, 9 refs.

Foley, B.T.

40-4456

SOIL CHEMISTRY, SEDIMENTS, METALS, DE-TECTION, CHEMICAL ANALYSIS, DRYING.

Mercury in soils and sediments can be accurately determined over the concentration range of 0.04 to 2 microgram Hg/g using amalgamation on thin gold films Relative standard deviation of analysis is about 10%. A mild sample dissolution technique, involving HNO3 at 75C, produced quantitative Hg recoveries for certified sediment samples and recoveries equivalent to those of ingorous Parr-bomb digestions for other soil and sediment samples. Oven drying of samples at 150C resulted in significant losses of Hg from both soil and sediment samples. Air drying, oven drying at 60C or freeze drying resulted in Hg recoveries that agreed within 20% of those for undried samples. Thus, any one of these three comparable methods is recommended for Hg determinations in soils and sediments Mercury in soils and sediments can be accurately determined

DETERMINING THE EFFECTIVENESS OF A NAVIGABLE ICE BOOM.

Perham, R E., Oct 1985, 28p, ADA-162 926, 19 refs. 41-446

ICE NAVIGATION, ICE BOOMS, RIVER ICE, ICE CONTROL, ICE COVER THICKNESS, ICE POROSITY.

POROSITY.

The performance of a navigable ice boom was studied by monitoring the progression of the leading edge of the unconsolidated ice cover over a reach of the St Marys River directly downstream of the boom lice and hydraulic data were obtained for four winters from 1975-76 through 1978-79 for the St Marys River at Sault Ste Marie, Michigan The ice cover progression rate was highest in early winter The unconsolidated ice cover in the channel was estimated to have a thickness of at least 0.91 m and a porosity of 30% During early winter the ice discharge per vesse passage averaged approximately 5500 cu m for the four years Model tests for this site had indicated that without an ice control structure of any type, an ice release of 63,000 an ice control structure of any type, an ice release of 63,000 cu m per ship passage could be expected, with an ice boom the release would be 12,300 cu m per ship passage.

SNOW IN THE CONSTRUCTION OF ICE BRIDGES.

Coutermarsh, BA, et al, Oct 1985, 12p, ADA-163 118, 6 refs.

Phetteplace, G. 40-3269

40-3269
ICE CROSSINGS, MILITARY OPERATION, SNOW (CONSTRUCTION MATERIAL), SNOW COVER EFFECT, SURFACE PROPERTIES, ICE SURFACE, ICE COVER STRENGTH.

SURFACE, ICE COVER STRENGTH.

Snow's contribution as a wearing surface, leveling material or reinforcement to ice bridges is discussed. It is shown that it has limited value as a reinforcement and then only by adding water and freezing the resulting slutry. Snow can be used effectively as either a leveling or wearing surface but natural ice thickening is inhibited by the insulating property of the snow. The snow should be of uniform depth and not mounded or windrowed to avoid deflecting the ice away from the water surface. This would substantially weaken the carrying capacity of the ice bridge. carrying capacity of the ice bridge

DESCRIPTION OF THE BUILDING MATERI-ALS DATA BASE FOR NEW HAVEN, CONNECT-ICUT.

Merry, CJ, et al, Nov. 1985, 129p., ADA-166 457, 13

LaPotin, P.J.

GONSTRUCTION MATERIALS, CHEMICAL PROFERTIES, SAMPLING, DAMAGE, STATISTICAL ANALYSIS, COMPUTER APPLICATIONS, PRECIPITATION (METEOROLOGY), ENVIRONMENTAL PROTECTION.

ENVIRONMENTAL PROTECTION.

A building material sampling program for the New Haven, Connecticut, region was conducted in March and April of 1984 to examine the types and amounts of building surface materials exposed to acid deposition. A stratified, systematic, unaligned random sampling approach was used to generate sample points across the five sampling frame areas. At least 107 sample points were examined per sampling frame to yield a total sample size of 576 points. Building sizes, surface materials, roof characteristics, roof-mounted apparatus, changings, suffers, downspouts, frees, and mixellaneous outsurface materials, fool characteristics, roon-mounted apparatus, chinneys, gutters, downspouts, fences and miscellaneous out-door accessories were recorded. This report provides an initial summary of the data collected. Sample sizes indicate that additional sampling is required to produce the desired 70 sites (with buildings) per frame.

SR 85-20 POTENTIAL OF REMOTE SENSING IN THE CORPS OF ENGINEERS DREDGING PRO-GRAM.

McKim, H.L., et al, Nov. 1985, 42p., ADA-166 334, Refs. p.23-37

Klemas, V., Gatto, L.W., Merry, C J.

DREDGING, REMOTE SENSING, AERIAL SUR-VEYS, CHANNELS (WATERWAYS), SEDIMENT TRANSPORT, SUSPENDED SEDIMENTS, ENVI-RONMENTAL IMPACT

RONMENTAL IMPACT.

The potential of remote sensing in the Corps of Engineers Dredging Program for providing data on channel surveys, sediment drift and dispersion during dredging, water quality and suspended sediment concentrations, and selection of disposal sites and monitoring environmental effects at disposal sites was reviewed. The recommended remote sensor combination for recording dredging and environmental changes was a small, single-engine aircraft equipped with at least two 70-mm or 35-mm cameras. The first camera should be loaded with color film and the second camera with color infrared film for vegetation or land use mapping, or panchromatic film with special filters for water studies. For bathymetric mapping, the cameras will have to be supplemented by airborne impulse radar or laser profilers, and possibly sonar depth finders. A combination of small aircraft and boats is optimum for mapping currents and observing plume dynamics.

IMPULSE RADAR SOUNDING OF LEVEL FIRST-YEAR SEA ICE FROM AN ICEBREAKER. Martinson, C.R., Nov 1985, 9p., ADA-163 229, 2 refs. 41-461

41-461
ICE COVER THICKNESS, SEA ICE, RADAR ECHOES, SOUNDING, ICEBREAKERS.
During the last weeks of May 1984, a CRREL impulse radar system was used onboard the RV Polarstern to measure the thickness of level first-year sea ice. The purpose was to determine the onboard performance of the radar system and, if possible, provide ice thickness information to researchers conducting other tests. Radar data were compared with ice thicknesses determined by drilling, indicating that radar soundings could be a viable means of collecting ice thicknesses information. A lack of adequate coordination between the two measurement methods prevented a point-by-point companison of ice thicknesses, the companisons were based on averages for particular test runs. The differences between the two measurement methods prevented a pointby-point comparison of ice thicknesses, the comparisons were
based on averages for particular test runs. The differences
of the averages from the two measuring methods ranged
from 0.03 m to 0.22 m with a mean variation in the differences
of 0.13 m for eight runs. There may have been some
interference from the ship's hull during data collection because
of the location of the antenna. However, an unidentified
signal in some of the data does not appear to obscure
a valid return from the bottom of the ice sheet

SR 85-22

COMPARISON OF EXTRACTION TECHNIQUES AND SOLVENTS FOR EXPLOSIVE RESIDUES IN SOIL.

Jenkins, TF, et al, Nov 1985, 33p., ADA-166 474, 11

Leggett, D.C. 40-3272

SOIL CHEMISTRY, EXPLOSIVES, SOIL POLLU-TION, ULTRASONIC TESTS, CHEMICAL ANAL-

YSIS.

Extraction of TNT, TNB, RDX and HMX from two soils was studied in terms of process kinetics and recovery. Two solvents, acetonitrile and methanol, and four extraction techniques. Soxhlet, ultrasonic bath, mechanical shaker and homogenizer-sonicator were compared. The results were complex in that some interactions among analyte, method and solvent were found. Acetonitrile was found to be clearly superior to methanol for RDX and HMX. Soxhlet and ultrasonic bath generally recovered more than homogenizer or shaker, although a complicating factor is that all techniques were not necessarily at equilibrium. In terms of sample throughput, the ultrasoric bath and shaker are preferred over Soxhlet and homogenizer-sonicator. The ultrasonic bath generally approached equilibrium more rapidly than the shaker so it appears to be the best overall choice. Another complicating factor is that times to reach equilibrium were different for the two soils and for the different analytes. This points to the need for more kinetic studies on other soils and sediments. soils and sediments

PRELIMINARY INVESTIGATIONS OF MINE DETECTION IN COLD REGIONS USING SHORT-PULSE RADAR.

Arcone, S A, Nov. 1985, 16p., ADB-100 401, 10 refs

40-3302
DETECTION, SNOW COVER EFFECT, RADAR ECHOES, MINES (ORDNANCE), DIELECTRIC PROPERTIES, FROZEN GROUND PHYSICS, POLARIZATION (WAVES), POLAR REGIONS.

Short pulse radar is being investigated as a tool for detecting mines in cold regions. The specific problem is the detection of mines buried in a snowpack characterized by a dielectric constant. In this preliminary investigation air and frozen

sand are used to roughly approximate the dielectric extremes of a dry snowpack. The radar signal used had a duration sand are used to roughly approximate the dielectric extremes of a dry snowpack. The radar signal used had a duration of 3-4 ns and a broad frequency spectrum centered near 800 MHz. The responses of mines suspended in air were first recorded as a function of polarization and orientation Mine responses were then recorded for emplacement in a fairly homogeneous dielectric of frozen sand. The waveform amplitudes depended strongly on mine orientation and weakly on polarization. Resonances in air at all orientations and polarizations for a particular mine type were similar. Responses in the sand were easily recognizable for an antenna standoff of 1 m, but depended on target size. in a snowpack are now beginning SR 85-24

REGRESSION MODELS FOR PREDICTING BUILDING MATERIAL DISTRIBUTION IN FOUR NORTHEASTERN CITIES.

Merry, CJ., et al, Dec 1985, 50p, ADA-166 335, 12 refs

LaPotin, P.J. 40-3303

CONSTRUCTION MATERIALS, BUILDINGS POLAR REGIONS, MODELS, DISTRIBUTION. BUILDINGS,

POLAR REGIONS, MODELS, DISTRIBUTION. The Corps of Engineers conducted a field sampling program for inventorying building materials in the northeastern United States, and the data from the field program were compiled into a data base for statistical analysis. Correlation coefficients were derived between the independent variables and the surface area of the five building material types. The correlation coefficients were used in an optimal stepwise regression model developed for each material class for each city. A number of factors appear to be significantly associated with the distribution of building material exposure. However, the variables do not correlate at levels required for constructing adequate predictive models that would be applicable to other sampling locations.

SR 85-25 BLASTING AND BLAST EFFECTS IN COLD RE-GIONS. PART 1: AIR BLAST.

Mellor, M., Dec. 1985, 62p., ADA-166 315, 23 refs.

BLASTING, EXPLOSION EFFECTS, SHOCK WAVES, ATTENUATION, ANALYSIS (MATHEMATICS), POLAR REGIONS.

Air blast phenomena are reviewed and a digest of data is given, mainly in graphical form. To the extent possible, corresponding data are given for air blast in cold regions, provided that the prevailing conditions are significantly different from those of temperate regions.

SR 85.26

USACRREL PRECISE THERMISTOR METER. Trachier, G.M., et al, Dec. 1985, 34p., ADA-166 470, 4 refs.

Morse, J S., Daly, S.F.

40-3305 FRAZIL ICE, WATER TEMPERATURE, THER-MISTORS, ICE FORMATION, MEASURING IN-

STRUMENTS, ACCURACY. STRUMENTS, ACCURACY.

To facilitate the study of frazil ice in the field, a highly accurate, portable water temperature meter was required. The USACRREL Precise Thermistor Meter was designed and built to meet this need. The meter is rugged, battery-operated, waterproof, and able to operate over a wide range of ambient temperatures. A unique feature of this instrument is the use of software to compensate for temperature-dependent variation in the analog electronics. The circuitry consists of an analog printed circuit board and a low power microcomputer. The resistance of a calibrated thermistor is determined and its temperature calculated using the Steinhart-Hart equation. The accuracy of the meter was determined both theoretically and in cold room tests. The hardware and software used in the meter are described.

TECHNOLOGY TRANSFER OPPORTUNITIES FOR THE CONSTRUCTION ENGINEERING COMMUNITY: MATERIALS AND DIAGNOS-TICS. 1986, 54p, ADA-166 360, Refs passim selected papers see 40-4705 through 40-4708

DETECTION, CONSTRUCTION MATERIALS, ROOFS, PAVEMENTS, MAINTENANCE, PROTECTIVE COATINGS, THERMAL CONDUCTIVITY, CONCRETE AGGREGATES

SR 86-02 NITROGEN REMOVAL IN COLD REGIONS TRICKLING FILTER SYSTEMS.
Reed, S.C., et al., Fr. 1086, 39p., ADA-167 118. 19

refs

Diener, C.J., W y 40-3581

MENT. WATER TREATMENT. MICAL ANALYSIS. TEMPERA-WASTE T' SEEPAGL, MICAL ANALYSIS, TEMPERATURE EFFECTS, DESIGN, HEAT LOSS, POLAR REGIONS

Tricking filters are found in about 50° of the operating wastewater treatment systems owned by the U.S. Army, and more are likely for any new construction. Control of introgen, particularly ammonia in wastewater effluents is a growing necessity. Ammonia can be removed in tricking filters but the process is temperature-dependent

This study combined an intensive literature review with data collection at full-scale and pilot-scale systems. These results are presented and evaluated. A liquid temperature of at least 7 C is necessary in the filter bed for effective ammonia removal, and a separate single-purpose filter bed dedicated for intification is recommended when significant ammonia removal is required at cold regions locations. Criteria and equations are derived for future cold region system designs.

SR 86-03

MIZEX—A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION EXPERIMENTS IN ARCTIC MARGINAL ICE ZONES. MIZEX BULLETIN 7. Mar 1986, 88p., ADA-172 265, Refs. passim For individual papers see 41-3053 through 41-3052

41-3052
SEA ICE DISTRIBUTION, ICE EDGE, ICE MELT-ING, ICE DEFORMATION, ICE CRYSTAL STRUCTURE, ICE SURFACE, OCEAN CUR-RENTS, ICE AIR INTERFACE, ICE WATER IN-TERFACE, BOUNDARY LAYER.

FORTRAN SUBROUTINES FOR ZERO-PHASE DIGITAL FREQUENCY FILTERS.

Albert, D G, Mar 1986, 26p., ADA-168 855, 4 refs 41-3648

FILTERS, COMPUTER PROGRAMS, DESIGN, ANALYSIS (MATHEMATICS).

This report describes and gives user instructions for a series of FORTRAN subroutines that can be used to design and apply zero-phase frequency filters to digitized data. The general properties of these filters are discussed and complete listings are presented

SR 86-05

COMPARISON OF WINTER CLIMATIC DATA FOR THREE NEW HAMPSHIRE SITES. Govoni, J.W., et al, Mar. 1986, 78p., ADA-167 427,

Smith, S.J.

40-3582

40-3582
ICE DETECTION, ICING, METEOROLOGICAL
DATA, CLIMATE, DEW POINT, WIND VELOCITY, WIND DIRECTION, PRECIPITATION
(METEOROLOGY), ALTITUDE, HUMIDITY,
UNITED STATES—NEW HAMPS INTERTOTAL CONTROL OF THE PROPERTY OF THE P

UNITED STATES—NEW HAMPSHIRE. This data report contains climatological measurements for the winters of 1980-81 and 1981-82 made at three sites in New Hampshire situated at elevations of 155 m, 870 and 1910 m above sea level Parameters measured included wind speed and direction, precipitation, temperature, humidity, and duration of icing events. Comparison of the data provides the opportunity to examine the influence of elevation on atmospheric icing occurrence and intensity. In New Hampshire, icing appears to occur only at elevations above about 900 m

SR 86-07

PERFORMANCE OF HIGHWAY AND ALL-SEA-SON RADIAL TIRES AND TRACTION AIDS ON ICE AND IN SNOW.

Rogers, T, et al, Apr. 1986, 20p., ADA-168 872, 3 Liston, R A

43-4590

TIRES, PERFORMANCE, TRACTION, COLD WEATHER PERFORMANCE, COLD WEATHER

TES1S
This study compares the traction performance of a group of all-season radial tires, highway radial tires, link and cable chains. The tests were conducted on ice and snow. The all-season radials perform slightly better on ice, presumably because of the adhesive compound used in manufacturing these tires. The chains significantly improved traction on ice over bare tires, the link chain being best. In snow, the bare tires performed approximately the same. The cable chains provided only a slight improvement, while the link chains again performed best.

SR 86-08

DESCRIPTION OF THE BUILDING MATERIALS DATA BASE FOR PITTSBURGH, PENN-

Merry, C J., et al, Apr 1986, 87p., ADA-167 285, 15 refs.

LaPotin, PJ

40-3583

40-3383 CONSTRUCTION MATERIALS, PRECIPITA-TION (METEOROLOGY), BUILDINGS, ENVI-RONMENTAL PROTECTION, ROOFS, CHEMI-CAL ANALYSIS, STATISTICAL ANALYSIS, COST ANALYSIS, UNITED STATES—PENN-SYLVANIA—PITTSBURGH

A building materials sampling program for the Pittsburgh, Pennsylsania, region was conducted in December 1984 through February 1985 to examine the types and amounts of building surface materials exposed to acid deposition. A stratified, systematic, unaligned random sampling approach was used to generate sample points across six sampling frame areas.

A minimum of 70 sample points was examined per sampling frame to yield a total sample size of 541 points Building sizes, surface materials, roof characteristics, roof-mounted apparatus, chimneys, gutters, downspouts and fences were recorded. This report provides an initial summary of the data collected.

SR 86-09

SR 86-09
MIZEX—A PROGRAM FOR MESOSCALE AIRICE-OCEAN INTERACTION EXPERIMENTS
IN ARCTIC MARGINAL ICE ZONES. 8. A
SCIENCE PLAN FOR A WINTER MARGINAL
ICE ZONE EXPERIMENT IN THE FRAM
STRAIT/GREENLAND SEA: 1987/89.
Davidson, K., ed, Apr. 1986, 53p., ADA-169 070,

Refs. p.46-47.

ICE PHYSICS, REMOTE SENSING, ICE EDGE, ACOUSTICS, METEOROLOGY, OCEANOGRA-PHY, ICE WATER INTERFACE, MEASURING INSTRUMENTS, FRAM STRAIT, GREENLAND

SR 86-10

REVISED GUIDELINES FOR BLASTING FLOATING ICE.

Mellor, M., May 1986, 37p., ADA-168 760, 11 refs 41-3814

ICE BLASTING, PENETRATION TESTS, FLOAT-ING ICE, EXPLOSION EFFECTS, SUBGLACIAL OBSERVATIONS

OBSERVATIONS

Empirical prediction curves for ice blasting are given, and their derivation and use is explained. Alternative forms of the curves, which relate more closely to conventional underwater explosion technology, are developed and examined. Results of experiments with gas blasting devices are summarized and discussed in relation to the cratering effects of conventional explosives. There is a brief discussion of the energetics of ice fragmentation, effects of surface charges are outlined, and penetration by shaped charges is described. Son've test data that were not previously available are given in an appendix. in an appendix.

SR 86-11

CONCENTRATION AND FLUX OF WIND-**BLOWN SNOW.**

Mellor, M., et al, June 1986, 16p., ADA-170 504, 7

Fellers, G.

41-3928

SNOWDRIFTS, SNOW REMOVAL, WIND TUNNELS, VISIBILITY, WIND VELOCITY, MASS TRANSFER, STATISTICAL ANALYSIS.

RANSPER, STATISTICAL ANALYSIS.

Representative graphical relations are developed for the flux and concentration of wind-blown snow as functions of wind speed and height above surface Previously published field data are tabulated to provide 120° data sets for flux and the same number for mass concentration Using appropriately transformed variables, multiple regression analysis yields empirical relations for horizontal mass flux as a function of wind speed and height, and for mass concentration as a function of wind speed and height.

SR 86-12

NATURAL ELECTRICAL POTENTIALS THAT

ARISE WHEN SOILS FREEZE. Yarkin, I.G, June 1986, 24p., ADA-170 583, 16 refs.

SOIL FREEZING, ELECTRICAL PROPERTIES, FROST HEAVE, SOIL STRUCTURE, EX-PERIMENTATION, POLARIZATION (CHARGE SEPARATION)

Samples of sand, kaolin, bentonite, and loam were frozen from the top downward in cylinders 10 to 12 cm high and 7 cm in diameter. During the freezing process electrical potentials of up to 300 mV were measured between platinum electrodes placed near the ends of the samples. The mechanism that gives rise to these potentials and the effect of soil type and fineness, moisture content, and moisture migration are discussed.

SR 86-13

DESCRIPTION OF THE BUILDING MATERIALS DATA BASE FOR PORTLAND, MAINE. Merry, CJ, et al, June 1986, 83p., ADA-172 633, 12

LaPotin, P.J.

41-662
CONSTRUCTION MATERIALS, PRECIPITATION (METEOROLOGY), CHEMICAL ANALYSIS, ENVIRONMENTAL PROTECTION,
BUILDINGS, DAMAGE, STATISTICAL ANALYSIS, COMPUTER APPLICATIONS, UNITED STATES-MAINE-PORTLAND.

STATES—MAINE—PORTLAND.

A building materials sampling program for the Portland, Maine, region was conducted in July and August 1984 to examine the types and amounts of building surface materials exposed to acid deposition. The stratified, systematic, unaligned random sampling approach was used to generate sample points across the six sampling frame areas. A minimum of 70 sample points was examined per sampling frame to yield a total sample size of s461 points. Building sizes, surface materials, 100f characteristics, 100f-mounted apparatus, chimneys, gutters, downspouts and fences were

Lunardini, V.J., June 1986, 107p., ADB-105 859, Refs. 2.40-42 41-3815

MILITARY OPERATION, ICE HEAT FLUX, MILITARY OPERATION, ICE HEAT FLUX, HEAT SINKS, HEAT TRANSFER, THERMAL PROPERTIES, MATHEMATICAL MODELS, DESIGN, COMPUTER APPLICATIONS, ICE MELTING, WATER TEMPERATURE.

ING, WATER TEMPERATURE.

A review is presented of the general characteristics of ice heat sinks, including thermal, mechanical and operational aspects

The thermal design of a vertical ice heat sink with annular flow is outlined using a computer model to give quantitative results

The mathematical model allows interaction between the ice sink and the surrounding rock material.

Design curves are presented to estimate the outlet water temperature as a function of time and the rate of ice melt.

SR 86-15

PROCEEDINGS, VOL.1.

Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985, June 1986, 369p., ADB-135 277, Refs. passim. For individual papers see 43-4622 through 43-4649.

43-4621 SNOW PHYSICS, SNOWFLAKES, SNOW-STORMS, SNOWFALL, MILITARY OPERA-TION, SNOW ACOUSTICS, MEETINGS, VISIBIL-ITY, TRAFFICABILITY, SNOW ICE INTER-FACE, BACKSCATTERING, RADAR ECHOES, MEASURING INSTRUMENTS.

SR 86-16 BLASTING AND BLAST EFFECTS IN COLD RE-PART 2: UNDERWATER EXPLO-SIONS

Mellor, M., July 1986, 56p., ADA-178 363, For Pt.1 see 40-3304. 17 refs. 41,3020

ICE BLASTING, EXPLOSION EFFECTS, SHOCK WAVES, ICE SHEETS, SUBGLACIAL OBSERVA-TIONS, COLD WEATHER PERFORMANCE, MILITARY OPERATION.

The general characteristics of underwater explosions are reviewed in order to provide a background for the consideration of under-ice explosions

Test data for under-ice explosions nd for explosive icebreaking are summarized and interpreted.

SR 86-17 ARCTIC AND SUBARCTIC CONSTRUCTION: GENERAL PROVISIONS.

Lobacz, E.F., July 1986, 75p., ADA-172 674, Refs. p.72-75.

COLD WEATHER CONSTRUCTION, FROST ACTION, PERMAFROST DISTRIBUTION, FROST PENETRATION, FREEZING INDEXES, GROUND THAWING, SNOW COVER DISTRIBUTION, POLAR REGIONS.

Working in the world's cold regions is quite different from working in warmer places

This document gives general information on frost action, permafrost and other special factors to help engineers who must operate in arctic and subarctic areas

SOME DEVELOPMENTS IN SHAPED CHARGE TECHNOLOGY.

Mellor, M., July 1986, 29p., ADB-109 567, 16 refs. For another source see 41-2678.

PROJECTILE PENETRATION, CAVITATION, FROZEN GROUND STRENGTH, ICE STRENGTH, MILITARY OPERATION, MATERI-ALS, PENETRATION TESTS, DESIGN.

EFFECT OF FREEZING ON THE LEVEL OF CONTAMINANTS IN UNCONTROLLED HAZ-ARDOUS WASTE SITES. PART 1: LITERA-TURE REVIEW.

Iskandar, I K., July 1986, 33p., ADA-172 979, Refs. p 27-33. 41-693

WASTE TREATMENT, POLLUTION, SOIL FREEZING, WATER TREATMENT, SEA WATER, SLUDGES, FREEZE THAW CYCLES, IONS, ARTIFICIAL FREEZING

ARTIFICIAL FREEZING
This report reviews the literature concerning the effects of ground freezing on uncontrolled hazardous waste sites Since there was very little information directly related to hazardous waste materials, previous studies on the beneficial use and impact of freezing on wastewater, sea water, studged and soils have been included. Freezing of ur-ontrolled hazardous waste sites may cause frost heaving of buried waste material, allowing chemical wastes to move upward, and chemical transport of ions in freezing and frozen soils Also, repeated cycles of freeze thaw may adversely affect

recorded. This report provides an initial summary of the data collected.

SR 86-14
ICE HEAT SINKS. PART 1: VERTICAL SYSTEMS.
Lunardini V I June 1986 1070, ADB-105 859 Refs. is a critical factor.

SR 86-20

INITIAL ASSESSMENT OF THE 600-GALLON-PER-HOUR REVERSE OSMOSIS WATER PURIFICATION UNIT. FIELD WATER SUP-PLY ON THE WINTER BATTLEFIELD

Bouzoun, J.R., et al, July 1986, 6p., ADA-171 989, 3

Reed, S.C., Diener, C.J.

WATER SUPPLY, MILITARY FACILITIES, WATER TREATMENT, COLD WEATHER PER-FORMANCE, WATER POLLUTION, LOGISTICS, WATER TEMPERATURE

WATER TEMPERATURE

An initial study was conducted to determine the effects of raw water temperature on the finished water production rates of the Army's new 600-gal/hr Reverse Osmosis Water Purification Unit (ROWPU)

This study showed that the finished water production rates decreased from 687 gal/hr at a raw water temperature of 68.3 F to 348 gal/hr at a raw water temperature of 337 F

The report also has a list of suggestions on how to set up and operate the ROWPU on the winter battlefield.

STABILIZATION OF FINE-GRAINED SOIL FOR ROAD AND AIRFIELD CONSTRUCTION. Danyluk, L S., July 1986, 37p., ADA-172 600, 14 refs.

SOIL STABILIZATION, ROADS, FROST RESIST-ANCE, BITUMENS, CEMENT ADMIXTURES, SUBGRADE SOILS, GRAIN SIZE, LIMING, CHEMICAL PROPERTIES, ORGANIC SOILS, FROST HEAVE, AIRPORTS.

FROST HEAVE, AIRPORTS.

A laboratory study was conducted to determine the feasibility of stabilizing an organic sult for use in sub-base or base courses for all-weather, low-volume roads and artificlds in Alaska. The soil used in this study has an organic content of 12% and a modified Proctor value of 791 lb/cu ft at a 29% moisture content. The stabilizers evaluated were: cement, cement with additives (calcium chloride, hydrogen peroxide, sodium sulfate, and lime), lime, lime/fly sah, asphalt emulsion, tetrasodium polyphosphate, and calcium acrylate Unconfined compressive strengths obtained were 39 lb/sq in with 20% cement, 64 lb/sq in. with 20% cement and 2% calcium chloride, 51 lb/sq in. with 20% cement and 2% calcium chloride, 51 lb/sq in. with 20% cement and 1848 lb/sq in with calcium chloride. Lime and lime/fly sah proved to be ineffective for this soil. Although tetrasodium polyphosphate did not improve the soil's strength it did reduce frost susceptibility and permeability.

SR 86.22

AFTER-ACTION REPORT—REFORGER '85. Liston, R.A., Aug. 1986, 20p., ADB-107 244. 41-3816

MILITARY OPERATION, TANKS (COMBAT VEHICLES), TIRES, SNOW COVER EFFECT, SOIL WATER, TRAFFICABILITY, SNOWFALL Four demonstrations associated with the 1985 REFORGER are described a demonstration of the performance characteristics of commercially available radial tires, a demonstration of the use of a soil moisture sensor to predict the trafficability of soils in a maneuver area, a demonstration of the need to account for the effects of a snow cover when planning anti-tank and anti-personnel mine fields, and a determination of the effects of the winter environment on tank electro/optical systems performance

systems performance SR 86-23

ICE ATLAS, 1984-1985: OHIO RIVER, AI LEGHENY RIVER, MONONGAHELA RIVER. Gatto, L.W., et al, Aug. 1986, 185p Daly, S.F., Carey, K.L.

42-801
RIVER ICE, MAPS, ICE CONDITIONS, ICE
NAVIGATION, UNITED STATES—OHIO RIVER, UNITED STATES—PENNSYLVANIA—ALLEGHENY RIVER, UNITED STATES—MONON-GAHELA RIVER.

GAHELA RIVER.

Ice conditions on inland rivers can change rapidly and adversely affect navigation

The neemaps in this atlay were prepared to document the 1984-85 nee conditions on those reaches of the Ohio. Allegheny and Monongahela Rivers that are included in study areas for the River Ice management (RIM) Program, namely river mile 0 to 437 on the Ohio River, mile 0 to 7 on the Allegheny, and mile 0 to 65 on the Monongahela

The maps were prepared from interpretation of sertical aerial video imagery taken from a low-flying aircraft. The interpreted toe conditions were classified into 5 units and transferred to base maps by reference to navigation charts and topographic maps. Fragmented ice Cover and Ice Floes or Frazil Sluth and Pans were the most common ice units in the lower pools of the Monongahela River and lower Allegheny. Solid Ice Cover and Iragmented Ice Cover were the most common units in the upper pools of the Monongahela. Fragmented Ice Cover and Open Water were the most eximine units in

the Emsworth to New Cumberland pools of the Ohio; Open Water and Ice Floes or Frazil Slush and Pans were the predominant units in the downstream pools There were frequent cancellations of flights during the 1984-85 winter because of low cloud ceilings. To get more frequent video coverage of ice during the 1985-86 winter, a wider-angle lens on the video camera will be used. This will allow flights at a lower altitude, permitting video coverage even when the ceiling is low.

CONDENSING STEAM TUNNEL HEAT SINKS. Lunardini, V.J., Aug. 1986, 29p, ADB-106 677, 19 refs.

41-1350

HEAT SINKS, TUNNELS, HEAT TRANSFER, ROCKS, THERMODYNAMICS, CONDENSATION, THERMAL CONDUCTIVITY, MATHEMATICAL MODELS, TEMPERATURE EF-FECTS. AIR MASSES.

FECTS, AIR MASSES.

This report examines the feasibility of condensing steam from an underground power source by heat conduction into the surrounding rocks. A mathematical model was utilized such that the condensing steam delivered a variable flux of energy to the walls of the condenser tunnel. Heat flow in the surrounding rock was limited to conduction A numerical analysis of the transient problem results in predictions of tunnel lengths and diameters needed to dissipate specified condenser heat loads as a function of initial steam pressure, surrounding rock thermal properties, and ambient rock temperature. The rock thermal conductivity exerts a large influence upon the required tunnel length, with tunnel length decreasing with increasing rock conductivity. The length decreasing with increasing rock conductivity. The quantitative predictions of the model indicate that a condensing steam tunnel in rock may be competitive with circulating water or ice/water heat dissipation modes

WINTER FIELD FORTIFICATIONS. Farrell, D., Aug. 1986, 50p., ADB-106 228, 23 refs

FORTIFICATIONS, MILITARY OPERATION, SNOW (CONSTRUCTION MATERIAL), WOODEN STRUCTURES, EMBANKMENTS, WINTER,

TESTS.

Preparation of winter field fortifications poses problems that are not encountered in any other environment. The primary construction materials available for aboveground construction are snow and wood. This report describes what snow is, and how and when to use it to the best advantage, and it presents the results of tests of the capacity of snow embankments to stop projectiles. The information presented is based on both laboratory and field test results. Both approaches were required to understand why a builet stops quickly in snow and how durable a snow fortification can be. Field tests showed that a non-fuzed round as large as that from the Soviet 145 mm KPV can be stopped by 2 m (66 ft) of packed snow Laboratory studies revealed the mechanics of buillet interaction with snow For the larger, fragmentation munitions field tests were cumberrevealed the mechanics of bullet interaction with snow For the larger, fragmentation munitions field tests were cumbersome and unproductive But a laboratory simulation of fragment penetration into snow showed that only 0.6 m (2.1) of packed snow stops the smaller, high-velocity fragments while 1.5 m (5.1) of snow is required to stop the larger, slower fragments To represent the larger, anti-armor, direct-fire weapons containing shaped-charge warheads, the 90-mm M67 and the 70-mm Soviet RPG-7 were used in field tests The results showed that 3 m (10.1) of snow absorted all effects, even after multiple impacts

SR 86-26

ICE HEAT SINKS. PART 2: HORIZONTAL SYSTEMS. Lunardini, V.J., Aug 1986, 104p, ADB-111 755,

Refs. p.23-25.

41.3818

41-3818
MILITARY OPERATION, HEAT SINKS, ICE
HEAT FLUX, HEAT TRANSFER, COMPUTER
APPLICATIONS, MATHEMATICAL MODELS,
THERMAL PROPERTIES, ICE MELTING, WATER TEMPERATURE.

WATER TEMPERATURE.

The thermal design of a horizontal ice heat sink with horizontal water flow is outlined using a computer model to give quantitative results. The mathematical model allows interaction between the ice sink and the surrounding rock material Data taken from an experiment, undertaken as part of this study, on melting, horizontal ice sheets were used in the mathematical model. Design curves are presented to estimate the outlet water temperature as a function of time and the rate of ice melt. The horizontal ice heat sinks can deliver outlet water at temperatures between 45 and 55 F for a considerable period of time (hundreds of hours) if the heat dissipation rate of the sink is less than 0.8 kW/ft. For this range of heat dissipation rates, the horizontal sink is comparable in performance to the vertical ice heat sink is remained in the mathematical model emphasizes the thermal superior of the heat sink with no consideration given to mechanical and plumbing problems construction techniques, or maintenance of the sink

SR 86-27 DRILL BITS FOR FROZEN FINE-GRAINED

Sellmann, P V., et al, Aug. 1986, 33p., ADA-178 113, 9 refs.

Mellor, M.

41-2610
DRILLS, FROZEN GROUND TEMPERATURE AUGERS, PERMAFROST, SEDIMENTS, GRAIN SIZE, GROUND ICE, ROTARY DRILLING, TEM-PERATURE EFFECTS.

Successful drill bits for use in frozen sediments have certain Successful drill bits for use in frozen sediments have certain characteristics that are not commonly found in commercial bits used for unfrozen soils and rocks. In frozen sediments, drilling characteristics and optimium bit design vary, depending on grain size, ice content, and temperature of the material Drills for frozen fine-grained material (silt and clay) have specific requirements that differ from those for other frozen soil types. Important features of drills that perform well in frozen fine-grained materials include (1) full face cutting, (2) and the that can cause and class its cuttings (3) annonnate. in frozen line-grained materials include (1) full face cutting, (2) a pilot but that can cut and clear its cuttings, (3) appropriate cutter angles (adequate clearance angles and positive rake), (4) sharp but durable cutters, (5) unobstructed flow paths for chip clearing, and (6) stabilizing features for smooth running Examples of successful bits are discussed and illustrated others are of commercial manufacture

SR 86-28

ENGINEERING SURVEYS ALONG THE TRANS-ALASKA PIPELINE.
Godfrey, R N, et al, Sep. 1986, 85p, ADA-173 853,

4 refs.

Eaton, R.A

PERMAFROST BENEATH STRUCTURES, COLD REMMARKOSI BENEATH STRUCTURES, COLD WEATHER CONSTRUCTION, PIPELINES, FREEZE THAW CYCLES, ENGINEERING, PERMAFROST BENEATH ROADS, DESIGN C. TERIA, ENVIRONMENTAL PROTECTION, CLIMATIC FACTORS, THAW DEPTH, UNITED STATES—ALASKA.

STATES—ALASKA.

During the spring of 1976, environmental engineering investigations along the Alyeska Pipeline Haul Road and TAPS (Trans-Alaska Pipeline System) Road were initiated by CRREL in conjunction with the Federal Highway Administration and the Alaska Department of Highways. The three-year research project had two general objectives 1) to systematically obtain data on selected highway, airfield and pipeline workpad test sites and adjacent terrain to establish the rates and types of modifications in perimafrost-dominated regions, and 2) to provide the basis for improved design criteria and specifications governing road, airfield and workpad construction and restoration in permafrost zones that are influenced by many different seasonal climatic regimes SR 8.6-29

BLISTERING OF BUILT-UP ROOF MEM-BRANES: PRESSURE MEASUREMENTS. Korhonen, C., Oct. 1986, 22p, ADA-190 293, 13 refs.

ROOFS, SURFACE TEMPERATURE, PROTEC-TIVE COATINGS, MAINTENANCE, PRESSURE, DAMAGE, TEMPERATURE MEASUREMENT.

Several blisters in built-up roof membranes were instrumented with pressure and temperature sensors Internal blister pressures varied from positive during the heat of the day pressures varied from positive during the heat of the day to negative during the cool of the night, these pressure changes cause blisters to grow Air is drawn into the blister at night When exposed to sunshine, the air rapidly expands before it can escape. Water is not necessary to cause growth Blisters grow best when the days are hot and the nights are cool Pressures apparently do not occur within the insulated space of a roof to cause blisters. Reflective coatings may help to slow blister growth forowth can be stooped by using a minimum correspondent. Growth can be stopped by using a miniature pressure relief

SR 86-30

SECOND WORKSHOP ON ICE PENETRATION TECHNOLOGY, 1986.

Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986, Oct. 1986, 659p, ADB-108 529. Refs passim For individual papers see 41-2653 through 41-2681.

41-2652

11-2012 ICE COVER STRENGTH, PENETRATION TESTS, MILITARY OPERATION, SEA ICE, ICE MECHANICS, MEETINGS, DESIGN, ICE COVER THICKNESS, MODELS, CAVITATION. OVER THICKNESS, MODELS, CAVITATION, On 16-19 June 1986 the Naval Surface Weapons Center (NSWC) and the US Army Cold Regions Research and Engineering Laboratory (CRREL) to hosted the Second Workshop on Lee Penetration Technology at the Naval Postgraduate School in Monterey, California Since the first workshop at CRREL two years ago, many notable accomplishments had occurred regarding ice penetration and related subjects. The objectives of the workshop were to provide a forum at which to present and discuss these findings and identify areas recurring more work. Papers were presented on areas recurrent do at which to present and orders these findings and identify areas requiring more work. Papers were presented on the following general topics environmental data needs, ice measurement techniques, ice statistics, ice mechanics, scale model tests, field tests, analytical modeling, design and hardware, alternate methods, airborne ASW and submarines

DESCRIPTION OF THE BUILDING MATERIALS DATA BASE FOR CINCINNATI, OHIO. Merry, C J., et al, Oct. 1986, 85p., ADA-189 046, 14 refs

LaPotin, P.J.

41-3498
CONSTRUCTION MATERIALS, PRECIPITA-TION (METEOROLOGY), ENVIRONMENTAL PROTECTION, DAMAGE, CHEMICAL ANAL-YSIS, STATISTICAL ANALYSIS, COMPUTER PROGRAMS, SAMPLING.

PROGRAMS, SAMPLING.

A building materials sampling program for the Cincinnati, Ohio, region was conducted in Jan. and Feb. 1985 to examine the types and amounts of building surface materials exposed to acid deposition. The stratified, systematic, unaligned random sampling approach was used to generate sample points across four sampling frame areas. A minimum of 70 sample points was examined per sampling frame to yield a total sample size of 387 points. Building sizes, surface materials, roof characteristics, roof-mounted apparatus, chimneys, gutters, downspouts and fences were recorded. This report provides an initial summary of the data collected.

EQUIPMENT FOR MAKING ACCESS HOLES THROUGH ARCTIC SEA ICE. Mellor, M., Nov. 1986, 34p., ADA-180 961, 34 refs.

41-3819

41-3819
ICE CUTTING, ICE DRILLS, PROJECTILE
PENETRATION, SEA ICE, HYDRAULIC JETS,
ICE BLASTING, EQUIPMENT, ROTARY DRILLING, PERCUSSION DRILLING.

ICE BLASTING, EQUIPMENT, ROTARY DRILL-ING, PERCUSSION DRILLING.

Navy underwater construction teams require a capability for making access holes through arctic sea icc.

Required hole diameters tange from less than 4 in. (100 mm) to more than 10 ft (3 m) in ice up to 15 ft (4.6 m) thick. Small diameter holes are to be completed in less than 4 hr and large diameter holes in less than 8 hr. The report first gives brief descriptions of the working environment, site access considerations, and probable operational procedure. Principles and techniques for penetrating sea ice are summarzed, with an initial list of 14 topics Twelve of these items are identified as potentially relevant, and are discussed more fully. They include 1) projectile penetration, 2) shaped charge penetration, 3) high pressure water jets, 4) blasting, 3) flame jets, 6) electrothermal devices, 7) hydrothermal devices, 8) rotary drilling, 9) percussive and vibratory penetration, 10) mechanical cutting, 11) chemical penetration, 12) exotic concepts. The final selection, which takes into account practical concerns and field experience, recommends the following things as basic tools a) small diameter auger drills (less than 4 in diam), b) large diameter auger drills (less than 4 in diam), b) large diameter auger drills (approx 9 in diam), c) chain saws, d) a hot water system for drilling and cutting. The discussion of associated equipment covers electric generators, hoists and lifting tackle, hand tools, and blasting supplies. Consideration is also given to single-fuel operation, bulk melting, and possibilities for use of compressed air Recommendations for development work by NCEL are given

SR 86-33

INSTRUCTIONS FOR COMPLETING A FIELD WORKSHEET FOR INVENTORYING BUILDING MATERIALS.

Merry, CJ, Dec. 1986, 25p., ADA-176 467, 9 refs.

CONSTRUCTION MATERIALS, PRECIPITA-TION (METEOROLOGY), ENVIRONMENTAL PROTECTION, DAMAGE CHEMICAL ANAL-YSIS.

A worksheet for use in the field was developed to inventory building materials in four northeastern cities in support of the EPA Acid Rain program. The initial form was tested for two of the cities, the redesigned and simplified form discussed in this report was used in the two remaining cities. The worksheet was designed to provide information on the census tract, land use type and sampling frame, the dimensions and type of building, the lot size, the materials distribution percentages in the foundation, first story and all above stories, and the surface area and material types for the roof roof-mounted apparatus (sents, flues, stacks, skylights and flashing), chimneys, rain gutters, downspouts and fences. The worksheet is recommended for future surveys of building materials in other cities. A worksheet for use in the field was developed to inventory

CALIBRATING HEC-2 IN A SHALLOW, ICE-COVERED RIVER.

Calkins, D J, et al. Dec 1986, 25 refs., ADA-176 485, 7 refs

Adley, M D. 41-2531

FLOOD CONTROL, ICEBOUND RIVERS, ICE COVER THICKNESS, RIVER FLOW, WATER LEVEL, MATHEMATICAL MODELS, FLOAT-ING ICE, FREEZEUP, ICE COVER EFFECT.

HEC-2 has recently been modified to accept input for a floating ice cover several techniques were evaluated in a steep, shallow river. The ice cover thickness, as expected. was the dominant parameter affecting the water levels and not the Manning's roughness coefficient of the ice cover Excellent field data on ice cover thicknesses, water levels and flow discharges were available for calibration. The relatively shallow depths of less than 6 ft and ice covers of up to 3-ft thick created special problems in matching the water levels. The actual ice cover thicknesses measured in the field should be used as a guide for ice thickness input to the model for shallow streams. The transition of ice cover thickness from one section to the next in the model is extremely critical, otherwise there will be excessive head losses. Several methods for interpolating the ice thickness between the measured sections were attempted in trying to simulate the freeze-up, and ineffective flow areas were blocked off as well. The latter provided the most realistic simulation of flow velocities beneath the ice cover.

Sr 86-35

ROOF BLISTERS. PHYSICAL FITNESS BUILDING, FORT LEE, VIRGINIA.
Kothonen, C., et al, Dec. 1986, 15p., ADA-177 801,

Bayer, J.J.

ROOFS, WATERPROOFING, THERMAL PROP-ERTIES, LEAKAGE, BUILDINGS, DEFECTS, COUNTERMEASURES.

The blusters on this 2-year old roof were first noticed one year after construction. Findings show that all blusters were built into the roof and that they will continue to develop in size and number. Currently, this roof is watertight, but leaks will occur as blisters begin to break. Rather than wait for problems, recommendations are provided for using a CRREL-designed pressure relief valve to prevent blisters from growing and ever becoming a problem

AUGER BIT FOR FROZEN FINE-GRAINED

Sellmann, P.V, et al, Dec. 1986, 13p, ADA-190 343, 5 refs.

Brockett, B.E.

AUGERS, FROZEN GROUND STRENGTH, DRILLS, MILITARY ENGINEERING, PENE-TRATION TESTS, BOREHOLES.

TRATION TESTS, BOREHOLES.

Auger bits 65 in. (165 mm) and 95 in (241 mm) in diameter were modified to satisfy military and general engineering requirements for producing holes in frozen soil. A commercial bit was selected since it appeared to need only minor modification. Penetration tests were run in frozen.

The region of soils one type containing some gravel. Modifiminor modification Penetration tests were run in frozen fine-grained soils, one type containing some gravel Modifications, which primarily involve changes in cutter relief angles, substantially improved performance Penetration rates were as high as 5 ft/min (15 m/min), compared to 0-14 ft/min (0-0.4 m/min) for the unmodified bits

DEVELOPMENT OF A FRAZIL ICE SAMPLER. Brockett, B.E., et al, Dec. 1986, 12p, ADA-179 043 Sellmann, P.V.

FRAZIL ICE, CORE SAMPLERS, ICE SAMPLING, DESIGN, GRAIN SIZE

A lightweight sampler has been constructed to provide large A lightweight sampler has been constructed to provide large cores from frazil ice deposits. Samples containing frazil ice particles ranging in size from 1 mm to over 70 mm, including the interstitial water, were successfully recovered during field tests. These samples were nearly undistrubed while confined in the sample tube, based on a comparison with samples acquired using a freeze probe technique.

SR 86-38 LOW TEMPERATURE EFFECTS ON SORP-TION, HYDROLYSIS AND PHOTOLYSIS OF ORGANOPHOSPHONATES—A LITERATURE REVIEW

Britton, K.B., Dec. 1986, 47 refs., ADA-178 349, Refs. p.42-47 41-3050

POLLUTION, CHEMICAL ANALYSIS, ICE COMPOSITION, SNOW COMPOSITION, SOIL COMPOSITION, FROZEN GROUND, TEMPER-POLLUTION, ATURE EFFECTS, ENVIRONMENTAL IMPACT.

A survey was made of the open literature to determine the information available on the persistence of organophos-phonate chemical agents in the environment. This review phonate chemical agents in the environment. This review focuses on low temperature hydrolytic and photolytic Jegradation of the nerve agents GA (Tabun), GB (Sarin), GD (Soman) and VX. The role of adsorption to ice, snow and frozen soils and sediments is also discussed in relation to these degradative processes. Suggestions are made for the investigation of agent decomposition using simularity. The method proposed for the study of agent persistence is based on the use of linear free energy relationships, which should allow for more reliable prediction of agent behavior than if a single simulant is used as a model compound SR 86-39

COMPARATIVE TRACTIVE PERFORMANCE OF MICROSIPED AND CONVENTIONAL RADIAL TIRE DESIGNS.

Blaisdell, G.L., et al, Dec. 1986, 11p., ADA-178 355, 4 refs

Morrison, T.L.

TIRES, TRACTION, RUBBER ICE FRICTION, BRAKES (MOTION ARRESTERS), DESIGN.

The braking and driving tractive effectiveness of aftermarket The braking and driving tractive effectiveness of aftermarket microsping of all-season design radial tries was studied as an alternative to standard traction aids such as snow tires, studs, and chains Microsping is a process that involves laterally slicing the tires to a depth close to that of the tread depth, thus dividing each tread element into several adjacent, contacting elements Microsping removes virtually no material from the tire. From previous studies, it is known that traction on ice is overwhelmingly dependent on the adhesion between the ice surface and the tire tread compound. Since microsping does not alter the compound, a measurable improvement in traction on ice for several tire types and temperatures, as expected, was not found

SR 87-02

LOSSES OF EXPLOSIVES RESIDUES ON DIS-POSABLE MEMBRANE FILTERS.

Jenkins, T.F., et al, Mar. 1987, 25p., ADA-180 889, 10

Knapp, L.K., Walsh, M.E. 41-3820

41-3620 EXPLOSIVES, POLLUTION, FILTERS, LABORA-TORY TECHNIQUES, EXPERIMENTATION, WATER POLLUTION, SOLUTIONS.

WATER POLLUTION, SOLUTIONS.

A number of 0 45-micron disposable filters were tested for sorption of HMX, RDX, TNB, DNB, tetryl, TNT and 2,4-DNT.

Both aqueous and mixed aqueous-organic solvent matrices were tested. For aqueous matrices, the Nalgene (green) cellulose acetate filter sorbed significant amounts of HMX, RDX, TNT and 2,4-DNT. The Gelman Acro LC25 filter, described as a naturally hydrophilic fluoropolymer, also sorbed significant levels of HMX, TNT and tetryl Where sorption was found, losses were greatest for the first portion of filtrate passed through the filter and for filtration conducted slowly Addition of 50% organic solvent prior to filtration eliminated sorption problems for all filters tested When aqueous matrices are filtered, the recommended procedure is to discard the first 10-mL portion of filtrate and retain the second 10-mL portion for analysis

EXTINCTION COEFFICIENT MEASUREMENT IN FALLING SNOW WITH A FORWARD SCAT-TER METER.

Koh, G., Mar. 1987, 9p., ADA-180 958, 5 refs. 41-3849

LIGHT SCATTERING, SNOWFALL, INFRARED RADIATION, LIGHT TRANSMISSION, FOG, MILITARY OPERATION.

A forward scatter meter designed to measure the visible extinction coefficients measured with a forward scatter meter and a transmissometer indicates that a forward scatter meter can be used to measure extinction coefficient in falling snow. The different calibrations required for snow and fog are partially explained by examining the effect of particle size on the angular distribution of scattered light.

TREATMENT AND DISPOSAL OF ALUM AND OTHER METALLIC HYDROXIDE SLUDGES Reed, S.C., et al, Mar. 1987, 40p. + plates, ADA-180 960, 19 refs

Smith, J.E., Sletten, R S, Resta, J.

SLUDGES, WATER TREATMENT, WASTE TREATMENT, WASTE DISPOSAL, FREEZING, DRYING, MILITARY FACILITIES, MASS BAL-

Sludge is an inevitable product of water and wastewater treatment. The treatment and disposal of these materials is often the most costly aspect of the overall operation. The use of alum and other metallic chemicals for coagulation. and other purposes has increased significantly in both water and wastewater treatment in recent years. These chemicals not only increase the total volume of studge produced but very significantly influence its characteristics. This report describes a number of processes for sludge treatment and disposal and recommends those best suited for military facili-

PROCEDURE FOR MEASURING BUILDING R-VALUES WITH THERMOGRAPHY AND HEAT FLUX SENSORS.

Flanders, S.N., May 1987, 29p., ADA-180 959, 5 refs. 11.4083

THERMAL INSULATION, BUILDINGS, HEAT FLUX. ECONOMIC ANALYSIS, COMPUTER AP-PLICATIONS, INFRARED EQUIPMENT, MEA-SURING INSTRUMENTS, TESTS.

This report describes a procedure for measuring R-values on actual buil lings, using thermography, heat flux transducers,

and data acquisition equipment. R-values measurement is necessary to optimize investment in additional insulation and permits confirmation of the quality of newly installed insulation.

PREPARATION AND DESCRIPTION OF A RE-SEARCH GEOPHYSICAL BOREHOLE SITE CONTAINING MASSIVE GROUND ICE NEAR FAIRBANKS, ALASKA.

Delaney, A.J., June 1987, 15p., ADA-183 186, 4 refs. 41-3627

PERMAFROST PHYSICS, GROUND ICE, BORE-HOLES, GEOPHYSICAL SURVEYS, SOIL TEM-PERATURE, UNITED STATES—ALASKA— FAIRBANKS.

FAIRBANKS.

A geophysica control site consisting of 27 holes drilled in permafrost and cased with ABS pipe has been completed near the USACRREL permafrost tunnel at Fox, Alaska The site provides excellent control on a range of material types in permafrost terrain including frozen silt, gravel, bedrock, and all common ground-ice types such as wedge, lens, and pore ice. The holes delineate massive groundice features of which there is no surface manifestation fround temperature data is available from a small-diameter glycol-filled hole. This report describes the site, its preparation, and the soil logs and data obtained.

TRACKING TWO-DIMENSIONAL FREEZING FRONT MOVEMENT USING THE COMPLEX VARIABLE BOUNDARY ELEMENT METHOD. Hromadka, T.V., II, June 1987, 58p., ADA-183 547,

COMPUTER PROGRAMS, FROZEN GROUND TEMPERATURE, SOIL FREEZING, SOIL WATER MIGRATION, PHASE TRANSFORMATIONS, BOUNDARY LAYER, THERMAI LAYER, THERMAL REGIME, HEAT FLUX.

TIONS, BOUNDARY LAYER, THERMAL REGIME, HEAT FLUX.

The Complex Variable Boundary Element Method (CVBEM) is used to develop a computer model for estimating the location of the freezing front in soil-water phase change problems. This computer program, CVBFRI, is based on the following major assumptions: 1) the problem is two-dimensional, 2) the entire soil system is homogeneous and soitopic, 3) the problem thermal boundary conditions are constant values of temperature for stream function), 4) soil-water flow effects are neglected (the problem is strictly geothermal), 5) all heat flow from the freezing front is within the control volume, there is no heat flux associated with the freezing front from exterior of the control volume, and 6) the freezing front movement is slow enough that heat flux along the moving boundary can be determined by assuming steady state heat flow conditions for small durations of time (i.e., timesteps). The CVBEM is used to model the thermal regime of the voil system. The theory and development of the CVBEM are given in CRREL Internal Report 969. Complex Variable Boundary Elements. Engineering, by Hromadka. Because the numerical technique is a boundary integral approach, the control volume thermal regime is modeled with respect to the boundary values, and, therefore, the CvBERI data entry requirements are significantly less than those usually required of domain methods such as finite-differences or finite-elements. Soil-water phase change along the freezing front is modeled as a simple balance between computed heat flux and the evolution of soil-water volumetric latent heat of fusion. To model the displacement of the freezing front program CVBFRI front doordinates with respect to a vector normal to the freezing front coordinates with respect to a vector normal to the freezing front to ordinates with respect to a vector normal to the freezing front boundary.

NODAL DOMAIN INTEGRATION MODEL OF TWO-DIMENSIONAL HEAT AND SOIL-WATER FLOW COUPLED BY SOIL-WATER PHASE CHANGE. Hromadka, T.V., II, June 1987, 124p, ADA-183 518,

Refs passim

FROZEN GROUND THERMODYNAMICS, SOIL FROZEN GROUND INERMODINAMICS, SOIL
WATER MIGRATION, HEAT TRANSFER,
FREEZE THAW CYCLES, HEAT FLUX, PHASE
TRANSFORMATIONS, MATHEMATICAL
MODELS, COMPLTER APPLICATIONS, TEMPERATURE EFFECTS, SNOW COVER EFFECT A model of phase change in freezing and thawing soils is developed for cold regions engineering problems which require two-dimensional analysis of the thermal regime of soils. These problems include complex boundary conditions soils These problems include complex boundary conditions such as atmosphere ground surface thermal interaction and snowpack insulation. Other concerns include complex soil conditions such as the presence of a peary muskeg or fundralises oil which may preside thermal insulation for understuce tich interal soil. Although several models have been developed to predict temperatures in feezing and thawing soils, often the key question is simply without or not the soil is friezin since soil structural properties are ugnificantly influenced by the soil water state of phase. In this report, a simple two dimensional model is developed for use in soil regions engineering studies. A FORTRAN compiler program is available, which as composition to the conditional control of the soil was available, which as composition to the conditional control of the control of t coal regions engineering studies. A FORTRAN computer program is available which accommodates two-dimensional

heat and soil-water flow models as coupled by an isothermal phase change model. The program can be used to analyze two-dimensional freezing-thawing problems which have sufficient known information to supply the necessary modeling parameters, boundary conditions, and initial conditions.

FREEZE-THAW TEST TO DETERMINE THE FROST SUSCEPTIBILITY OF SOILS.
Chamberlain, E.J., Jan. 1987, 90p., ADA-180 000, 7

refs

FREEZE THAW TESTS, PAVEMENTS, FROST HEAVE, FROST RESISTANCE, AIRPORTS, SOIL FREEZING, THAW WEAKENING, AIRCRAFT LANDING AREAS.

LANDING AREAS.

A new freezing test for determining the frost susceptibility of soils is presented to supplant the standard CRREL freezing test currently specified by the Corps of Engineers. This test reduces the time required to determine the frost susceptibility of a soil in half. It also allows for the determination of both the frost heave and thaw weakening susceptibilities and considers the effects of freeze-thaw cycling. The new freezing test eliminates much of the variability in test results caused by the human element by completely automating the temperature control and data observations.

BENCHMARK DESIGN AND INSTALLATION: A SYNTHESIS OF EXISTING INFORMATION. Gatto, L.W., July 1987, 73p., ADA-183 925, 27 refs. 42.92

BENCH MARKS, COLD WEATHER CONSTRUCTION, FROST HEAVE, STABILITY, SUBSIDENCE, DESIGN, SURVEYS.

DENCE, DESIGN, SURVEYS.

Techniques used for topographic, hydrographic, construction, boundary, geodetic and structural movement surveys are only as accurate as the benchmarks used as reference. In northern areas, frost action can cause substantial vertical movement of benchmarks. Benchmarks may also subside or shift in wetlands and coastal areas. Various benchmark designs and installation procedures reduce or eliminate movement, but information on the designs and procedures is widely scattered and not available to Corps of Engineers Districts in one report. This report is a synthesis of information compiled from surveys of Corps of Engineers Districts and Divisions, U.S. and Canadian government agencies, private industry and a literature review. Matrices for selecting and installing benchmarks that meet third-order accuracy requirements or better and that are appropriate for various climatic and soil conditions were prepared from the synthesized information.

Procedures to be followed. he synthesized information. Procedures to be followed while installing various types of benchmarks are included Procedures to be followed

EMBANKMENT DAMS ON PERMAFROST: DE-SIGN AND PERFORMANCE SUMMARY, BIB-LIOGRAPHY AND AN ANNOTATED BIBLIOG-

Sayles, F.H., July 1987, 109p, ADA-184 163, Refs p.28-102.

PERMAFROST BENEATH STRUCTURES, DAMS, EMBANKMENTS. SEEPAGE, COLD WEATHER CONSTRUCTION, DESIGN, DEFOR-MATION, PONDS, SPILLWAYS, FREEZE THAW CYCLES.

The designs of embankinent dams on permafrost can be divided into two general types, frozen and thawed. The frozen type of embankinents and their foundations are maintained frozen during the life of the structure. The thawed type of embankinents usually are designed assuming that the embankment will remain unfrozen and its permafrost foundation will thaw during construction or during the operation of the structure. In some locations where water is to be retained intermittently for short periods of time, thaved embankments have been designed assuming the permafrost will remain frozen throughout the life of the embankment in selecting this type of design for a particular site, many factors that are peculiar to cold regions must be considered. This summary of methods of design, construction and operation of embankment dams in permafrost areas records the successes and some failures that have occurred. The designs of embankment dams on permafrost can be and some failures that have occurred. Embankment dams have been built and successfully operated in Canada, Greenland, the USSR and Alaska. A number of failures have been reported in the USSR and one in Alaska. Most of the difficulties arose because insufficient attention was given to establishing and maintaining a reliable frozen condition and to controlling seepage.

SR 87-12

PROCEEDINGS, VOL.1.

Snow Symposium, 6th, Hanover, NH, Aug 12-14, 1986, July 1987, 207p, ADB-115 486, Refs. passim Fer individual papers see 42-1404 through 42-1422.

SNOW PHYSICS, SNOWFALL, SNOW COVER FFFECT, INFRARED RADIATION, MEETINGS, VISIBILITY, LIGHT TRANSMISSION, SOUND WAVES, LIGHT SCATTERING, RADAR ECHOES.

SR 87-13

TACTICAL BRIDGING DURING WINTER: 1986 KOREAN BRIDGING EXERCISE

Coutermarsh, B A., July 1987, 23p., ADB-114 800. 11

ICE CUTTING, RIVER CROSSINGS, ICE BLAST-

ICE CUTTING, RIVER CROSSINGS, ICE BLAST-ING, MILITARY OPERATION, BRIDGES, EX-PLOSIVES, ICE CONTROL, WINTER
Deployment alternatives for the U.S. Ribbon bridge are discussed assuming an ice sheet is present at the crossing site. Ice blasting time and effectiveness with several explosives readily available to the Army are presented. A 1986 Korean winter bridging exercise is detailed where an ice sheet was blasted using C4 explosives in a gnd pattern Ice rubble consolidation was attempted using the Bridge Erection Boat, after which the launch of a bridge bay section was tried. It is shown that ice rubble hinders boat operations and retrieval of the bay sections

SALINE ICE PENETRATION: A JOINT CRREL-NSWC TEST PROGRAM. Cole, D M., et al, July 1987, 34p, ADA-189 206.

Steves, H.K.

42-2417 MILITARY

OPERATION, PENETRATION TESTS, ICE STRENGTH, FLOATING ICE, ICE SALINITY, PROJECTILE PENETRATION, IMPACT STRENGTH, FRACTURING, ICE COVER

THICKNESS.

This paper reports on the response of a floating saline ice sheet to penetration and perforation by 25.4-mm-diameter projectiles with 3 nose shapes a full cone, a truncated cone and a full flat. Impact velocity was varied to produce behavior ranging from slight penetration to complete perforation of the 210- to 280-mm-thick ice sheet. The extent of crushing and fracturing adjacent to the path of the projectile was quantified, indicating the existence of a zone of crushing extending 1 to 2 body diameters into the ice sheet from the cavity wall. A series of shots into free-floating targets indicated that for penetrations of roughly two-thirds of the sheet thickness, the depth of penetration did not vary significantly as the target size was reduced to 24 body diameters. Texts on coated projectiles indicated that no significant abrassion occurred between the ice and the nose area of the projectile information is also presented on the effects of gun pressure, nose shape, average sheet temperature and angle of attack on the depth of penetration.

RATING UNSURFACED ROADS—A FIELD MANUAL FOR MEASURING MAINTENANCE PROBLEMS.

Eaton, R.A, et al, Aug 1987, 34p, ADA-185 621 Gerard, S., Cate, D.

ROAD MAINTENANCE, SURFACE ROUGHNESS, DRAINAGE, TRAFFICABILITY, PAVEMENTS, MANUALS.

EVALUATION OF THE SHASTA WATERLESS SYSTEM AS A REMOTE SITE SANITATION FACILITY.

Martel, CJ, Aug 1987, 24p., ADA-186 000, 5 refs 42-1088

SANITARY ENGINEERING, MILITARY FACILITIES, WASTE DISPOSAL, TANKS (CON-TAINERS).

The wateriess toilet manufactured by Shasta Manufacturing, Inc., of Redding, California, was evaluated for possible use at remote military training sites and guard stations. A telephone survey of 6 recreational areas indicated that park personnel were generally pleased with the performance of these units. On-site visits did not encounter offensive odors. Proper ventilation and liquid level control were found to be key factors in successful operation. A rational approach to string these units was developed on the basis of local pan evaporation rates. local pan evaporation rates

WORKING GROUP ON ICE FORCES. 3RD STATE-OF-THE-ART REPORT.

Sanderson, T.J.O., ed. Sep. 1987, 221p., ADA-191 067, Refs passim. For individual papers (mostly from different source) see 40-4602 through 40-4608 and 42-3038

42-3037

ICE LOADS, OFFSHORE STRUCTURES, HY-DRAULIC STRUCTURES, SEA ICE, ICE SCORING, STRUCTURES, DESIGN, ENGINEERING, LESTS.

Flux working group report on see forces includes individual papers which discuss laboratory results, field measurements, instrumentation, numerical analysis, and neberg scour. A more detailed abstract appears at the beginning of each individual paper.

SR 87-18

SORPTION OF CHEMICAL AGENTS AND SIMULANTS: MEASUREMENT AND ESTIMA-TION OF OCTANOL-WATER PARTITION CO-

Leggett, D.C., Sep. 1987, 15p , ADB-117 069, 14 refs. 42-1790

MILITARY OPERATION, CHEMICAL COMPO-SITION, SOIL POLLUTION, WATER FLOW, SOLUBILITY, TIME FACTOR, COUNTERMEAS-URES, ANALYSIS (MATHEMATICS), POLAR REGIONS.

Octanol-water partition coefficients were determined experimentally for 8 simulants. These were supplemented with published fragment constants and water solubilities to predict log K(ow) values of several threat agents. These estimates can be used to predict sorption and transport in soils. If correct, organophosphorus agents are more mobile in soil water than previously expected.

SR 87-19

FIELD OBSERVATIONS OF MINE DETECTION IN SNOW USING UHF SHORT-PULSE RADAR.

Arcone, S A, et al, Oct. 1987, 24p., ADB-117 360, 11 refs

Delaney, A.J. 42-1953

MILITARY OPERATION, RADAR ECHOES, SNOW DEPTH, DETECTION, POLAR REGIONS, FREEZE THAW CYCLES, EXPERIMENTATION, METALS.

METALS.

The response to short-pulse radar of land mines emplaced in snow was observed throughout the winter of 1985-86 in Fairbanks, Alaska. The radar produced a pulse of a few nanoseconds duration with a spectrum centered near 900 MHz, resistively loaded dipole antennas were used at two polarizations. The mines—standard anti-armor types and a Plexiglas simulation of one of these—were emplaced at various orientations on or above a cleared ground surface and monitored. There was little change in the mine responses that occur before the ground surface response under conditions of 0 and 35 cm of snow, the maximum depth achieved, as long as the snow was dry. Responses from the migrating freeze-thaw interface in the active layer masked some of the later mine responses. The radar effected no response from several of the mines when the pack began to thaw and temperature was nearly constant at 0 C. Some polarization sensitivity was always evident, depending on the orientation of the mine. In no case was there any response to the Plexiglas simulation. UHF short-justeradar is an excellent mine detection technique in dry snow so long as mines are metallic, but is unsuitable for detecting small, plastic mines in snow.

SR 87-20

SR 87-20 ICE ATLAS 1985-1986: MONONGAHELA RIVER, ALLEGHENY RIVER, OHIO RIVER, ILLINOIS RIVER, KANKAKEE RIVER. Gatto, L.W., et al, Nov. 1987, 367p., ADA-191 865. Daly, S.F., Carey, K.L.

ICE CONDITIONS, RIVER ICE, MAPS, PHO-TOINTERPRETATION, AERIAL SURVEYS, ICE SURVEYS, ICE REPORTING.

TOINTERPRETATION, AERIAL SURVEYS, ICE SURVEYS, ICE REPORTING.

The nee maps in this alias were prepared to document the 1985-86 nee conditions included in study areas for the River Ice Management (RIM) Program, namely twer mile 0 to 12 on the Monongahela River, mile 0 to 17 on the Allegheny, mile 0 to 437 on the Ohio, mile 120 to 273 on the Illinois and mile 0 to 21 on the Kankakee The maps were prepared from interpretation of vertical aerial video imagery also from low flying aircraft The interpreced nee confittions were classified into 5 units and transferred to base maps by reference to navigation charts and topographic maps lee floes or frazil slush and pans (IFFSP) was the most common nee unit in the lower Monongahela Fragmented nee cover with open water areas (FICOWA) was the most common nee unit in the lower Allegheny Fragmented nee cover (FIC) and FICOWA were the most extensive ce units above Hannibal Dam on the Ohio, ICFSP were predominant below Solid tee cover (SIC), FIC and FICOWA were the most extensive nee types on the lake-like areas of the Illinois River, while FICOWA and FIFSP predominated elsewhere on the Illinois. SIC and FIC were the most common nee units on the Kankakee River There were frequent cancellations of flights of the Ohio, Allegheny and Monongahela during the 1985-86 winter because of low cloud ceilings. Various options are being explored te get more frequent coverage in the future to get more frequent coverage in the future SR 87-21

CRITICAL COMPARISON OF MOVING AVER-AGE AND CUMULATIVE SUMMATION CONTROL CHARTS FOR TRACE ANALYSIS DATA. McGcc, LE., et al., Nov. 1987, 57p., ADA-188 312, 20

Grant, C.L.

WASTE DISPOSAL, CHEMICAL ANALYSIS, EN-VIRONMENTAL IMPACT, SOIL POLLUTION, ISOTOPE LABELING, DETECTION

Percentage recovery estimates have been obtained for 15 analytes or surrogates of environmental concern by four

commercial laboratories over a two-year period. These quality control analyses were performed using standardized methods on a control soil matrix. Over 100 lots of results were available for many of these analytes. This massive amount of data afforded an opportunity to compare the sensitivity of different quality control protocols for detecting "out-of-control" situations and also to compare the performance of the four laboratories. Recovenes averaged 90-100% for 11 of 15 analytes. Reproductibility of recovery estimates was surprisingly consistent from lab-to-lab. From a comparison of moving average control charts (n=2 and n=3) with cumulative summation charts, the n=3 moving average charts were considered most suitable for routine lot-to-lot control by contractors. The cumulative summation charts are very useful for situations requiring critical diagnostic analysis of problems. Where duplicate recoveries were obtained with each lot, lot-to-lot variability was similar in magnitude to within-lot variability. To avoid an excessive number of out-of-control responses, control limits should be based on total variability rather than within-lot variability.

SR 87-22 COMPARISON OF METHANOL AND TETRA-GLYME AS EXTRACTION SOLVENTS FOR DETERMINATION OF VOLATILE ORGANICS IN SOIL

Jenkins, T.F., et al, Nov 1987, 26p., ADA-189 028, 23 refs

Schumacher, P.W.

SOIL CHEMISTRY, WASTE DISPOSAL, WATER POLLUTION, DETECTION, SOLUBILITY.

POLLUTION, DETECTION, SOLUBILITY.

The abilities of methanol and tetraglyme to extract chloroform, benzene, toluene, and tetrachloroethylene from vapor-contaminated soils are directly compared. Comparisons are made both with respect to process kinetics and analyte recovery using an extraction procedure based on equilibration on a wrist-action shaker and determination using a purge-and-trap GC/MS. An equilibration period of 10 minutes is recommended for extraction using either methanol or tetraglyme. In all cases methanol was as good as or better than tetraglyme with respect to analyte recovery. This was even the case for soils contaminated with an oily residue. While commercial methanol and tetraglyme both contain measurable levels of volatile atomatics, simple rotary evaporation was successful in removing these contaminants to levels below detection limits for tetraglyme. Thus, for cases where very small amounts of these contaminants must be detected, degassed tegraglyme would be superior. Overall, however, methanol is considered the best choice for extraction of volatile organics where subsequent analysis is to be conducted by purge-and-trap GC/MS.

SR 87-23

INFORMATION SYSTEMS PLANNING STUDY. Atkins, R.T., et al, Nov. 1987, 48p.
Albert, D.G., Fellers, G., Greeley, H.P., Hoge, G., O'Neill, K., Swart, P., Tucker, W.B., Zabilansky, L.J. 43-450i

LABORATORIES, ORGANIZATIONS, COMPUT-

ER PROGRAMS.

CRREL HOPKINSON BAR APPARATUS. Dutta, P.K., et al, Dec. 1987, 29p, ADA-190 599, 21

Farrell, D., Kalafut, J. 42-2635

42-2033
ICE STRENGTH, FROZEN GROUND
STRENGTH MEASURING INSTRUMENTS, ICE
CRYSTAL STRUCTURE, LOW TEMPERATURE
TESTS, BRITTLENESS, DYNAMIC LOADS,
CONSTRUCTION MATERIALS, IMPACT STRENGTH.

Most materials at low temperatures change their modulus and tend to become brittle. When using these materials in stria ural components that are likely to be subjected to impact it is important to understand their behavior at low temperatures under dynamic loading. The CRREL split Hopkinson Test Bar was designed and set up to conduct compressive strain rate tests (up to 1000 strains/s, i.e., in, infores) at low temperatures (down to -100 C). The results provide dynamic stress-strain, relationships of materials at low temperatures by considering the transmission of the stress wave through a test specimen is contained in a liquidition of the stress wave through a test specimen is contained in a liquidition of the stress wave through a stress wave through a stress wave and clastic striker impacts the bar as a result a stress wave passes down the bar. At the specimen a part of the wave is reflected and the rest is transmitted to the second bar. Strain gauges mounted on the bars record the wave hapes, which are analyzed to obtain the dynamic stress-strain relationships. The test bars are 1-1.2 in, in diameter and each is 3 ft long. The apparatus is suitable for testing light metals, plastics, composites, rocks, i.e., and frozen soil. The data acquisition and analysis system are completely automatic, using software developed at CRREL, so the system provides for a tapid and low-cost method for high strain, atc. Most materials at low temperatures change their modulus

ANALYTICAL METHOD FOR DETERMINING TETRAZANE IN WATER.

Walsh, M.E., et al, Dec. 1987, 34p., ADA-189 045, 15 refs.

Jenkins, T.F.

EXPLOSIVES, GROUND WATER, MILITARY OPERATION, CHEMICAL ANALYSIS, WATER POLLUTION

POLLUTION.

An ion-pairing RP-HPLC method was developed to determine tetrazene in water. The method uses an LC-18 column and a mobile phase of 2/3 v/v methanol-water modified by 0.01 molar 1-decenesulfonic acid sodium salt. The mobile phase pH was adjusted to 3 with glacial acctic acid. The modified mobile phase was optimal for separating of tetrazene from potential interferences by other explosive compounds such as HMX and RDX and for allowing elution of TNT within a 15-minuter run time. The retention time for tetrazene was 2.8 minutes

The UV detector was an access 2.80 nm. A linear model with zero intercept was for tetrazene was 2.8 minutes The UV detector was set at 280 nm A linear model with zero intercept was found to adequately describe the calibration data. The concentration range tested was 6.2-1238 microgram/L. A spike recovery test on each of 4 days gave an average recovery of 103%. A reporting limit of 7.25 microgram/L was estimated The relative standard deviation was approximately 2% over the range tested Tetrazene was found to be unstable in an aqueous medium at room temperature Concentrations decreased by 96-100% over 24 hours. Chilled solutions were less prone to degradation than room temperature solutions, and heated solutions (50 C) degraded completely within two hours.

SR 87-28 XYFREZ.4 USER'S MANUAL.

O'Neill, K., Dec. 1987, 55p., ADA-191 466, 3 refs. 42-3159

HEAT TRANSFER, COMPUTER PROGRAMS, PHASE TRANSFORMATIONS, MATHEMATICAL MODELS, LATENT HEAT, HEAT CAPACITY, TEMPERATURE DISTRIBUTION.

TY, TEMPERATURE DISTRIBUTION.

Using the program XYFREZ, version 4, one may simulate two-dimensional conduction of heat, with or without phase change. The mathematical method employed uses finite elements in space and finite differences in time, and includes latent heat effects through a singulanty in the heat capacity. The user need have no real familiarity with either the underlying equations or the numerical procedures. He must only specify material properties, geometrical features, initial and boundary conditions, and information on the desired manner and duration of simulation through time. Heterogeneous material properties may be specified Boundary conditions currently implemented allow one to specify 1) temperature values which vary arbitrarily in space and time, 2) convective conditions, via a heat transfer coefficient and an ambient temperature, and 3) a no-flux or symmetry condition. The program outputs computed temperature values at numerical mesh points, as well as information for later plotting. From the latter one may see the mesh configuration as well as the phase change isotherm location on it over time.

ICE CONDITIONS ALONG THE OHIO RIVER AS OBSERVED ON LANDSAT IMAGES, 1972-

Gatto, L.W., Jan. 1988, 162p, ADA-191 172, 25 refs. 42-3010

ICE CONDITIONS, RIVER ICE, REMOTE SENS-ING, ICE NAVIGATION, AERIAL SURVEYS, LANDSAT, PHOTOINTERPRETATION, SEA-SONAL VARIATIONS, UNITED STATES—OHIO RIVER.

RIVER.

Landsat images were used to map ice distributions along the Ohio River—lee conditions were inferred based on image grey tones interpreted using conventional photointerpretation techniques—Portions of the river that appeared black were considered ince-free—Grey tones were interpreted as ice that varied from patches of thin, snow-free solid or fragmented ice, sonetimes with open areas, to floes, pans and slush—A white tone represented thick see or snow-covered lice with few interspersed open areas—lee that produced grey tones on the images occurred most frequently.

Lee typically forms in late Dec. or early Jan—on the Ohio River and is gone by mid to late Feb—lee was observed on the upstream section of the river from 1972 to 1985, on the middle section from Greenup Dam during 7 of the 13 winters from 1972 to 1985, on the middle section from Greenup Stream section from Cannelton Dam to the Mississippi River during 4 winters—The most severe and long-lasting ice conditions—ccutred during the 1976-77 winter when accorded 65% of the upstream section, 56% of the middle section, and 78% of the downstream section

SR 88-02

PREDICTING PRODUCT WATER QUALITY FROM THE 600-GALLON-PER-HOUR RE-VERSE OSMOSIS WATER PURIFICATION UNIT. FIELD WATER SUPPLY ON THE WIN-TER BATTLEFIELD.

Bouzoun, J.R., Feb. 1988, 7p., ADA-194 988, 4 refs.

WATER SUPPLY, MILITARY ENGINEERING, MILITARY RESEARCH, LOGISTICS, WATER TREATMENT, WATER CHEMISTRY, ANAL-YSIS (MATHEMATICS).

A prelimmary equation for predicting the total dissolved solids (TDS) concentration in the product water from the 600-gph ROWPU is presented the raw water temperature and TDS concentration as input data. Both of these variables can be easily measured in the field. The equation is presently limited to raw water TDS concentrations in the range of 800-900 mg/L. As data become available for a greater range of raw water TDS concentrations, including seawater, the equation will be modified The standard error of the estimate is 3.4 mg/L.

SR 88-03

TECHNIQUES FOR MEASURING RESERVOIR BANK EROSION.

Gatto, L.W., Feb. 1988, 27p., ADA-191 400, Refs. 42-3462

BANKS (WATERWAYS), SHORE EROSION, RESERVOIRS, LAKES, RIVERS, SEDIMENTS.

This report summarizes the processes that cause and conditions that contribute to bank erosion along reservoirs, lakes, rivers and coasts. It suggests measurements, techniques and measurement frequencies for four different levels of bank erosion study Details on specific procedures for a particular tech-nique must be obtained from references cited. There are neither standard measurements to make nor standard methods to use during erosion studies, but this report can be useful to investigators selecting an approach for future work

SR 88.04

PRELIMINARY DEVELOPMENT OF A FIBER OPTIC SENSOR FOR TNT.

Zhang, Y., et al, Mar. 1988, 16p., ADA-191 865, 6

Seitz, W.R., Sundberg, D.C., Grant, C.L. 42-2809

SOIL POLLUTION, DETECTION, GROUND WA-TER, OPTICAL PROPERTIES, MILITARY RE-SEARCH, WATER POLLUTION.

Research aimed at the development of a fiber-optic based sensor is described for *in-situ* detection of TNT in groundwater. Three approaches were evaluated in depth. All three involved use of a material to concentrate TNT in the field of view of an optical fiber. The materials tested were 1) a concentrated dextran solution isolated by a semi-permeable membrane, 2) a pre-swollen cross-linked polysumly alcohol polymer; and 3) an amine-loaded PVC membrane. Another approach based on the formation of a colored TNT anion at high pH was also considered. The amine-loaded PVC membrane appears to have the most promise. Clear membranes were prepared which reacted with TNT to form a colored product. Measurement is made at 520 nm which is very convenient for fiber optic-based sensing. Various primary amines were assessed Research aimed at the development of a fiber-optic based ous primary amines were assessed

DEVELOPMENT OF THE UNSURFACED ROADS RATING METHODOLOGY. Eaton, R.A., Apr. 1988, 13p., ADA-195 837, 2 refs.

ROAD MAINTENANCE, SURFACE PROPER-TIES, SURFACE DRAINAGE, ENGINEERING.

TIES, SURFACE DRAINAGE, ENGINEERING. A method for rating the surface drainage and conditions of unpawed roads has been developed, and a field manual has been prepared to assist county, municipal, military and township highway agencies in managing the maintenance of such roads. The types of distress found in unpawed roads are categorized and listed in the manual. For each type of distress listed, there is a description of the distress and the levels of severity, an illustration, and a measurement method. The manual also includes instructions on how to inspect unsurfaced road conditions, a field inspection work sheet, and a family of deduct value curves for the distress types and associated severity levels. The curves were validated using data gathered during 7 field surveys throughout the United States. This report describes the development of the deduct value curves for the 7 distresses identified in unsurfaced road maintenance. The development of the original curves and the adjustments after each ment of the original curves and the adjustments after each field trip are described. The surface and drainage rating method and maintenance management strategies can be used. alone, or they can be adapted for use with any existing computerized pasement management system (PMS). The rating method and strategies are compatible with the PAVER PMS developed by the U.S. Army Corps of Engineers and the American Public

SR 88-06

ICE CONDITIONS ALONG THE ALLEGHENY AND MONONGAHELA RIVERS AS OBSERVED ON LANDSAT IMAGES, 1972-1985.

Gatto, L.W., May 1988, 106p, ADA-196 432, 11 refs

RIVER ICE, ICE CONDITIONS, REMOTE SEN ING, ICE NAVIGATION, LANDSAT, SNOW COVER EFFECT, AERIAL SURVEYS, PHOTOGRAPHY, UNITED STATES—ALLEGHENY RIVER, UNITED STATES—MONONGAHELA RIV-FR

ER.

Landsat images were used to map ice distributions along a 72-mile section of the Allegheny River, and the 129-mile-long Monongahela River. River reaches with greyice and white ice were mapped based on image tones using conventional photointerpretation techniques. Portions of a river that appeared black were mapped as ice free, although thin, transparent ice could also appear black. Grey tones were produced by ice that varied from patches of solid or fragmented ice with large open-water areas, to floes, pans, slush, or thin ice mixed with open areas. A white tone was produced by thick ice or snow-covered ice with very small or no open areas. Ice that produced grey tones was more frequent than ice that produced a white tone. Ice was observed on the Allegheny River during 10 of the 13 winters from 1972 to 1985, with the most severe ice conditions in 1976-77 when 100% of the river was covered with white ice. The Monongahela River had ice during 7 winters. Grey ice and white ice were observed covering the entire Monongahela River during the 1983-84 winter. During 1976-77, grey and white ice covered 94%

SR 88-07

INVENTORY OF ICE PROBLEM SITES AND REMEDIAL ICE CONTROL STRUCTURES. Perham, R.E., July 1988, 9p., ADA-197 967, 12 refs.

RIVER ICE, ICE CONTROL, ICE NAVIGATION, ICE CONDITIONS, STRUCTURES.
As part of the River Ice Management (RIM) program, several

As part of the River Ice Management (RIM) program, several ice-affected, navigable rivers were studied to find locations where ice problems occur on a regular basis. The rivers studied were the Illinois River and the Ohio River and its tributance, especially the Allegheny and the Monongahela Several problem areas were found at river bends, islands, and locks and dams and were generally caused by having too much broken ice in the ship track. One site had a serous frazil ice problem. Ice control structures such as ice booms and deflector booms were investigated for use at certain locations. The report includes a list of 64 ice problem sites, 5 locks and dams that could benefit from ice control structures, and 3 proven structures that are technically applicable.

EVALUATION OF SEVERAL AUGER BITS IN FROZEN FINE-GRAINED SOILS, ASPHALT, AND CONCRETE.

Sellmann, P.V., et al, July 1988, 10p., ADA-199 415, 3 refs.

Brockett, B.E.

AJUGERS, FROZEN GROUND STRENGTH, DRILLING, CONCRETE STRENGTH, BITU-MENS, GRAIN SIZE, TESTS.

MENS, GRAIN SIZE, TESTS.

Several auger bits were evaluated for drilling in frozen ground, asphalt, and concrete to determine bit performance in a wide range of materials. Promising bits in the 9- to 10- in (229- to 254-mm) diameter range were used with varying success depending on bit configuration. Bits included finger bits and a two-wing bit with continuous cutters It was possible to penetrate all the test materials, with performance depending on bit parameters and characteristics of the drill rig. Drill rig specifications are important because of the high torque and vertical thrust required for drilling in these hard materials. The finger bits have an advantage over bits with fixed cutters (voldered to the bit) for this demanding drilling, since damaged and duit cutters can be rapidly replaced in the field without special equipment. Several smaller-diameter bits 35 in (89 mm) were also tested in frozen ground equipment. Several smaller-diameter bits 3.9 in the minute to 6.5 in (165 mm) were also tested in frozen ground only.

SR 88-09

BEHAVIOR OF MATERIALS AT COLD RE-GIONS TEMPERATURES. PART 1: PROGRAM RATIONALE AND TEST PLAN.

Dutta, P.K., July 1988, 68p, ADA-199 566, Refs 43-1146

MATERIALS, MILITARY RESEARCH, LOW TEMPERATURE TESTS, FRACTURING, EX-PERIMENTATION, METALS, POLYMERS, STRESS STRAIN DIAGRAMS, ANALYSIS (MATHEMATICS)

Newer materials and products are being constantly added to the Army's inventory. Cold regions climatic conditions should not impair the reliability and durability of these messagems. This report discusses the rationale of the test program being undertaken at CRREL to evaluate material behavior at low temperatures.

SR 88-10

WATER QUALITY CHANGES CAUSED BY EX-TENSION OF THE WINTER NAVIGATION SEASON ON THE DETROIT-ST. CLAIR RIVER

Sletten, R.S., July 1988, 56p., ADA-200 535, 15 refs. 43-1201

WATER POLLUTION, ICE NAVIGATION, WIN-TER, SEASONAL VARIATIONS, LAKE WATER, GREAT LAKES, DETROIT RIVER, SAINT CLAIR

RIVER
This study was conducted to determine how the water quality in the Detroit-St Clair river system may change if the navigation season is extended from early Jan. to the end of Jan The study looked at background water quality, the effects of ship passage, and sedimentation rates Background water quality in the study area has been continually improving since 1967. In the main shipping channel where ship passage studies were conducted, there were no significant relationships between the passage of a ship by a point and water quality

The rate of natural sediment accumulation increased during the winter. increased during the winter.

SR 88-11

PREDICTION OF OCTANOL-WATER PARTI-TION COEFFICIENTS OF ORGANOPHOS-PHONATES: EVALUATION OF STRUCTURE-UNCTION RELATIONSHIPS.

Britton, K B, et al, Aug. 1988, 24p., ADB-126 287, 44 refs.

Grant, C.L.

MILITARY RESEARCH, CHEMICAL COMPOSITION, MOLECULAR STRUCTURE, FROZEN GROUND, SNOW COMPOSITION, ENVIRONMENTAL IMPACT, ANALYSIS (MATHEMATICAL CONTROL OF THE PROPERTY OF THE PRO

Three theoretical approaches were evaluated for the prediction of octanol-water partition coefficients for organophosphonates Three theoretical approaches were evaluated for the prediction of octanol-water partition coefficients for organophosphonates. The first involved the development of a series of substituent constants based on experimentally determined partition coefficients. A linear relationship was found between the log of the partition coefficient (log P) and substituent constants, indicating possible utility for predicting partitioning behavior for chemical agents. This approach is limited by the available data for some important substituents. The second approach investigated involves discetting molecules into a series of structural elements called fragments. Log P is calculated by summing the corresponding fragment values. Octanol-water partition coefficients calculated for organophosphorus compounds disagreed significantly with experimentally determined values. Molecular connectivity was the third method evaluated. Values obtained by this method are not derived from experimental data but are solely based on molecular structure. Connectivity indices are based on the number and types of atoms and bonds with the molecule. The most promising results were obtained using compounds that are structurally similar to chemical agents containing only aliphatic substituents. Agreement between experimental and predicted values was highly variable. It appears that molecular connectivity cannot at present be used to accurately predict K(ow) values for chemical agents. Overall, the use of structure-function relationships is not recommended for the accurate prediction of chemical agent partitioning at their current stage of development.

ICE CONTROL IN RIVER HARBORS AND FLEETING AREAS.

Perham, R E., Aug. 1988, 7p, ADA-199 369, 9 refs

ICE CONTROL, RIVER ICE, ICE NAVIGATION. PORTS, ICE REMOVAL, CHANNELS (WATER-

WAYS)

Lee control in river harbors and fleeting areas in the northern tier of the United States east of the Mississippi River is handled mainly by the barge and towboat companies. Fleeting area portection in many locations is provided by its provided by the possible, unused barges are anchored in side channels and below islands or set along one side of the waterway in large groups for ice protection. Incetreaking is done by towboats, without barges, and a wide track is broken out. Alternative methods of ice control are discussed.

HARD-SURFACE RUNWAYS IN ANTARCTICA. Mellor, M., Aug. 1988, 87p., ADA-200 444

RUNWAYS, AIRCRAFT LANDING AREAS, ICE RUNWAYS, SNOW ROADS, PAVEMENTS, TRAFFICABILITY, AIRPLANES, FREEZE THAW CYCLES, COST ANALYSIS, ANTARCTICA MCMURDO STATION, ANTARCTICA AMUNDSEN SCOTT STATION

AMUNDSEN SCOTI STATION.

The feasibility of constructing and maintaining hard surface snow runways at McMurdo Sound and South Pole was studied. Lasting technology was reviewed, and proposals for novel techniques and machines were put forward. It was concluded that all season operation of heavy wheeled aircraft from snow runways is not a practical proposition for the short term. Other possibilities for all season operation of wheeled aircraft were considered. These included

(a) a conventional runway of rock-fill and gravel, (b) rock-fill and gravel over permanent ice, (.) a runway on coastal glacier ice, (d) runways on bare glacier ice at inland locations Rough cost estimates were made for each of the runway Rough cost estimates were made for each of the runway types that were considered. After examining the trends in antarctic aviation, the following recommendations were offered (1) develop a construction plan for a conventional runway at Marble Point, (2) proceed with site selection, equipment design, and development of ground transport for a wheel runway on the Ross Ice Shelf, (3) search for natural "blue ice" artifields at inland locations, especially locations that are not too far from the South Pole (Auth.)

ERUPTIONS FROM UNDER-ICE EXPLO-SIONS

Mellor, M., et al, Sep. 1988, 26p., ADA-207 497, 4

L'Heureux D.

EXPLOSIVES, VELOCITY MEASUREMENT, EX-PLOSION EFFECTS, UNDERWATER PHOTOGRAPHIC TECHNIQUES. PLOSION.

Struptions from under-ice explosions were recorded by a standard video camera and an ordinary motor-driven 35-mm camera. The records give the dimensions and velocities of the eruptions. Velocity, diameter, and height are related to charge depth and the results are compared with data for ordinary underwater explosions in ice-free water.

SP 88-15 ANALYTICAL METHOD FOR DETERMINING

TETRAZENE IN SOIL. Walsh, M.E., et al, Sep. 1988, 22p., ADA-201 138, 14 refs.

Jenkins, T.F. 43.1307

EXPLOSIVES, DETECTION, SOIL POLLUTION, MILITARY RESEARCH, CHEMICAL ANALYSIS, WATER POLLUTION, EXPERIMENTATION, ENVIRONMENTAL IMPACT, COMPUT-ER APPLICATIONS, STORAGE, MANUFAC-TURING.

An ion-pairing RP-HPLC method was developed to determine tetrazene in soil. The method involves extracting a 2 soil sample with 50 mL. of a solvent containing 55/45 v/v methanol-water and 1-decanesulfonic acid, sodium salt at 0.01 M concentration. The soil and extracting solvent are vortexed for 15 s and shaken on a platform orbital shaker for a period up to 5 hr. The extract is filtered through a 0.5-micron Millex SR filter and analyzed. Determination was achieved using an LC-18 column, a mobile phase of 2/3 v v methanol-water containing 1-decanesulfonic acid, sodium salt at 0.01 M concentration, and a UV detector set at 280 nm. The mobile phase pH was adjusted to 3 with glacial acetic acid, which was optimal for separation of tetrazene from potential interferences by other explosives Retention time was 2.8 min. Kinetic studies show maximum tetrazene recoveries are achieved from undried soil within 5 hr of shaking at room temperature. Refrigeration is required for extracts that are not analyzed immediately SR 88-16. An ion-pairing RP-HPLC method was developed to determine

SR 88.16 EFFECTS OF TEMPERATURE AND SPECIES

ON TNT INJURY TO PLANTS.
Palazzo, A J, et al, Sep 1988, 7p., ADA-200 323, 12

43-1140

PLANTS (BOTANY), SOIL POLLUTION, PLANT PHYSIOLOGY, DAMAGE, GROWTH, TEMPER-ATURE FFFFCTS

The studies tested the toxic effects of trinitrotoluene (TNT) The studies tested the toxic effects of trinitrotoliuene (TNT) to plants grown hydroponically. The first study tested the effect of temperature and TNT concentration on plant growth and the second tested the effect of TNT on various legumes and grass. The studies showed that the tolerance to TNT is related to both the genotypic characteristics of the plant and its rate of growth. Plants growing in more optimum environments and having a greater growth rate were more tolerant to the injurious effects of TNT. TNT toleran e was greater in grasses than in legumes. The growing points of plants originating from the crown were most tolerant to TNT injury.

SR 88-17 EFFECTS OF ALL-TERRAIN VEHICLE TRAF-FIC ON TUNDRA TERRAIN NEAR ANAK-TUVUK PASS, ALASKA.

Racine, C., et al, Sep. 1988, 12p., ADA-199 969, 17 refs

Johnson, L.A 43-1340

TUNDRA, ALL TERRAIN VLHICLES, ENVI-RONMENTAL MERALIN VEHICLES, ENVIRONMENTAL IMPACT, VIGIT VIION, TOPO-GRAPHIC FEATURES, DAMAGE, FROZEN GROUND STRENGTH, LICHENS, GROUND THAWING, THERMOKARST DEVELOPMENT Ny and eight wheel iight weight an terrain scholes (ATVs) (maints the Argo with low pressure, now ribbed tires) are currently used in the Anaktos in Piss, Vaska, a.ea for summer subsistence travel from the single into several Brooks Range valless. The environmental effects of summer ATV use are poorly understood. During the summers of 1285 and 1986, terrain disturbance at 31 sites representing trails over dry, moist and wet tundra was evaluated by rating the levels of soil exposure, vegetation destruction and microtopographic depression (ruts). Surface and frozen layer profiles across selected trail sites were also obtained, and trail visibility from the air and ground was rated. The levels of trail disturbance vary between valleys and generally decrease with distance from the village of Anaktuvuk Pass. Trails over dry tundra showed low to moderate terrain disturbance, the hard substrate and shallow organic cover resulted in low surface depression and low exposure of mineral soil However, vegetation disturbance was often high, particularly to lichens and tailer shrubs. These trails were generally of low visibility except where light-colored lichens were removed. Terrain disturbance on trails over most tundra varied from low to high. As long as cottongrass tussocks remained intact, and supported vehicle weight, terrain disturbance was low, once tussocks were destroyed, deep ruts developed quickly, followed by trail abandonment and formation of a new parallel track. Thawing increased under the highly disturbed trails, but thermokarst formation was infrequent because the ice content of the soils in the Anaktuvuk Pass area is generally low. Wet tundra trail sites showed moderate to high terrain disturbance with low vegetation disturbance but high microtopographic changes. On wet tundra, drivers often move to an adjacent new trail following only a few passes, reducing the disturbance in one track. Visibility was generally high because of standing water in the tracks and the presence of several parallel tracks.

IMPROVED TECHNIQUES FOR CONSTRUC-TION OF SNOW ROADS AND AIRSTRIPS. Lee, S.M., et al, Sep. 1988, 99p, ADA-100 113, 41

Haas, W.M., Wuori, A.F. 43-1150

43-1150
AIRCRAFT LANDING AREAS, ICE RUNWAYS, SNOW ROADS, SNOW COMPACTION, SNOW HARDNESS, SNOW TEMPERATURE, SNOW DENSITY, SNOW STRATIGRAPHY, GRAIN SIZE, METAMORPHISM (SNOW), ANTARCTICA—MCMURDO STATION, ANTARCTICA—AMINDSEN, SCOTT STATION AMUNDSEN-SCOTT STATION.

AMUNDSEN-SCOTT STATION.

Rammsonde profile measurements and surface strength (Clegg impact) tests were conducted at selected sites in Antarctica on the snow roadways between McMurdo Station and Williams Field as well as on the aircraft skiway Rammsonde measurements were elso made at several points on the South Pole Station skiway, taxiway and construction sites Snow pit data were collected at various locations at McMurdo and South Pole stations The purpose of the snow pit work was to investigate possible correlation between rammsond-hardness data of the snowpack and the snow characterization data consisting of profiles of temperature, density, stratification, grain size, and metamorphic state. California Bearing Ratio (CBR) testing, to supplement previous work, was done in a laboratory coldroom at Michigan Technological University using snow that had been harvested near Houghton, Michigan, during the winter of 1985-86. A report on this will be published separately The samples were prepared in a compaction machine and tested after sintering times of 7 14 and 21 days at -10 C. A field test was conducted in Houghton with binder/additive-snow mixes in situ. The results of this field test are also included in this report (Auth.) (Auth)

ANTITANK OBSTACLES FOR WINTER USE. Richmond, P.W., Oct. 1988, 11p., ADB-128 768, 18

MILITARY OPERATION, SLOPES, ICE COVER EFFECT, SNOW COVER EFFECT, TANKS (COMBAT VEHICLES), WINTER.

Barrier systems and obstacles have an important role in defense plans and in the conduct of a battle A complete understanding of antitack obstacles is thus required under all environmental conditions. This report examines the construction and effectiveness of antitank obstacles under winter conditions. Expedient and constructed obstacles, in particular ice slopes, natural snow-covered slopes, snow berms and snow-covered step obstacles, are discussed

DEPLOYMENT OF FLOATING BRIDGES IN ICE-COVERED RIVERS.
Mellor, M., et al, Oct. 1988, 38p., ADB-129, 184, 8

refs.

Calkins, D.J.

43-1839

RIVERICE, ICE REMOVAL, RIVER CROSSINGS. ICE NAVIGATION, MILITARY OPERATION BRIDGES, KOREA

BRIDGES, KOREA

The US Army Ribbon Bridge was deployed in an ice-covered fiver in A real using two different methods to remove ice from the river. In one method, the ice was cut ye chain saws, floating ice slabs were conveyed to the river oank, where they were pushed into a disposal pile by a bulldozer. In the other method, the ice was broken by a row of 416/b (18-kg) explosive charges set beneath the ice cover. The targest ice slabs were conveyed to the river bank and were again pushed into a disposal pile by a bulldozer. After initial clearance of the launching area.

Bridge Erection Boats were used to push ice slabs to the river bank. The report gives full details of the exercise and illustrates the methods with numerous photographs

DYNAMIC AEROSOL FLOW CHAMBER. Hewitt, A.D., Oct. 1988, 13p., ADA-202 305, 7 refs.

AEROSOLS, SNOWFALL, CLOUD CHAMBERS, DYNAMIC PROPERTIES, OPTICAL PROPER-TIES, AIR FLOW, TESTS.

TIES, AIR FLOW, TESTS.

A flow chamber has been developed for optically measuring the interaction between an aerosol cloud and falling snow Analysis of aerosol clouds passing through the optical region of the chamber in the absence of precipitation resulted in an average ratio of 1.09 for transmission readings taken from two lines of sight 15 m apart. The ability to pass dynamic aerosol clouds of constant opacity through a chamber where they can be exposed to natural meteorological phenomena allows for the analysis of precipitation scavenging.

SR 88-22

IMJIN RIVER ICE BOOM.

Perham, R.E., Oct. 1988, 10p., ADB-127 580, 8 refs. 43-1398

ICE BOOMS, FLOATING ICE, ICE STRENGTH. ICE BOOMS, FLOATING ICE, ICE STRENGTH, ICE COVER THICKNESS, MILITARY ENGINEERING, BRIDGES, ANCHORS, RIVER ICE, ICE CONTROL, ICE (CONSTRUCTION MATERIAL), KOREA—IMJIN RIVER.

An ICE boom to support military bridging exercises in the winter of 1982-83 was designed well in advance of selecting the materials from stores in the field. The design was hard already account a contract amount of informatics with a start and the selection of the contract of the selection o

the materials from stores in the field the design was based upon a sparse amount of information, yet by onsite work and communication with the appropriate military persons the project came to fruitien, and the ice boom was built and deployed This report provides data for reusing the boom as well as design data and background information.

IMPROVED RP-HPLC METHOD FOR DETERMINING NITROAROMATICS AND NITRAMINES IN WATER.

Jenkins, T.F., et al, Nov. 1988, 36p, ADA-203 306, 13

Miyares, P.H., Walsh, M.E.

SOIL POLLUTION, SOIL WATER, EXPLOSIVES. SOIL COMPOSITION, CHEMICAL ANALYSIS, WATER CHEMISTRY.

WATER CHEMISTRY.

A protocol was developed for determining nitroaromatic and nitramine explosives by reversed-phase high-performance liquid chromatography on an LC-18 column. The method employs dilution of an aqueous sample 11 with methanol, filtration through a 0.5 micron Millex-SR filter, separation on the LC-18 column using a 1-1 water-methanol eluent, and determination by UV-254 nm. A careful comparison was made with an earlier standard protocol, which used separation on an LC-8 column with a 50 38-12 water-methanol-acctonitrile eluent. Overall, the new procedure provides better separation for a wider range of analytes and equivalent recovery for all analytes tested. The new procedure is particularly effective at separating TNT from tetryl, and it allows analysis of water and soil extracts using a single column and eluent combination.

DEVELOPMENT OF A MEMBRANE FOR IN-SITU OPTICAL DETECTION OF TNT.

Zhang, Y., et al. Nov. 1988, 6p., ADA-202 306, 6 refs Seitz, W R, Sundberg, D D

WATER POLLUTION, GROUND WATER, EX-PLOSIVES, MILITARY FACILITIES, OPTICAL FILTERS, PHOTOMETRY, DETECTION, MEA-SURING INSTRUMENTS.

SURING INSTRUMENTS.

A membrane has been developed for in-situ determination of polynitroaromatic hydrocarbons in groundwater at levels as low as 10 ng/ml. A typical membrane is prepared by dissolving the following in tetrahydrofuran 0.5 g polytyring chloride; PVC), 0.2 ml. dioxyl phthalate to serve as a plasticizer and 0.12 ml. Jeffamine T403, a polyosyethylenea mise that tito acts as a plasticizer, as well as reacting with polynitroaromatic, hydrocarbons to produce a colored product. The membrane is formed by asting the solution and a giasy Petri dish with a diameter of 8 cm and anowing the solvent to slowly evaporate. Trace amounts of 2,4,6-timitrofoliuene (TNT), 1,3,5-timitrobenzene (TND), 2,4,5-timitrofoliuene (ZNS-TNT), and methyl 2,4-6 timitropheny intra mine (tetryl) react with the membrane op produce a visually observable reddish brown color. No pretreatment of water samples is required. Recoveries of 0.1 to 4.0 ppm. TNT from spixed groundwater ranged from 95. to 405. Direct analysis of water samples agreed with HPIC results.

ICE OBSERVATIONS ON THE ALLEGHENY AND MONONGAHELA RIVERS.

Bilello, M.A., et al, Nov. 1988, 43p., ADA-213 028, 10

Gatto, L.W., Daly, S.F., Gagnon, J.J.

44-800
RIVER ICE, ICE NAVIGATION, ICE CONDITIONS, ICE REPORTING, UNITED STATES—ALLEGHENY RIVER, UNITED STATES—MONONGAHELA RIVER.

MONONGAHELA RIVER.

Corps of Engineers and National Weather Service records of ice conditions on the Allegheny and Monongahela rivers in PA and WVA were analyzed for seven recent winters. The on-ground observations recorded daily at a number of lock and dam locations were issued in the form of alphaniumene ice codes that included the coverage, type, thickness, structure and extent of river ice. These codes were used to graph ice conditions throughout the rivers to allow easier analysis of historical ice conditions. In addition, compansions were made between these observations and aerial videotapes and satellite images of the ice. Results of these complementary and should be used together whenever possible tary and should be used together whenever possible

SR 88-26 SNOWMELT INCREASE THROUGH ALBEDO REDUCTION.

Colbeck, S.C., Dec. 1988, 11p., ADA-204 523, 45 refs. 43-1927

SNOWMELT, ALBEDO, DUSTING, FREEZE THAW CYCLES, CLIMATIC FACTORS, SURFACE PROPERTIES, SNOW SURFACE, ICE MELTING, ABLATION.

MELTING, ABLATION.

Due to changing surface conditions, the albedo decreases naturally as snow ages. The details of the melting processes have been investigated for some years and much is known about the effect of each process and the interactions among them. Albedo has attracted a lot of attention because of recent interest in snow-climate feedback, and the reduction in albedo by darkening agents has been studied and practiced extensively. Although much is known about albedo reduction, the optimum design of a field program to enhance snow melting requires too much information to be easily achievable. The relevant snow properties and processes are described here along with some field observations. Much research must still be done to provide guidelines for the use of snow darkening agents in any particular environment.

SR 88-27

CONSIDERATIONS FOR WINTER USE OF THE GROUND EMPLACED MINE SCATTER-ING SYSTEM.

Richmond, P.W., et al, Nov. 1988, 13p., ADB-129 428, 13 refs

Blaisdell, G.L.

MILITARY OPERATION, SNOW COVER EF-FECT, ICE COVER EFFECT, ICE COVER THICK-NESS, EQUIPMENT, COLD WEATHER OPERA-TION. TRAFFICABILITY.

This report presents information related to the use of the Ground Emplaced Mine Scattering System in winter Specifically, the following areas are examined mobility in show-covered areas, ice thickness requirements for operations on freshwater ice, and mine performance considerations in winter. Results of a limited number of drawbar-pull tests in show are discussed, as are the results of a series of mine offentiation tests in show are discussed. mine orientation tests in various snow conditions mendations are made for the inclusion of this information in appropriate Army manuals

SR 88-28 SNOW HI WEST FIELD EXPERIMENT RE-PORT. VOLUME I.

Lacombe, J., et al, Dec. 1988, 170p., ADB-129 329, 17

Matisc, B.K., Petzko, D.R., Petraska, J.W., Rice, J.E., Burlbaw, E.J., Chenault, T., Stallings, E.S., Former, W.M.

MILITARY OPERATION, COLD WEATHER OP-ERATION, SNOW COVER EFFECT, TRANSMIS-SIVITY, METEOROLOGICAL FACTORS,

SIVITY, METEOROLOGICAL FACTORS, EXPERIMENTATION, STATISTICAL ANALYSIS. The SNOW-III WEST field experiment was conducted by the U.S. Army Cold Regions Research and Figureering Laboratory during the winter of 1984-85 at Camp Grayling, Michigan The principal purpose of this test was to compare military target acquisition sensors under obscuring winter conditions. Detection ranges for ground combat vehicular targets were measured for selected U.S. and foreign acquisition sensors while vehicle and background signatures, atmospheric transmitance, snow characterization, and meteorological measurements were made. This report describes the instrumentation and test procedures that were used and the manner in which the collected data were reduced. Results are presented in a format that allows for convenient extraction of information needed by the modeling, measurement and systems analysis communities.

SR 89-01

STATISTICAL ANALYSIS OF BUILDING WALL MATERIALS DISTRIBUTION IN FOUR NORTHEASTERN CITIES.

Merry, C.J., et al, Jan. 1989, 156p., ADA-205 754, 19

LaPotin, P.J.

44-3015 CONSTRUCTION MATERIALS, BUILDINGS, POLLUTION, RAIN, PRECIPITATION (METEOROLOGY), CHEMICAL PROPERTIES, STATISTICAL ANALYSIS, URBAN PLANNING.

The overall purpose of this research was to develop a data base of building material types sensitive to acid deposition. The objective of this study was to address several statistical questions about the data base of sampled building materials for four cities, which included. New Haven, Connecticut, Portland, Maine: Pittsburgh, Pennsylvania, and Cincinnati, Ohio. The four cities were mapped into sampling frames, which divided the city into similar areas. Use of the sampling frames assumed that the location, form and function of buildings, and the amount and kind of building materials, are related to the land use. Information on building materials for about 70 buildings per sampling frame were inventoned. are related to the land use Information on building materials for about 70 buildings per sampling frame were inventored for each city. The statistical analyses of the data base for each city included comparing building sizes with the size of the sampling footprint, determining the distribution of buildings per footprint for each sampling frame, and examining the distribution of material types as a function of building size and building type for each sampling frame

RESPONSE OF PAVEMENT TO FREEZE-THAW CYCLES: LEBANON, NEW HAMP-SHIRE, REGIONAL AIRPORT.

Allen, W.L., et al, Jan. 1989, 31p., ADA-205 559, 6 refs.

Quinn, W.F., Keller, D., Eaton, R.A.

43-2809 PAVEMENTS, RUNWAYS, FREEZE THAW CY-CLES, FROST HEAVE, FROST PROTECTION, UNITED STATES—NEW HAMPSHIRE—LEBA-NON.

In 1978 reconstruction was begun on the runway of the Lebanon Regional Airport, Lebanon, New Hampshire The runway had experienced severe differential frost heaving and Leoanon Regional Airport, Leoanon, New Hampsnier Inc.
runway had experienced severe differential frost heaving and
cracking during the previous three winters, which had resulted
in closure of the facility during periods of extreme roughness.
At the request of the Federal Aviation Administration and
in conjunction with the reconstruction, CRREL undertook
to study the newly constructed pavements to investigate
the relationships between weakening of the pavements, frost
heave of the pavement surfaces and the position of the
freezing front. Temperature sensors were placed within
the newly constructed pavement sections, and during the
winters of 1979, 1980 and 1982 temperature data were
recorded, and level surveys and repeated plate bearing tests
were performed in order to provide data for the investigation.
The three pavement sections were constructed to investigate
the effect of section thickness on the level of frost protection
provided The sections consisted of 4 in of asphalt concrete,
6 in. of crushed gravel and 22, 30 and 38 in of wellgraded sand subbase material. The 48 in section provided
the highest level of frost protection to the subgrade However, all three pavement sections maintained resilient stiffness the highest level of frost protection to the subgrade of the serial three pavement sections maintained resilient stiffness values during the spring thaw period on the order of two to three times that of the pavement before reconstruction Also, frost heave in all sections was reduced to levels that would not cause difficulty for aircraft using the facility

SR #9.04

RADAR PROFILING OF NEWTON AIRFIELD

IN JACKMAN, MAINE. Martinson, C.R., Feb. 1989, 9p., ADA-207 303, 2 refs.

FROST HEAVE, INSULATION, PAVEMENTS. RADAR.

During Apr. 1987 ground-penetrating radar was used to observe subsurface conditions of Newton Field, an airfield in Jackman, ME. It was constructed in 1986, with insulation observe substance conditions of Newton Frict, an affrication for Jackman, ME. It was constructed in 1986, with insulation used as part of its subgrade. A road near the artifield that was constructed in the same fashion, except without the insulation, was also profiled for comparison. The survey was to document conditions of nonuniform frost heaving and, if possible, frost depth. Radar data, collected with a 900-MHz antenna, showed that the insulation beneath the runway apparently varied in depth from approximately 5 to 24 in. Frost depth, however, could not be determined with the 900-MHz antenna.

SR 89-05

WORKING GROUP ON ICE FORCES. 4TH

STATE OF-THE-ART REPORT.
Timco, G.W. ed, Feb. 1989, 385p. ADA-207 546,
Refs. passim. For individual articles see 43-2813 through 43-2825.

ICE LOADS, ICE MECHANICS, ICE PRESSURE, SOLID INTERFACE. ICE STRENGTH. STRUCTURES.

This working group report on ice forces on structures includes 13 papers covering topics of local ice pressures, large-scale ice pressures, large-scale ice loads and failure modes, damage models for ice, ice forces on compliant structures and conical-

shaped structures, ice rubble, spray ice and ice loads on icebreaking vessels. The papers were written with senior undergraduate and graduate students in mind so it should provide an excellent textbook for those students interested in ice mechanics.

SR 89-06

FIRST INTERNATIONAL CONFERENCE ON SNOW ENGINEERING, SANTA BARBARA, CALIFORNIA, JULY 1988; PROCEEDINGS.

International Conference on Snow Engineering, 1st, Santa Barbara, CA, July 10-15, 1988, Feb. 1989, 573p., ADA-207 260, Refs. passim. For individual papers see 43-3545 through 43-3599.

SNOW LOADS, ENGINEERING, ROOFS, SNOW MECHANICS, SNOW DENSITY, BUILDINGS, STRUCTURES, MEETINGS, SNOWDRIFTS, SNOW ACCUMULATION, MODELS, DESIGN.

SR 89-07 PROCEEDINGS.

Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987, Mar. 1989, 136p., ADB-133 455, Refs. passim. For individual papers see 43-3872 through 43-3883. Bates, R.E., ed, Hogan, A.W., ed, Wright, E.A., ed.

43-38/1 SNOW THERMAL PROPERTIES, SNOW OP-TICS, SNOW ACOUSTICS, SNOWFALL, SNOW COVER EFFECT, SNOW DEPTH, SNOW AIR IN-TERFACE, RADIO ECHO SOUNDINGS.

QUICKDRAW DATA STRUCTURES FOR IMAGE PROCESSING.

LaPotin, P.J, et al, Apr. 1989, 17p, ADA-208 945, 11

McKim, H.L.

43-3676

DATA PROCESSING, COMPUTER PROGRAMS, SPACEBORNE PHOTOGRAPHY, PHOTOIN-TERPRETATION, AERIAL SURVEYS.

TERPRETATION, AERIAL SURVEYS.

QuickDraw is the graphical operating language for the Apple Macintosh. Standard binary data formats are currently used to import and export satellite images to geographic information- and image-processing systems. These data structures provide a standard sequential method to read and write large volumes of information in a semicompressed format. While the binary structure is adequate for strict import and export of image data, it is poorly adapted to fast image-processing at the microcomputer level. In this study, new data structures are investigated that use operating codes to quickly convert raster binary image data and vector overlay files into a high-speed graphical language for efficient display and processing. Binary data is converted into "picture handles" of variable size and resolution using 2-byte operating codes to symbolize the graphical process As a result, images are drawn as objects that may be coupled as independent vector components in multiple bit planes. The bit planes may be specified for each pixel to support 24- and 32-bit color of both raster and vector data. The efficiency of these structures allows the user to display 1024 x 1024 scenes in multiple overlapping windows using simple. 24- and 32-bit color of other inster and vector data. The efficiency of these structures allows the user to display 1024 x 1024 scenes in multiple overlapping windows using simple Cut/Copy/Paste commands. In addition, the use of operating codes allows an analyst to quickly store and retrieve archived images in their compressed form using simple "scrap manager" techniques. Early results for this technique indicate that converted vector overlays may be compressed by a factor of 8 and SPOT images (depending on scene diversity) by a factor of 2. More significantly, images that typically require 4 min to load from binary may be displayed in fractions of a second using the new display method and resultant operating codes. In its present form, the software provides a gateway for users of image data to display multiple bands of information quickly, and to vary hue, saturation, brightness, and resolution levels on the microomputer New utilities will include image export into the PNTG, PHCA, EPS, and TIFF formats for export compatibility with Postscript page-layout software and video image-processing systems. with Positing systems

SR 89.09

INFLUENCE OF WELL CASING COMPOSI-TION ON TRACE METALS IN GROUND WA-TER.

Hewitt, A.D., Apr. 1989, 18p., ADA-208 109, 12 refs.

GROUND WATER, WELL CASINGS, WATER POLLUTION, ENVIRONMENTAL IMPACT.

Experiments were conducted to determine the concentration Experiments were conducted to determine the concentration dependence of trace inorganic priority pollutants (Ax. Cd. Cr and Pb) in ground water solutions exposed to polyvinyl, hio ride (PVC), polytetrafluorothylene (PTTE) and two types of stainless steel (SS304 and SS316). The test design used a factorial screening matrix with two concentrations of metals (Ax-Cr-Pb. Do and 10 microgram'l. Cd. 10 and 2 microgram'l.), pH (5.8 and 7.7), and total organic carbon (natural and natural plus 5 mg·l. humic acid) as variables Samples containing well casings and controls without pipe sections were run as duplicates. Aliquots were removed from all of the solutions after 0.5. 4, 8.24 and 7.2 hours Aqueous metal concentrations were determined by graphite furnace atomic absorption spectroscopy. The results showed furnace atomic absorption spectroscopy

The results showed

PTFE to have no significant influence on the metals monitored
under any of the groundwater conditions

Metal concentra-

tions in ground water exposed to SS316 and SS304 had large random variances believed to be caused by surface oxidation of the stainless steel. PVC had a more active surface than PTFE in terms of both sorption of Pb and release of Cd.

COMPACTED-SNOW RUNWAYS: GUIDE-LINES FOR THEIR DESIGN AND CONSTRUC-TION IN ANTARCTICA.

Russell-Head, D.S., et al, Apr. 1989, 68p., ADA-208 910. Refs. passim.

43-3474

SNOW PHYSICS, SNOW COMPACTION, SNOW (CONSTRUCTION MATERIAL), RUNWAYS, DESIGN, PENETROMETERS, ANTARCTICA.

Only small areas near the margins of the ice cap in Antarctica Only small areas near the margins of the ice cap in Antarctica are ice-free, and only a few of these exposed sites are suitable for the construction of conventional runways. Wheeled aircraft have operated successfully on hard see ice and exposed glacial ice, and skis have been fitted to a wide range of aircraft for use on snow. There has been a resurgence of interest in making snow runways suitable for use by conventional wheeled aircraft. Laboratory and field work has confirmed that low-density surface snow can be compacted in several ways to yield a strong, uniform, load-bearing pavement that can support heavy wheeled aircraft. The Soviets have constructed several full-scale runways in Antarctica. This report provides some of the Icefaical Ine Soviets have constructed several full-scale runways in Antarctica. This report provides some of the technical background for the design and construction of compacted-snow runways in Antarctica. The technology is not particularly difficult, and it is likely that the next few decades will see substantial changes to antarctic air transportation as more snow runways are constructed throughout the continuous nent. (Auth)

SR 89-11

LAND MINES IN WINTER.
Richmond, P.W., May 1989, 10p., ADB-134 433, 26 refs.

43-4041

MINES (ORDNANCE), MILITARY OPERA-TION, COLD WEATHER PERFORMANCE, RAIN, FROZEN GROUND, SNOW DEPTH.

RAIN, FROZEN GROUND, SNOW DEPTH.

A number of questions about the use and performance of land mines in winter were investigated during the past 7 years as part of the Mine/Countermine Research Program of the Corps of Engineers. The environmental effects of winter on both conventional and scatterable mines are discussed. Recommendations are made to enhance the efficient use of mines in winter, many of these suggestions have already been published in U.S. Army doctrinal literature. The effects of thawing and freezing soil, deep snow, triplines in snow and freezing rain on conventional mines (mines that are not designed to self-destruct) are discussed. A general analysis of the behavior of scatterable antitank mines in snow is introduced and results of experiments using the GEMSS and RAAMS are presented.

SR 89-12 POROUS PORTLAND CEMENT CONCRETE AS AN AIRPORT RUNWAY OVERLAY: LABORA-TORY EVALUATION.

Korhonen, C., et al, May 1989, 20p., ADA-208 974, 10 refs.

Bayer, J.J.

43-3070

CONCRETE PAVEMENTS, RUNWAYS, CON-CRETE STRENGTH, COLD WEATHER PER-FORMANCE.

FORMANCE.

A company recently introduced a special mixing method for producing stronger porous portland cement concrete than that made using standard mixing techniques. The process, which includes no admixtures, relies on a patented high-speed mixer to achieve the claimed results. The material, as designed by the company, was evaluated under laboratory conditions to determine its suitability for use as an overlay on concrete runways in the cold regions included strength, permeability and freeze-than tests. Concrete strength was improved whenever the high-speed mixer was used. However, the improvements were erratic, ranging from 2 to 37° stronger than the same concrete mixed using the standard technique. The mix design used by the company was fairly permeable to water but was not resistant to freezing and thawing when water was ponded it. Further improvements are needed in both the consistency of strength and the resistance to frost of this material before it can be considered for cold regions applications.

SR 89-13

PRELIMINARY DESIGN GUIDE FOR ARCTIC EQUIPMENT.

Walsh, M.R. et al. May 1989, 35p. ADA-209 455, 8 refs. 1 bibliography p 33-35

J.S. 41.3894

EQUIPMENT. DESIGN CRITERIA, COLD WEATHER OPERATION, COLD WEATHER PERFORMANCE, LOW TEMPERATURE RE-SEARCH, TEMPERATURE EFFICES

Designing equipment for arctic environments requires special considerations from the design enginee. I ow temperatures

and harsh environments place special demands on equipment and components. Many materials in common use will experience drastic changes in physical properties, resulting in catastrophic failure of the systems in which they are in catastrophic failure of the systems in which they are incorporated. Components may no longer meet original specifications, and instrumentation may not work properly. This design guide should familiarize the design engineer with the factors that must be considered when designing for the arctic environment. A list of environmental factors and how they may affect a design is first presented. Then, a general design procedure is presented and a detailed analysis of problems and solutions for materials, components and systems follows:

SR 89-14

SNOW IV FIELD EXPERIMENT DATA RE-PORT.

Wright, E.A., ed, May 1989, 250p., ADB-134 724, Refs. passim. For individual papers see 43-4297 through 43-4308.

Bates, R.E., ed.

MEASUREMENT, WAVE PROPAGATION, METEOROLOGICAL CHARTS, METEOROLOG METEOROUS ALCHARTS, METEOROLOGICAL INSTRU-MENTS, SNOWFALL, ACOUSTICS, VISIBILITY, AIRBORNE EQUIPMENT, MILITARY OPERA-TION, ATTENUATION, LIGHT TRANSMIS-SION, LIGHT SCATTERING.

SION, LIGHT SCATTERING.

The SNOW-IV Field Experiment, held at the Hollis Center, ME, U.S. National Guard site (near Portland) was conducted by the U.S. Army Cold Regions Research and Engineering Laooratory in cooperation with several other government agencies and contractors. The objectives of the field study were to 1) evaluate the effects of natural obscurants on the performance of electro-optical and millimeter wavelength devices, 2) extend the data base for electromagnetic propagation through falling and blowing snow, and 3) determine the effects of wet snow and coastal winter fog on electro-optical system performance. This data report presents information gathered at the sixth field experiment of the SNOW series. It was conducted between Dec. 1985 and Mar. 1986 and was sponsored by the U.S. Army Copps of Engineers Winter Battlefield Obscuration Research Program. The report includes field data collected on meteorology. The report includes field data collected on meteorology, snow characterization, atmospheric propagation, and seismin-lacoustic wave propagation.

SR 19-15

BLASTING AND BLAST EFFECTS IN COLD RE-GIONS. PART 3: EXPLOSIONS IN GROUND MATERIALS.

Mellor, M., May 1989, 62p., ADA-209 382, Refs. p.59-62. For Pt.1 see 40-3304; Pt.2, 41-3020. 43-3651

EXPLOSION EFFECTS, BLASTING, ICE BLAST-ING, FROZEN GROUND STRENGTH, FROZEN ROCK STRENGTH, COLD WEATHER PER-FORMANCE, MILITARY OPERATION.

The effects of underground explosions are considered, first for deep explosions far from a free surface, then for shallow explosions which form craters and eject debrs. The general pattern of behavior is established from compilations of test data for typical rocks and soils, and comparable compilations are made for the more limited test data relating to frozen calls for each carmon statement of the more limited test data relating to frozen soils, ice and snow.

SR 89-16 EFFECT OF TOSTON DAM ON UPSTREAM ICE

CONDITIONS Ashton, G.D., May 1989, 9p., ADA-210 119, 4 refs. 43-3957

DAMS, RIVER ICE, ICE JAMS, ICE CONDITIONS, ICE COVER THICKNESS, UNITED STATES—MONTANA—MISSOURI RIVER.

The effect of raising the reservoir level of Toston Dam on the Missouri River on water levels upstream during winter periods with ice is assessed. The analysis used the HEC-2 program with the ice option to estimate water levels under present and future raised dam elevations. Ice thicknesses were estimated using a trial-and-error procedure based on existing ice jam theory Results of the analysis were validated using field observations from two winters

SR 49-17

EFFECTS OF SOIL COVERS ON LATE-FALL SEEDINGS OF FOUR TALL FESCUE VARIE-TIES.

Palazzo, A.J., June 1989, 5p, ADA-212 203, 20 refs

GRASSES, COLD WEATHER SURVIVAL

GRASSES, COLD WEATHER SURVIVAL.
Soil covers promote seed germination and plant growth at suboptimum temperatures by conserving heat near the soil surface. This conservation of heat results in a higher soil surface temperature than in uncovered soil. The result is succulent seedlings that may be more susceptible to premature death during winter and reduced growth the following season. The objectives of this study were to evaluate the effectiveness of soil covers for promoting seed germination in the fall and to observe the effects of soils covers on plant growth and development. A field study was conducted using Clemfine, Misstang, Rebel and Rebel II varieties of tall fescue (Festuca anudanacea Schreb) sown in mid-Oct in New Hampshire using a randomized block design. Half of each plot was covered with a spun-bonded polypropylene

soil cover The cover remained on the plots until the following June. It enhanced seedling emergence in the fall for all four varieties and subsequent regrowth during May for all varieties except Rebel. Very little extra growth May for all varieties except Rebel. Very little extra growth was observed under the cover during Apr., when average ambient temperatures were shout 6.2 C. Analysis of tissue sampled in June showed that the carbohydrate content was lower with the higher-pielding varieties. Higher-pielding varieties that had been covered showed lower concentrations of fructans in leaves, but the levels were not sufficient to affect summer growth. No differences in carbohydrate concentrations between varieties were found. Test results show that the use of soil covers promoted seed germination of late fall seeding and improved grass growth through the following Aug. following Aug.

SINGLE FIBER MEASUREMENTS FOR REMOTE OPTICAL DETECTION OF TNT.
Zhang, Y., et al, May 1989, 7p., ADA-209 995, 5 refs. Seitz, W.R., Sundberg, D.C. Seitz, W. 43-3870

EXPLOSIVES, WATER POLLUTION, DETECTION, SPECTROSCOPY, GROUND WATER, MEASURING INSTRUMENTS.

Single fiber optical measurements have been used to follow changes in the color of an initially clear poly(vinyl chloride) (PVC) membrane, which reacts with aqueous 2,4,6-trinitrotol-une (TNT) to form a colored product that absorbs strongly at 500 nm. Attempts to make this measurement via the at 500 nm. Attempts to make this measurement via the effect of the colored product on the emission spectrum of a fluorophor incorporated into the PVC membrane were unsuccessful. However, single fiber absorption measurements were successful. Refractive index matching and a reflector behind the membrane to increase reflected intensity were essential to keeping the stray light levels small relative to the signal of interest. To compensate for drift, the reflected intensity at 500 nm is measured relative to the reflected intensity at \$24 nm, a wavelength where intensity is not affected by color formation in the membrane. The rate at which the ratio of intensity at 500 nm to intensity at \$24 nm increases is a function of TNT concentration. It is estimated that TNT levels below 0.10 ppm can be measured by this technique.

SR **89-**19

ICE RUNWAYS NEAR THE SOUTH POLE. Swithinbank, C., June 1989, 42p., ADA-211 606, 7

43.4508

ICE RUNWAYS, COLD WEATHER CONSTRUC-AERIAL SURVEYS, ANTARCTICA— GLACIER, ANTARCTICA—HOWE, TION, AERIAL MOUNT.

MOUNT.
Following an examination of air photographs of the Transantarctic Mountains, 37 blue-ice areas were reconnostered from the air, using a skr-wheel Twin Otter operating from the South Pole. Two sites were selected as potential airfields for conventional transport aircraft, and ground surveys were made. On the Mill Glacier at 85 06'S, 167 15'E there is an area of smooth and level ice which gives a 7 km run directly into the prevailing wind. Five wheel landings were made there. Alongside Mount Howe there is a large area of level ice at 87 20'S, 149 50'W. It offers a 7 km runway, but there is a strong crosswind component from the prevailing wind and some bumps on the ice surface need to be planed off. Eight wheel landings were made at Mount Howe. (Auth)

COMPARISONS OF LOW CONCENTRATION MEASUREMENT CAPABILITY ESTIMATES IN TRACE ANALYSIS: METHOD DETECTION LIMIT AND CERTIFIED REPORTING LIMIT. Grant, C.L., et al, June 1989, 21p., ADA-211 829, 19

Hewitt, A.D., Jenkins, T.F.

43-4607

SOIL POLLUTION, CHEMICAL ANALYSIS, WASTES, SPECTROSCOPY.

SOIL POLLUTION, CHEMICAL ANALYSIS, WASTES, SPECTROSCOPY.

Two large data sets were obtained over a four-day period for graphite furnace atomic absorption spectroscopic measurement of copper (Cu) and reversed-phase high performance liquid chromotographic determination of dinitrobenzene (DNB) at a number of concentrations near the lower limit of measurement. Low concentrations measurement espability estimates for each analyte were obtained using the Environmental Protection Agency's MDL (method detection limit) protocol and the U.S. Army Toxic and Hazardous Materials Agency's CRL (certified reporting limit) protocol For DNB, analytical variance was found to be homogeneous over the concentration range examined and MDL estimates were independent of concentration over the range of concentration examined MDL estimates varied by as much as a factor of three from day to day, emphasizing the uncertainty in these estimates. CRL estimates varied to about the same extent and were numerically quite similar to MDLs when equivalent false positive and false negative risks were used. For Cu, analytical variance was found to be proportional to concentration. Thus CRL estimates were every dependent on the concentration range examined MDLs were less sensitive to this problem. Recommendations regarding the choice of target reporting limits for the CRL protocol were made. The influence of risk assumptions no both MDL and CRL estimates was examined and recommendations for modifications to both procedures made.

to incorporate an operational false negative-risk appropriate to the problem at hand. A case was made for using outlier tests to edit data used to estimate low concentration measurement capabilities.

SR 89-21 INTERNATIONAL ARCTIC RESEARCH PRO-

Chung, J.S., comp, July 1989, 74p., ADA-212 206, Presented at the 7th International Conference and Exhibition on Offshore Mechanics and Arctic Engineering, Houston, TX, Mar. 1988. For individual papers see 44-125 through 44-130.

Link, L.E., comp. 44-124

RESEARCH PROJECTS, ECONOMIC DEVELOP-

SR 89-22

IMPROVING SNOW ROADS AND AIRSTRIPS

IN ANTARCTICA. Lee, S.M., et al, July 1989, 18p., ADA-211 588, 7 refs. Haas, W.M., Brown, R.L., Wuori, A.F.

SNOW ROADS, RUNWAYS, ANTARCTICA—MCMURDO STATION, ANTARCTICA—AMUNDSEN-SCOTT STATION.

MCMURDO STATION, ANTARCTICA—AMUNDSEN-SCOTT STATION.

During the 1986-1987 austral summer, snow road and runway test lanes were constructed at McMurdo Station and at South Pole Station. These lanes were monitored during Dec. 1986. Jan. 1987, and again in Jan. 1988. Test sections were constructed of 1) tractor-compacted snow topped with a 15-cm thick layer of rotary blower processed snow, 2) rotary processed and compacted snow in 15-cm layers to a depth of 60 cm, 3) rotary pr. seed and compacted snow in 15-cm layers to a depth of 60 cm, 3) rotary pr. seed and compacted snow in 15-cm layers mixed at 5% by volume, and 4) rotary—seed snow with 19% sawdust by volume. These test see, and monitored by obtaining temperature at. Rammsonde hardness profiles, California B. Clegg surface strength values, and testing for stand traffic. It was concluded that wood stop rocessed snow in amounts of 5% to 10% volume significantly increases the strength of the resul. Snow road or runway. This increase was greater at h. Murdo than at the South Pole, appearing to be a function of snow temperature. Adequate strengths of the snow/sawdust mixtures were achieved for limited use by wheeled C130 aircraft, but additional processing with heat, water or added compaction appears necessary to produce a 25-cm-thick surface layer sequante for more frequent use and to accommodate wheeled C141 aircraft. At McMurdo, it was found that the sawdust was not effective in maintaining the integrity of the surface for traffic during the thawing season without additional maintenance, whereas at the South Pole, thawing was not a problem since temperatures remained well below the melting point. It was concluded that the McMurdo snow roads were not constructed adequately early in the season to prevent failure and, therefore, required an undul, high maintenance effort during the warm season. It is also recommended that the future roads be constructed by depth processing with a rotary miller or blower. It is also recommended that the future roads be constructed

STATE OF THE ART OF PAVEMENT RE-SPONSE MONITORING SYSTEMS FOR ROADS AND AIRFIELDS.

Symposium on State of the Art of Pavement Response

Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989, Sep. 1989, 401p., ADA-214 957, Refs. passim. For individus: papers see 44-1637 through 44-1675.

Janoo, V.C., ed, Eaton, R., ed.

44-1636

PAVEMENTS, LOADS (FORCES). ROADS, AIR-PORTS, FROST ACTION, MEASURING INSTRU-MENTS, MONITORS, DESIGN, MEETINGS, DEFORMATION.

SR 19-24

FACTORS AFFECTING RATES OF ICE CUT-TING WITH A CHAIN SAW. Coutermarsh, B.A., July 1989, 14p., ADA-212 405, 8

BRIDGES, ICE CUTTING, MILITARY OPERA-TION, SAWS, ICE MODELS, ICE COVER THICK-NESS.

NEDS.

Military winter bridging procedures with an ice cover present on the waterway may involve cutting the ice away with chain saws to provide an ice-free crossing zone. This report investigates the cutting rates possible from one type of chain saw with two chain configurations, two operators, three cut lengths and three ice thicknesses. A statistical analysis is used to determine the effect the various factors have upon cutting rate and suggestions are made for chain modifications that might further improve cutting performance.

SR 89.25

MODEL TESTS IN ICE OF A CANADIAN COAST GUARD R-CEASS ICEBREAKER: HIGH FRICTION MODEL.

Tatinclaux, J.C., et al. July 1989, 41p., ADA-212 898,

Martinson, CR

44-1723

ICEBRBAKERS, ICE NAVIGATION, METAL ICE FRICTION, TEST CHAMBERS, ICE MODELS, ICE FRICTION.

ICE FRICTION.

This report presents the results of resistance and propulsion tests in level ice of a roughened 1:20 scale model of the Canadian Coast Quard Reclass leebreaker. The test conditions were the same as those previously reported for the smooth model. The present test results and those with the smooth model are compared, as are the results obtained at all facilities participating in the comparative study proposed by the Committee on Performance of Ships in Ice-Covered Waters of the International Towing Tank Conference.

SD 80.26

ESTIMATION OF TIME TO MAXIMUM SUPERCOOLING DURING DYNAMIC FRAZIL ICE FORMATION.

Daly, S.F., et al, July 1989, 13p., ADA-212 204, 12 refs

Axelson, K.D.

FRAZIL ICE, ICE FORMATION, RIVER ICE, SUPERCOOLING, HEAT LOSS, ANALYSIS (MATHEMATICS).

(MATHEMATICS). Time to insainum supercooling is a parameter that can be easily measured during experiments on the dynamic, nonequilibrium stage of frazil ice formation. Mereler's analytical expression is applied to a number of experiments in which the time to maximum supercooling was measured. In each of the experiments, the heat loss rate and turbulent dissipation rate were reported or could be determined from the experiment description. The secondary nucleation was set at the value of 40,000,000,000 nuclel/erg suggested by Mercier, and the seeding rate optimized to reproduce the experimental results. An inverse relationship was found between the coldroom temperature at which the experiment was conducted and the seeding rate. The optimized seeding rates varied from 2.7 to .000075 crystals/sq cm s. The implications for frazil ice formation in rivers and streams are discussed. are discussed.

SR 80.27

REFERENCE GUIDE FOR BUILDING DIAG-NOSTICS EQUIPMENT AND TECHNIQUES. McKenna, C.M., et al, July 1989, 64p., ADA-213 818, Refs. p.61-64.

Munis, R.H.

BUILDINGS, INDOOR CLIMATES, HEATING, VENTILATION, AIR CONDITIONING, IL-LUMINATING, AIR POLLUTION, MONITORS.

LUMINATING, AIR POLLUTION, MONITORS.
This report is designed for use by facilities engineers as a guide in the initial phases of investigating building diagnostics equipment and techniques. It provides information related to energy management and building environmental considerations-resulting from energy conservation measures. Subjects covered include: 1) building enclosure system evaluation; 2) heating, ventilating and air conditioning (HVAC) system evaluation; 3) lighting/illuminating system evaluation; 4) electrical system evaluation; and 5) indoor air quality measurements.

CRYOGENIC SAMPLING OF FRAZIL ICE DEPOSITS.

Chacho, E.F., Jr., et al, Aug. 1989, 6p., ADA-212 207,

Brockett, B.E., Lawson, D.E.

FRAZIL ICE, ICE SAMPLING, RIVER ICE, SAM-

A prototype cryogenic sampler has been used to examine fraril ice deposits beneath the ice-covered Tanana River near Fairbanks, AK. Modification of a streambed sediment sampler has provided full depth, in-situ samples of fraril ice deposits, which are suitable for determining structure and overall composition.

DATA REDUCTION OF GOES INFORMATION PROM DCP NETWORKS. DeCoff, G.W., et al, Sep. 1989, 15p., ADA-215 844,

1 ref.

Daly, S.F., Pangburn, T., Thomson, C.

ICE REPORTING, REMOTE SENSING, DATA PROCESSING, COMPUTER PROGRAMS.

PROCESSING, COMPOTER PROCERAMS.

A software system, DCP, FOR, was developed to provide a convenient and efficient method of decoding, reducing, and storing data from Data Collection Platform (DCP) networks transmitted through the Geostationary Operational Environmental Satellite (GOES) data collection system. The software system includes a simple means of defining the arrangement of sensors, at a DCP site that can be easily updated if the sensor arrangement is changed or the sensors

modified. Any incer data reduction procedure can be processed. Precise temperature measurements using individually calibrated thermstors can be processed through the use of voltage divider circuits, nonlinear resistance to temperature calibration, and impedance mismatch detection. temperature campration, and impedance minimated detection and correction. The system can process data from DCPs manufactured by four companies. User-defined maximum and minimum limits determine the acceptability of the processed data. Data values not within these limits or missing data are flagged with a missing value marker. The database created by the system is independent of the particular sensor arrangement at any DCP site. The data can be easily transferred to other database systems.

WASTE MANAGEMENT PRACTICES OF THE UNITED STATES ANTARCTIC PROGRAM.

Reed, S.C., et al, Feb. 1989, 28p., ADA-205 560, 20 refn.

Sletten, R.S.

44-2105

TREATMENT, WASTE DISPOSAL. WASTE WATER SUPPLY, ANTARCTICA.

The United States operates research facilities in Antarctics, at Coastal locations, inland sites, and on the interior snowfield. This report documents the results of 1988 investigations and evaluations of present waste management practices at these stations and recommends future action. to liquid and solid waste management, the report discusses related water supply issues. (Auth.)

SR 89-30 OPTICAL MEASUREMENT OF PRECIPITA-

Koh, G., Sep. 1989, 13p., ADA-214 357, 11 refs. 44-694

PRECIPITATION (METEOROLOGY), METEOROLOGICAL INSTRUMENTS, SNOW-PALL, RAIN, SNOW OPTICS, MEASURING IN-STRUMENTS, ANALYSIS (MATHEMATICS).

STRUMENTS, ANALYSIS (MATHEMATICS). A simple optical device is used to measure changes in light intensity caused by precipitating particles as they fail through a beam of light. The intensity changes are analyzed in the amplitude and frequency domains to obtain information shout precipitation. Tests conducted in snow and in rain show that the optical device can be used for characterizing precipitation with finer time resolution then conventional methods. Rain rates can be accurately monitored; however, errors in snow rates can be as high as a factor of two. Number flux measurements suggest that periodic trends may exist during snow and rain. Power spectra of the intensity changes show that spectral signatures exist for different types of precipitation.

VEHICLE MOBILITY ON THAWING SOILS. Shoop, S.A., Sep. 1989, 16p., ADA-215 148, 21 refs.

GROUND THAWING, SOIL TRAFFICABILITY, FREEZE THAW TESTS, SOIL TESTS, SOIL STRENGTH, THAW DEPTH, FROST ACTION, TRACTION.

Although vehicle mobility in soft and wet soil has been Attnough ventice moonly in soil and wet soil has been studied in the past, the more complex problem of vehicle mobility on thawing soils has not been addressed. This problem is being examined in CRREL's Frost Effects Research Pacility (FERF), where field-scale testing can be conducted under controlled conditions. The soil is frozen and then thawed to the desired test conditions.

Traction and motion thawed to the desired test conditions. Traction and motion resistance are measured using an instrumented vehicle. To date, mobility testing has been conducted for nine different thawing conditions of a frost-susceptible silt. The failure mechanisms of the tire-soil interaction were observed, that soil strength was calculated, and vehicle performance was analyzed. For the tire and soil conditions tested, the initial failure of the tire-soil interaction is totally within the soil. At higher tire slip the failure occurs at or near the tire-soil interface. The shear strength data calculated from the vehicle test results indicate that the soil is basically frictional in behavior, with little or no cohesion; however, there is apparent cohesion from soil tension at low moisture contents. Of the soil parameters measured, vehicle traction is most strongly influenced by the soil friction. In turn, soil friction and cohesion are influenced by moisture content, density and thaw depth. content, density and thaw depth.

SR 89-32

LEACHING OF METAL POLLUTANTS FROM FOUR WELL CASINGS USED FOR GROUND-WATER MONITORING.

Hewitt, A.D., Sep. 1989, 11p., ADA-215 239, 18 refs.

WATER POLLUTION, GROUND WATER, WELL CASINGS, LEACHING, CHEMICAL ANALYSIS, IMPURITIES, WATER PIPES.

IMPURITIES, WATER PIPES.
Polytetrafluorethylene (PTPE), polyvinylchloride (PVC), stainless steel 304 (SS 304) and stainless steel 316 (SS 316) well casings were tested for suitability for ground-water monitoring. A laboratory experiment, testing for the leaching of Ag, As, Ba, Cd, Cr, Hg, Pb, Se and Cu, was run in riplicate by exposing sections of the well casings to ground water for four periods ranging from 1 to 40 days. The results showed that PTPB did not leach any of the nine analytes studied, while SS 316 and PVC showed significant leaching of Cr, Cd and Pb; SS 316 also leached significant

amounts of Ba and Cu. Stainless stee! 304 showed signification leaching of Cr and Pb. In every case where contamination was observed, the release of metal analyte, when averaged over all of the exposure periods, was the greatest from either 88-304 or 88-316. Released contaminants were surbed back onto the well casings in several cases.

SR 89-33 ALTERNATIVE METHODS OF USING STB FOR DECONTAMINATION AT LOW TEMPERA-TURES. Walsh, M.E., et al, Sep. 1989, 13p., ADB-139 077, 7

refs.

Parker, L.V.

44-2110 SURFACTANTS, POLLUTION, MILITARY RE-SEARCH, MILITARY EQUIPMENT, COLD WEATHER OPERATION, COLD WEATHER TESTS, COUNTERMEASURES, WASTE DISPOS-

Alternative methods of using STB (Super Tropical Bicach) Arternative mentions of using 51% (object force) for cold weather decontamination of metal surfaces were investigated. Surfaces contaminated with the chemical agent aimulant, Bia, were treated with STB, fuller's earth, show and diesel fuel, separately or in combination. Of the decontaminants tested, STB mixed with show and dieselfuel achieved the maximum neutralization.

SR 89-34

WINTER HABITATS OF ATLANTIC SALMON, BROOK TROUT, BROWN TROUT AND RAINBOW TROUT; A LITERATURE REVIEW.

Calkins, D.J., Oct. 1989, 9p., ADA-214 832, 44 refs ANIMALS, RIVER ICE, PHYSIOLOGICAL EF-

FECTS, ECOLOGY, ICE CONDITIONS, ICE COVER EFFECT, COLD WEATHER SURVIVAL. COVER EFFECT, COLD WEATHER STRVIVAL.

A review of winter habitat studies lh ice-covered streams for four species of salmonid provided some general information on substrate conditions and focal point velocities and depths. All species of fry are found at depths less than 40 cm and at velocities of 10 cm/s or less; juveniles of all species are found at velocities of cess than 15 cm/s. A lack of continuous physical, chemical and biological measurements throughout the ice-covered season was a common deficency of the studies reviewed. The interaction of the ice cover with other physical processes in the stream was restrict adith other physical processes in the stream was rarely ad-

ANALYTICAL METHODS FOR DETERMINING NITROGUANIDINE IN SOIL AND WATER. Walsh, M.E., Nov. 1989, 27p., ADA-216 615, 9 refs.

POLLUTION, SOIL CHEMISTRY, WATER POLLUTION, GROUND WATER, EXPLOSIVES, CHEMICAL ANALYSIS.

CHEMICAL ANALYSIS.

Methods were developed for determining nitroguanidine in soil and water. The soil method involves extracting a 2-g sample with water using an ultrasonic bath. Soil extracts and water samples are filtered through a 45-micron membrane prior to determination by RP-HPLC. Separations are achieved on a mixed-mode RP18/cation column clusted with 1.5 mL/min of water; detection is by UV (lambda=263 nm). Certified reporting limits were estimated at 5.0 microgram/L for water and 0.5 microgram/L for soil.

SR 89-36 PERFORMANCE OF WALL COATINGS FOR CONCRETE AND MASONRY BUILDINGS IN ALASKA.

Korhonen, C.J., et al, Nov. 1989, 27 refs., ADB-139 753, 8 refs.

Bayer, J.J., Jr.

44-1878 PROTECTIVE COATINGS, WALLS, MILITARY FACILITIES, VAPOR BARRIERS, BUILDINGS, THERMAL INSULATION, WEATHERPROOF-

Coatings traditionally have been applied to the Army's concrete Coatings traditionally have been applied to the Army's concrete and masonry buildings in Alaska to improve their appearance and to increase their weather resistance. Unfortunately, these materials have not always lasted as long as desired, resulting in high maintenance costs. A visual examination of 151 buildings at three military installations in Alaska revealed that water vapor condensation was a major cause of premature coating failure. This moisture not only caused coatings to deteriorate, but when it froze, it caused spalling of the wall. Laboratory tests proved that coatings with the best field performance had the highest permeance to water vapor. This auggested that more attention be given water vapor. This suggested that more attention be given to defining and selecting breathable coatings.

SR 89-37

ACCURACY AND PRECISION OF GOES DATA COLLECTION PLATFORMS FOR TEMPERATURE MEASUREMENTS.

Daly, S.F., et al, Dec. 1989, 14p., ADA-218 798. Clark, C.H., Pangburn, T.

44-2846

REMOTE SENSING, ACCURACY, DATA TRANSMISSION, TEMPERATURE MEASURE-MENT, EQUIPMENT.

This report describes an analysis of the accuracy and precision of data transmitter. by 12 Data Collection Platforns (DCPs) over a one-month period. The DCPs were installed on the Monongahela, Ohio and illinois rivers A reference resistor with a known and stable resistance was installed at each DCP site. Comparison of the resistance calculated from the transmitted information with the actual resistance of the reference resistor allowed the accuracy and precision of the measurements made by the DCP to be determined. Four brands of DCPs were included in the test; two had 8-bit resolution and two had 12-bit resolution. The results were analyzed with respect to the nominal accuracy provided by the manufacturer and the expected analog-to-digital quantizing error. This error explained most of the imprecision of the 8-bit DCPs but only part of the imprecision of the 12-bit DCPs. A large bias for some of the results was apparently caused by an impedence mismatch. A means for correcting the data based on the reference resistor measurement is proposed.

SR 89-38

LOW-TEMPERATURE EFFECTS ON SYSTEMS FOR COMPOSTING OF EXPLOSIVES-CON-TAMINATED SOILS. PART 1: LITERATURE REVIEW.

Ayorinde, O.A., et al, Dec. 1989, 18p., ADA-219 352, 48 refs.

Reynolds, C.M. 44-2847

THERMODYNAMICS, LOW TEMPERATURE RESEARCH, TEMPERATURE EFFECTS, EX-PLOSIVES, WASTE TREATMENT, SOIL PHY-

This report reviews literature on the influence of major parameters on composting, with emphasis on temperature and explosives. Heat energy is produced by composting as a result of the microbial conversion of chemical energy an a result of the microbial conversion of chemical energy of thermal energy. Hence, heat production and transfer, the influence of engineering design on compost pile temperatures, and the control and measurement of compost pile temperatures are also examined. In addition, the report includes a general discussion on composting, fundamental composting principles, available types of composting systems, applications of composting technology, and the established parameters influencing composting under various environmental conditions that may be applicable to cold regions treatment of hazardous waste.

SR 89-39 PROCEEDINGS.

Arctic Technology Workshop, Hanover, NH, June 20-23, 1989, Dec. 1989, 475p., ADB-141 754, Refs. pass-im. For individual papers see 44-3133 through 44-3163

Richter-Menge, J.A., ed, Tucker, WB, ed, Kleinerman, M.M., ed.

SUBMARINES, ICE NAVIGATION, ICE ME-CHANICS, MILITARY OPERATION, ICE PHY-SICS, MEETINGS. MILITARY EQUIPMENT, UN-DERWATER ACOUSTICS, POLAR REGIONS, SEA ICE DISTRIBUTION.

SEA ICE DISTRIBUTION.

The Arctic Technology Workshop was held from 20-23 June 1989 at the U.S. Army Coll Regions Research and Engineering Laboratory (CRREL) in Hanover, NH This workshop follows the three previously held foe Penetration Technology Workshops in its intent to provide a forum for sharing and discussing recent efforts in the area of naval operations in the Arctic Papers were presented on the following general topics Arctic Ocean Acoustics, Atmospheric Phenomena, Ice Features, Statistics and Models, Mechanical Behavior of Ice, Through-Ice and High-Latitude Communications, Surface and Air Platforms, Submarine Operations, and Weadons Systems. Weapons Systems.

CD 00.01

PROCEEDINGS.

International Symposium Frozen Soil Impacts Agricultural, Range, and Forest Lands, Spokane, WA, March 21 22, 1990, Mar. 1990, 318p., ADA-219 637, Refs. passim. F through 44-2998. Cooley, K.R., cd. 44-2958 For individual papers see 44-2959

44-2936 SOIL FREEZING, FROZEN GROUND PHYSICS, FREEZE THAW CYCLES, FROST PENETRA-TION, SOIL WATER, CLIMATIC FACTORS, HEAT TRANSFER, WATER FLOW, MEETINGS, AGRICULTURE, FROST ACTION

SR 90-02

ENVIRONMENTAL TRANSFORMATION PRO-DUCTS OF NITROAROMATICS AND NITRA-MINES: LITERATURE REVIEW AND RECOM-MENDATIONS FOR ANALYTICAL DEVELOP-MENT

Walsh, M.Z., Feb. 1990, 21p., ADA-220 610, 57 refs

EXPLOSIVES, SOIL POLLUTION, WATER POL-PACT, SOIL CHEMISTRY, CHEMICAL ANALYSIS, DECOMPOSITION.

The literature describing the environmental transformation of organic explosives and related compounds is reviewed in an attempt to identify those byproducts for which certified analytical methods should be developed. Among those compounds identified are TNT reduction products (aminodinirotoluenes and diaminonitrotoluenes) and coupling products (azoxytoluenes). The development of methods is also recommended for the amno derivatives of DNT, TNB and DNB, as well as the nitroso derivatives of HMX and RDX.

FREEZEUP DYNAMICS OF A FRAZIL ICE SCREEN

Axelson, K.D., Feb. 1990, 8p., ADA-219 588, 12 refs.

FRAZIL ICE, RIVER ICE, ICE CONTROL, ICE BOOMS, FREEZEUP.

Fence booms made of wire mesh screen have been prop as economical, temporary frazil ice control structures. T screens incorporate frazil n = as it freezes to the screen material, eventually forming a frazil tee dam and raising the water level at a specified location. The purpose of raising the water level is to allow the formation of a stable tine water level at a specified location. The purpose of rasing the water level is to allow the formation of a stable ice cover that will incorporate still more frazil ice through hydraulic thickening of the cover and deposition bener the cover. A series of experiments examining the freezeup and blocking dynamics of an expanded metal frazil ice screen were conducted using both an impermeable barner a.. of frazil ice. A qualitative analysis of the complex frazil ice accumulation process indicated three phases of blocking—an onfice flow stage, a transition stage, and a permeable flow stage. A fourth phase, weir flow, was observed in some cases, and is expected to occur in prototype structures. High downstream flow velocities were associe with the orifice and transition stages. Downstream, ocities decreased during the permeable flow stage, although piping resulted in velocity jets. The test results indicate that a rapidly and completely blocked screen is desirable to minimize the time during which high downstream velocities, which lead to bed scour, occur.

SR 90-05

X RAY PHOTOGRAPHY METHOD FOR EX-PERIMENTAL STUDIES OF THE PROZEN FRINGE CHARACTERISTICS OF FREEZING

Akagawa, S., Feb. 1990, 69p., ADA-222 448, 15 refs.

SOIL FREEZING, FROST HEAVE, X RAY ANALYSIS. ICE LENSES. GROUND ICE. TEMPERA-TURE MEASUREMENT.

YSIS, ICE LENSES, GROUND ICE, TEMPERATURE MEASUREMENT.

The objectives of this report are to demonstrate a useful method for observing froe heave in freezing soil and to evaluate the method for the study of frozen fringe characteristics. X-ray photography of lead spheres containing thermocouples was tested in conjunction with frost heave tests. By applying image-processing techniques for determining the coordinates of the spheres, it is possible to obtain precise temperature profiles and determine, the deformation in freezing soil. Strin and strain rate data calculated from the coordinates of the lead spheres and the temperature profiles show when, where and how much deformation (heaving and consolidation) has taken place in the freezing soil. The temperature and strain field around the frozen fringe were also observed However, the method of determining the frozen fringe location from the location of the warmest ice lens was found to be located between the warmest visible ice lens and the 0 C isotherm. This was especially true during transient heaving, which occurs while the 0 C isotherm penetrates into the unfrozen soil. I are studying the precise deformation characteristics of the frozen fringe, further precise analysis of the X-ray photo's intensity profile will be needed to convert it to a strain profile. The accuracy and spacing of the temperature measurements in the frozen fringe, and there is a need for measurement methods that are more accurate than conventional temperature exposition. is a need for measurement methods that are more accurate than conventional temperature sensors

SALMON RIVER ICE JAM CONTROL STUD-IES: INTERIM REPORT.

Axelson, K.D., et al, Apr. 1990, 8p., ADA-222 665, 9

Foltyn, E P., Zabilansky, L.J., Lever, J.H., Perham, R.E., Gooch, G.E. 44-3754

ICE JAMS, RIVER ICE, ICE CONTROL, FRAZIL ICE, FLOOD CONTROL, ICE BOOMS, UNITED STATES—IDAHO—SALMON RIVER.

STATES—IDAHO—SALMON RIVER.
The city of Salmon, ID, has been affected by flooding resulting from an ice jum on the Salmon River. This ice jam, known as the Deadwater jam, is composed of frazil ice particles and the salmon should be salmon and its sproach to the control of the frazil ice in this situation. An Ice Control Structure (ICS) should provide encesh control of both production and transport of frazil ice to prevent the Deadwater jam from reaching Salmon Past investigations have indicated that a temporary ICS, or a combination of temporary and perinanent structures, might be succeed at Salmon This interim report documents the prograss of a study intended to obtain the information necessary to design an ICS upstream from Salmon

SURFACE CHANGES IN WELL CASING PIPE EXPOSED TO HIGH CONCENTRATIONS OF ORGANICS IN AQUEOUS SOLUTION.

Taylor S., et al. Mar. 1990, 14p, ADA-222 447, 12 refs.

Parker, 44.3755

WELL CASINGS, GROUND WATER, SOIL POL-LUTION, WATER POLLUTION, WASTES, SCANNING ELECTRON MICROSCOPY, COR-WASTES, ROSION, PIPES (TUBES), SURFACE PROPER-

TIES.

This preliminary study was undertaken to assess how the surface structural characteristics of four common well casing materials—polyvinyl chloride (PVC), Teflon (polytetrafluorocitylene, PTFE), stainless steel 304 (SS04) and stainless steel 316 (SS346)—are affected by exposure to an aqueous solution containing tetrachloroethylene, toluene, p-dichloroenezene and o-dichlorobenzene in concentrations near their solubility. Casing samples that had been exposed to a test solution for 1 week, 1 month and 6 months were examined with a scanning electron microscope (SEM) and c. mpared with control samples placed in well water for an equivalent time period. Pieces of casing that had not been placed in any aqueous solution were also examined and are assumed to be representative of the initial structure of the casing's surface. These organics are of concern at hazardous wastic sites, where they often occur in ground water. The observations indicate that the surface characteristics of PVC, SS316 and SS304 did not change when exposed to the organic aqueous solution. The surface variability and lack of distinguishing features at high magnification made it difficult to tell if the PTEE surface had changed. However, no obvious changes (swelling, pitting etc.) were However, no obvious changes (swelling, pitting etc.) were

SR 90-08

ICE EFFECTS ON HYDRAULICS AND FISH

Ashton, G.D., Apr. 1990, 24p., ADA-222 457, 5 refs. 44-3753

RIVER ICE, ICE COVER EFFECT, RIVER FLOW, HYDRAULICS, ANALYSIS (MATHEMATICS), ICE CONDITIONS, UNITED STATES—NEBRAS--PLATTE RIVER.

The effects of an ice cover on the flow depths and velocities beneath the ice are analyzed Data from gauging records for the Platte River in Nebraska are analyzed using this context. A procedure to use the results for ability simula-tions during winter periods is suggested. The effects of partial coverage by a stationary rec cover and the effects of coverage f ice on multiple channel flow distributions are analyzen

SR 90-09

CASE STUDY OF POTENTIAL CAUSES OF FROST HEAVE.

Henry, K.S., May 1990, 35p., ADA-224 071, 17 refs.

FROST HEAVE, PAVEMENTS, SOIL FREEZING, RUNWAYS, FROST PROTECTION, FROST PENETRATION, SUBGRADE SOILS.

PENETRATION, SUBGRADE SOILS.
Frost action beneath pavements can lead to several problems, including thaw weakening, which causes cracking and subsequent pumping of fine soil particles onto the surface, as well as hazardous conditions caused by differential heaving This stufy examined data and frost-susceptible soi. collected during the winter of 1985-86 at Ravalli County Airport, Hamilton, MT, to determine potential causes of frost heave Variables analyzed were depth to water table, depth of frost penetration, maximum frost heave, and soil moisture tension and soil temperature with depth. Analysis of the field data revealed the possibility that hydraulic conductivity of subgrade soils and rates of heat loss in the soil may be limiting frost heave rates. Soil density and depth to water table may also be factors affecting amounts of frost heave. Furthermore, the base course "gravel" used at the airport contained considerable amounts of fines and did heave somewhat in laboratory tests. Recommendations for design changes to reduce frost heave at Ravalli County Airport were made.

SR 90-10

WINTER BRIDGING EXERCISE ON THICK ICE: FORT MCCOY, WISCONSIN, 1988. Coutermarsh, B.A., Apr. 1990, 24p., ADA-223 682, 7

44-3957

ICE CROSSINGS, RIVER CROSSINGS, ICE CUT-TING, BRIDGES, MILITARY OPERATION

Deployment alternatives for the US Army Ribbon Bridge on a waterway covered with 24-in-thick ne were investigated lee clearing methods using a buildozer, ice tongs, chain saws and the hoists available on the bridge transporter trucks all worked with varying degrees of success. Sections of the Ribbon Bridge were deployed directly on the ice cover, a procedure that has potential but that also has problems and unanwered questions. and unanswered questions

SR 90-11 INVESTIGATION OF THE LIZ-3 DEW LINE STATION WATER SUPPLY LAKE.

Kovacs, A., Apr. 1990, 10p., ADA-222 469, 6 refs.

WATER SUPPLY, FROZEN LAKES, LAKE WA-TER, LAKE ICE, RADAR PHOTOGRAPHY, SUB-SURFACE DRAINAGE, SUBPERMAFROST GROUNDWATER, PERMAFROST BENEATH LAKES, UNITED STATES—ALASKA—NORTH

SLOPE.

The level of a lake supplying water to the LiZ-3 Dew Line Station, near the Chukchi Sea coast of Alaska, had fallen about a quarter of a meter. This lowering reduced the availability of water to the station during the winter and raised concern that the lake may continue to drain. A radar subsurface sounding survey of the lake was made in May 1984 to determine if the lake contained a deep area from which potable water could be drawn from under the ice during the winter. No acceptable deep areas were found. Recommendations are provided for preventing further drainage of the lake and for deepening a portion of the lake. A possible solution for making the sour water remaining under the winter lake ice acceptable for consumption is also presented.

SR 90-12

SK 90-12
USE OF SOFT GRADE ASPHALTS IN AIRFIELDS AND HIGHWAY PAVEMENTS IN
COLD REGIONS.
Janoo, V.C., May 1990, 47p., ADA-224 072, 54 refs.

44-4059

PAVEMENTS. BITUMINOUS CONCRETES CRACKING (FRACTURING), FROST RESIST-ANCE, FATIGUE (MATERIALS), BEARING STRENGTH, FREEZING INDEXES.

ANCE, FATIGUE (MATERIALS), BEARING STRENGTH, FREEZING INDEXES.

Soft grades of asphalt cement are being used for controlling low temperature cracking in some parts of the northern regions of the United States and in Canada. The U.S. Army Corps of Engineers (COE) specified softer asphalts for use in cold regions (ETL 1110-3-369) dated Nov. 1976; at present, the COE uses the penetration viscosity number (PVN) as a measure of the temperature susceptibility of the asphalt. A minimum PVN of -05 is specified for moderately cold areas and -0.2 in regions where the design freezing index is greater than 39900 Chr. Field studies have been conducted that clearly show the benefits of using softer grades of asphalt for minimizing low temperature cracking in cold regions; however, field studies relating ruting to asphalt type are rare. A major concern is whether or not pavements constructed with softer grades of asphalt are more susceptible to rutting during the hot summer months. A field study was conducted by CRREL to gather information on the use of soft grades of asphalt (AC 25, AC 5 and AC 10) and their associated pavement performance. An attempt was made to compare the COE specifications with State DOT specifications for these soft grades of asphalt. The influence of the asphalts studied, and the preliminary results of this filed program, are presented in this report. For the longer term objectives of this study, new or reconstructed pavements in various parts of the country will be monitored for both low temperature cracking and rutting.

COMPARISON OF FOUR VOLATILE ORGANIC COMPOUNDS IN FROZEN AND UNFROZEN SILT.

Taylor, S., et al, Apr. 1990, 9p., ADA-224 009. Schumacher, P.W., Perry, L B.

44-3991
SOIL FREEZING, SOIL POLLUTION, SOIL CHEMISTRY, WASTE TREATMENT.
The effect of freezing on the distribution and movement of four volatile organic compounds was studied in a silty soil. Eight polycarbonate test tubes were filled with spiked saturated soil. The soil was frozen half way up in four of the tubes; the other four were controls and were not spiked with chloroform, benzene, toluene, or tetrachloroethylene did not move the organics ahead of the freezing front, but rather that freezing retarded the volatilization of each organic in the frozen soil relative to the unfrozen soil.

MULTIBAND IMAGING SYSTEMS.

McKim, H.L., et al, May 1990, 10p., ADA-223 969 Merry, C.J., LaPotin, N.T.

44-4038
TERRAIN IDENTIFICATION, REMOTE SENSING, SPACECRAFT, MILITARY OPERATION, SPACEBORNE PHOTOGRAPHY, AERIAL SURVEYS, DATA PROCESSING, PHOTOINTERPRE-

Digital data from satellite systems can provide timely and detailed terrain information for battlefield intelligence Muldetailed terrain information for battlefield intelligence Multiband imaging systems that can acquire simultaneous remotely sensed data for the same ground locality throughout the electromagnetic spectrum are available for analysis using conventional photo interpretation techniques or more sophisticated digital image processing methods. This report derribes existing and future multiband imaging systems with the emphasis on how a terrain analyst would use these data to prepare thematic overlays.

SR 90-17 THERMAL INFRARED SURVEY OF WINTER TRAILS IN THE FT. WAINWRIGHT TRAINING AREA, ALAFKA.

Collins, C.M., et al, May 1990, 16p., ADB-145 746, 6 refs.

Haugen, R.K. 44-3988

44-3988
ROAD ICING, MILITARY OPERATION,
NALEDS, INFRARED PHOTOGRAPHY, ICE
ROADS, TERRAIN IDENTIFICATION, SNOW
RUADS, INFRARED RECONNAISSANCE, PERMAFROST BENEATH ROADS, UNITED STATES
—ALASKA—FORT WAINWRIGHT.

MAFROST BENEATH ROADS, UNITED STATES—ALASKA—FORT WAINWRIGHT.

A thermal infrared imaging system was mounted on an Army UH-1H helicopter and used to conduct a series of survey flights over the winter. rail network of the Ft. Wainwright Training Area during November 1986. The training area is south of the Tanana River from Fairbanks and consists of 2600 sq. km. of neatly flat land underlain by discontinuous permafrost. A network of trails has been developed over the years to allow access to the training area during the winter for unit training and large-scale military maneuvers. The purpose of the survey flights was to try to identify areas along the trails where groundwater comes to the surface as springs, seeps and stream overflows. During the winter these outflow areas can be a source of extensive ground icings as the water repeatedly seeps to the surface and freezes. These areas frequently remain unfrozen below a thin see cover well into the winter, and vehicles have become stuck when they broke through the thrn ice. On the thermal IR imagery, overflow or icing areas were easily discernible as brighter (warmer) areas against the darker (colder) snow-covered terrain. Even at night, details of the snow-covered trails, siffields and different vegetation types could be ascertained in the thermal IR image, due to slight differences in thermal properties. Information acquired during this study was supplied to the Ft. Wainwright Directorate of Plans, Training, and Mobilization and was used to reroute trails around the overflow and icing areas, allowing unimpeded winter access into the training area.

MONOGRAPHS

THERMAL PROPERTIES OF SOILS.

Farouki, O.T., Dec. 1981, 136p., ADA-111 734, Refs. p.125-132. 30.1258

FROZEN GROUND THERMODYNAMICS, PER-MAFROST HEAT TRANSFER, FROZEN GROUND MECHANICS, SOIL PHYSICS, SOIL MECHANICS, THERMAL CONDUCTIVITY, SOIL WATER, SOIL FREEZING.

This monograph describes the thermal properties of soils, unfrozen or frozen. The effects on these properties of water and its phase changes are detailed. An explanation is given of the interaction between mosture and heat transfer. Other influences on soil thermal properties are described, necluding such factors as soil composition, structure, additives, salts, organics, hysteresis and temperature Techniques increasing such factors as soil composition, structure, additives, salts, organics, hysteresis and temperature. Techniques for testing soil thermal conductivity are outlined and the methods for calculating this property are described. The monograph gives the results of an evaluation of these methods whereby their predictions were compared with measured values, thus showing their applicability to various soil types and conditions.

M 81-02 FROST SUSCEPTIBILITY OF SOIL; REVIEW OF INDEX TESTS.

Chamberlain, E.J., Dec. 1981, 110p., ADA-111 752, For another source see 37-973 (MP 1557). Refs. p.83-88. 39-2034

39-2034 FROST HEAVE, SOIL FREEZING, SOIL ME-CHANICS, ICE WATER INTERFACE, ICE SOLID INTERFACE, SOIL CLASSIFICATION, TEM-PERATURE GRADIENTS, SOIL WATER, PARTI-CLE SIZE DISTRIBUTION, GRAIN SIZE.

CLE SIZE DISTRIBUTION, GRAIN SIZE.

Methods of determining the frost susceptibility of soils are identified and presented in this report. More than one hundred criteria were found, the most common based on particle size characteristics. These particle size criteria are frequently augmented by information such as grain size distribution, uniformity coefficients and Alterberg limits. Information on permeability, mineralogy and soil classification has also been used. More complex methods requiring pore size distribution, moisture-tension, hydraulic-conductivity, heave-streas, and frost-heave tests have also been proposed. However, none has proven to be the universal test for determining the frost susceptibility of soils. Based on this survey, four methods are proposed for further study. They are the U.S. Army Corps of Engineers Frost Susceptibility Classification System, the moisture-tension hydraulic-conductivity test, a new frost-heave test, and the CBR-after-thaw test

GROWTH, STRUCTURE, AND PROPERTIES OF SEA ICE.

Weeks, W.F., et al, Nov. 1982, 130p., ADA-123 762, Refs. p.117-130.

Ackley, S.F. 37-2407

SEA ICE, ICE ELECTRICAL PROPERTIES, ICE MECHANICS, ICE SALINITY, ICE THERMAL PROPERTIES, ICE CRYSTAL STRUCTURE, ICE PHYSICS, GRAIN SIZE, ICE CRYSTAL GROWTH, GAS INCLUSIONS, TEMPERATURE

This monograph describes in some detail the current state of knowledge of the observed variations in the structural characteristics (grain size, crystal orientation, brine layer spacing) and composition (brine, gas and solid salts) of sea ice as well as the presumed causes of these variations. The importance of these variations in controlling the large observed changes in the mechanical, thermal and electrical properties of the sea ice is also discussed.

MECHANICAL BEHAVIOR OF SEA ICE. Mellor, M, June 1983, 105p, ADA-131 852, Refs p.99-105. 38-469

SEA ICE, ICE MECHANICS, ICE ELASTICITY, ICE STRENGTH, FRACTURING, FLEXURAL STRENGTH, STRESSES, STRAINS, RHEOLOGY, MECHANICAL PROPERTIES, PRESSURE MECHANICAL PROPERTIES, PR RIDGES, ANALYSIS (MATHEMATICS).

The first part of the report provides an introduction to the mechanics of deformable solids, covering the basic ideas of stress and stream, rheology, equilibrium equations, strain/displacement relations, constitutive equations, and failure entreast Fracture mechanics and fracture toughness are also reviewed briefly. The second part of the report summarizes available data on the mechanical properties of freshwater ice and saline ice, accounting for the influences of strain rate and

loading rate, temperature, porosity, salinity, and grain size Boundary value problems are not dealt with, but there is discussion of some miscellaneous topics, including thermal strains, behavior of brash ice, and pressure ridges. The report was written as a study text for a NATO Advanced Study Institute on Sea/Ice/Air Interactions, and was intended to be used in conjunction with companion texts on related tonics.

M 84-01 FRAZIL ICE DYNAMICS.

Daly, S.F., Apr. 1984, 46p., ADA-142 037, Refs. p.44-

FRAZIL ICE, ICE MECHANICS, ICE CRYSTAL GROWTH, ICE CRYSTAL NUCLEI, HEAT TRANSFER, ICE FORMATION, ICE PREVENTION, SUPERCOOLING, TURBULENT FLOW, ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).

To describe the dynamic evolution of frazil ice in turbulent natural water bodies, the basic equation for dynamic frazil crystal number continuity and the basic equation of heat balance for a differential volume are developed. Crystal growth and nucleation of new crystals are the major parameters in these equations Expressions for the growth rate of frazil ice crystals are described. The growth rate along the major axis is controlled by heat transfer. The heat transfer coefficient is a function of crystal size, the fluid urbulence, and the fluid properties. The magnitude of inertial and buoyancy forces on the ice crystals are determined as is their influence on the heat transfer. Spontaneous nucleation of ice can be discounted; secondary nucleation is responsible for the vast majority of frazil ice crystals. The theoretical rate of secondary nucleation is partially modeled as a function of the supercooling, fluid turbulence and crystal size distribution. A simple analytical solution of the basic equations is developed for the growth of frazil ice in a well-mixed, steady-state crystalilizer.

ATMOSPHERIC ICING ON SEA STRUCTURES. Makkonen, L., Apr. 1934, 92p, ADA-144 448, Refs.

ICING, OFFSHORE STRUCTURES, ICE ACCRE-ICING, OFFSHORE STRUCTURES, ICE ACCRETION, ICE PREVENTION, ICE ADHESION, ICE SOLID INTERFACE, ICE PHYSICS, CLIMATIC FACTORS, ICE LOADS, SUPERCOOLING, ANALYSIS (MATHEMATICS), DESIGN.

ANALYSIS (MATHEMATICS), DESIGN.
Atmospheric icing (icing due to fog, precipitation and watervapor in air) as a physical process and the problems it causes for ships and stationary offshore structures are reviewed Estimation of the probability and seventy of atmospheric icing based on climatological and geographical factors is discussed, and theoretical methods for calculating the intensity of atmospheric icing at sea are suggested. Ensisting data on the dependence of the atmospheric icing rate and the properties of the accreted ice on the meteorological conditions are analyzed. The methods of measuring the icing rate and ice prevention methods are discussed.

M 84-03

Hibler, W.D., III, July 1984, 52p., ADA-147 376, Refs. p.48-52. 39-896

ICE MECHANICS, RHEOLOGY, DRIFT, THER-MODYNAMICS, ICE PLASTICITY, OCEANOG-RAPHY, SEA ICE, ICE FORMATION, ICE 'AIR INTERFACE, ICE WATER INTERFACE, ICE STRENGTH, ICE COVER THICKNESS, ICE MODELS, SEA WATER, ANTARCTI' A—WED-

DELL SEA.

This monograph reviews essential aspects of sea ice dynamics of the Arctic and Antarctic on the geophysical scale and discusses the role of ice dynamics in air-sea-ice interaction. The review is divided into the following components a) a discussion of the momentum balance describing ice drift, b) an examination of the nature of sea ice rheology on the geophysical scale, c) an analysis of the relationship between ice strength and ice thickness characteristics, and d) a discussion of the role of ice dynamics in the atmosphere-coccan system

Because of the unique, highly nonlinear nature of sea-ice interaction, special attention is given to the ramifications of ice interaction on sea ice motion and deformation

These ramifications are illustrated both by analytic solution and by numerical model results. In addition, the role of ice dynamics in the atmosphere-ice-occan system is succussed in light of numerical modeling experiments, including a fully coupled ice-occan model of the Arctic-Greenland-Norwegian seas

M 85-01 EROSION OF NORTHERN RESERVOIR SHORES. AN ANALYSIS AND APPLICATION

OF PERTINENT LITERATURE.

Lawson, D.E., May 1985, 198p., ADA-157 811, Refs.

SHORE EROSION, ICE COVER EFFECT, RESERVOIRS, SLOPE PROCESSES, PERMAFROST, SHORELINE MODIFICATION, GROUND WA-TER, WATER LEVEL, MODELS, WATER WAVES, FORECASTING, TEMPERATURE EF-

FECTS.

This monograph describes the current state of knowledge of northern reservoir shore crosson, primarily by examining the results of crossonal studies on lakes, coasts and rivers. The major crossonal processes of reservoir beaches and bluffs and their mechanics are discussed in detail. Thermal and physical parameters affecting the crodibility of shores, the environmental impacts of crosson, and the basic characteristics of the unique reservoir environment are reviewed. Current models of shore zone development are also presented. This interature analysis revealed that knowledge of crosson and recession in northern impoundments is severely limited. Quantitative analyses of the processes of crosson and their relative importance, parameters determining the nature, rate relative importance, parameters determining the nature, rate and timing of erosion, and models to predict the erodibility of a shore for use in minimizing shoreline recession remain in need of basic field research.

M 88-01

HEAT CONDUCTION WITH FREEZING OR

THAWING. Lunardini, V J., Apr. 1988, 329p., Refs. p.267-281. 43-3847

HEAT TRANSFER, PHASE TRANSFORMA-TIONS, CONDUCTION, FREEZING, MELTING,

Freezing of water or melting of see are phenomena that underhe many important scientific and engineering studies of cold regions. Mathematical methods of treating these phase-change heat transfer problems are critical to understanding and dealing with the problems that freeze-thaw causes. While convection may be an important heat transfer mode, it can often be neglected without significant error. This treport deals only with problems for which conduction is the basic heat transfer mode or for which the solutions can be obtained in terms of conductionalities problems. the basic heat transfer mode or for which the solutions can be obtained in terms of conduction-like problems, where possible, exact solutions are presented, but since these are quite limited for phase-change problems, approximate solutions are examined in some detail. The approximate methods are 1) the perturbation method, which leads to quasi-stationary techniques, 2) the heat balance integral method, and 3) Biod's variational principle. The theory associated with these methods is discussed in the appendixes. The available exact solutions are derived and explained. Graphical solutions are then developed for practical applications or widely occurring problems. The approximate solutions are used to generate design curves—such as those for phase-change depth, temperature, and heat flow vs time. The results are presented so as to be easily accessible to practicing engineers without recourse to claborate calculations. This is especially true for application to soil systems is especially true for application to soil systems

M 90-01

SEA ICE PROPERTIES AND PROCESSES; PROCEEDINGS OF THE W.F. WEEKS SEA ICE SYMPOSIUM.

Ackley, S.F., ed, Feb. 1990, 299p., ADA-221 723, Refs. passim. For individual papers see 44-3809 through 44-3867 or B-42106, F-42103 through F-42105, F-42107 through F-42113, and I-42114. Weeks, W.F., ed, W.F. Weeks Sea

Ice Properties and Processes, San Francisco, CA, Dec. 1988

44-3808

SEA ICE DISTRIBUTION, ICE PHYSICS, ICE DEFORMATION, ICE CONDITIONS, CLIMATIC FACTORS, ICE MECHANICS, MEETINGS.

The W.F. Weeks Sea Ice Symposium held in San Francisco, Dec 1988 includes 84 papers and abstracts written by about 150 authors Studies of sea ice properties carried out in the Arctic and Antarctic were reported

CHARACTERISTICS OF THE COLD REGIONS. Gerdel, R.W., Aug. 1969, 51p., AD-695 661, 64 refs.

TEMPERATURE DISTRIBUTION, SNOW COVER DISTRIBUTION, GLACIER ICE, FROZEN GROUND, PERMAFROST STRUCTURE, EN GROUND, PERMAFROST LAKE ICE, RIVFR ICE, SEA ICE.

The paper gives a brief introduction to total cold environments relating the chara-teristics of the cold regions to the problems

produced which hinder man's activities in these regions Discussed are the zonal temperature regimes, the various forms and aspects of snow and ice, frozen ground and permatrost and the atmospheric phenomena of the greenhouse effect, refraction, reflection, and luminance.

SELECTED ASPECTS OF GEOLOGY AND PHYSIOGRAPHY OF THE COLD REGIONS. Stearns, S.R., July 1965, 40p., AD-630 983, 50 refs. 24-3399

STRUCTURES, MOUNTAINS, DISTRIBUTION, PERMA. GEOLOGIC MOUNTAINS, PLAINS, TEMPERATURE DISTRIBUTION, TOPOGRAPHIC FEATURES, SEA ICE, PERMA-FROST.

The cold regions of the earth are defined and described in terms of their physiographic features geologic histories, temperature characteristics, vegetation limitations, permafrost

PERMAPROST (PERENNIALLY FROZEN GROUND).

Stearns, S.R., Aug 1966, 77p., AD-642 730, Includes, p.71-77, Description and classification of frozen soils by K.A. Linell and C.W. Kaplar Bibliog.

Linell, K.A., Kaplar, C.W.

PERMAFROST DISTRIBUTION, PERMAFROST STRUCTURE, PERMAFROST HEAT BALANCE SURFACE FEATURES, VEGETATION PAT TERNS, COLD WEATHER CONSTRUCTION.

This monograph summarizes information on permafrost for engineering construction in cold regions The distribution and origin of permafrost is discussed and information on structure, thickness, and thermal regime is summarized. Patterned ground and vegetation in the cold regions are discussed and the engineering significance of permafrost is reviewed

M I-A3a CLIMATOLOGY OF THE COLD REGIONS. INTRODUCTION. NORTHERN HEMISPHERE, PART I.

June 1967, 141p., AD-656 447, For Part II See 24-3402, 323 refs

CLIMATOLOGY, TOPOGRAPHIC FEATURES, ATMOSPHERIC CIRCULATION, HEAT BALANCE, RADIATION BALANCE.

ANCE, RADIATION BALANCE.

A review summary of the climatological environment of the Northern Hemisphere contains a general introduction to the cold regions and a discussion of geographic controls and meteorological aspects including 1) the hemisphere surface in terms of configuration and relief, vegetation zones and permanent and seasonal ice and snow, 2) the general circulation and weather system dealing with the circumpolar vortex, sea-level pressure and cyclomic frequency, circulation system persistence, and surface weather associated with high latitude pressures. 3) the net radiation and heat halance pressures. 3) the net radiation and heat balance

M T-A3h CLIMATOLOGY OF THE COLD REGIONS NORTHERN HEMISPHERE. PART II. Wilson, C., Aug. 1969, 158p., AD-674 185, For Part I, see 24-3401. Extensive bibliogs with each major

24-3402

CLIMATOLOGY, TEMPERATURE EFFECTS, HUMIDITY, PRECIPITATION (METEOROLOGY), WIND FACTORS, ICE FOG.

Three major topics are treated in this paper humidity and precipitation, and surface winds Temperature, and inversions are presented Visibility and icing data are included with the section on atmospheric humidity and precipitation. Average and maximum wind speeds with the prevailing directions and blowing snow data are given

M I-A3c CLIMATOLOGY OF THE COLD REGIONS SOUTHERN HEMISPHERE.

Wilson, C., May 1968, 77p., AD-674 185, 281 rcfs

CLIMATOLOGY, ATMOSPHERIC CIRCULA-TION, HEAT BALANCE, METEOROLOGICAL DATA, ANTARCTICA.

DAIA, ANT INCLUENT.

This monograph summarizes the climatology of the cold regions of the Southern Hemisphere which consist almost entirely of the Antarctic Continent Comparisons with the northern cold regions are followed by a systematic treatment of general circulation, the energy budget, and menectrological elements forming the climate of the region. Thirty-two illustrations (many of several parts) and ten tables give climatological data, and a selected bibliography of 281 items provides complete coverage for further details.

M I-A3d RADIOACTIVE FALLOUT IN NORTHERN RE-

Wilson, C., Feb 1967, 35p. AD-656 448, 119 refs 24-3404

FALLOUT, RADIOACTIVE ISOTOPES, ATMO-SPHERIC CIRCULATION.

Information and data are given on the distribution of radioac-Information and data are given on the distribution of radioactive fallout and atmospheric processes, announced nuclear detonations, and monthly fallout deposition collection. It is pointed out that the 3 dangerous isotopes are Sr-90, Cs-137, and I-131. The data suggest that the arctic and subarctic stratorsphere plays an important role in the retention and release of 142 outcive fallout so that, regardless of the latitude at which the debris is injected into the stratosphere he fallout pattern may be unchanged. There is a close relationship between the troposphere jet streams and associated cyclonic disturbances and the distribution of fallout at the earth's surface. This hypothesis calls for the transfer of the debris in well-defined layers from the arctic stratosphere deep down into the troposphere in the vicinity of the ret of the deoris in well-defined layers from the arctic stratosphere deep down into the troposphere in the vicinity of the jet stream, where subsidence in the rear of cyclonic disturbances and the precipitation processes aid the rapid fall to earth. In the northern regions, fallout behavior depends on the initial pattern of the westerly vortex at the time of the detonation and its subsequent development

M I-B1 ANTARCTIC ICE SHEET.

Mellor, M., Feb. 1961, 50p., AD-276 609, 65 refs. 24-3405

LAND ICE, ICE COVER THICKNESS, ICE TEM-PERATURE, SNOW COVER, MASS BUDGET, ANTARCTICA.

ANIANCIICA.

The paper summarizes existing (as of 1960) knowledge of the Antarctic continent for the use of professional engineers engaged in design or construction in that region. Treated are the topographic features, accumulation, ablation, and drifting of snow, and a variety of ice characteristics including flow, thickness, variation of properties, temperature, mass budget, and annual gains and losses.

M I-B2 GREENLAND ICE SHEET.

Bader, H., Sept. 1961, 18p, AD-276 610, 11 refs.

LAND ICE, ICE COVER THICKNESS, ICE TEM-PERATURE, SNOW DENSITY, FIRNIFICATION. The paper summarizes the existing (as of 1961) knowledge of Greenland for use of professional engineers engaged in design or construction in that region. Discussed are the extent and thickness of the ice sheet, the regimen under which it exists, surface and subsurface temperatures, and snow densification

M II-A1 HEAT EXCHANGE AT THE GROUND SUR-

Scott, R.F., July 1964, 49p. plus append, AD-449 434, 56 refs

MEASURING INSTRUMENTS, METEOROLOG-ICAL DATA, WIND FACTORS, TEMPERATURE EFFECTS, SOIL TEMPERATURE, HEAT BAL-ANCE, FREEZE THAW INDEXES

The parer summarizes existing (as of 1964) knowledge of heat exchange at the ground surface from an engineering viewpoint, aiming at the solution of the problem of predicting the ground penetration of the freezing point isotherm from meanur, son, and surface conditions. As perameters used in the solution, radiation, wind and air temperature, soil and subsurface transperatures, surface heat balance, and freezing and thawing indexes are considered. weather, soil, and surface conditions As perameters used

M II-32a

SEISMIC EXPLORATION IN COLD REGIONS. Roethlisberger, H. Oct 1972, 138p, AD-752 111, 199 rcfs

27-1681

SUBSURFACE INVESTIGATIONS, SEISMIC VELOCITY, ICE PLASTICITY, SNOW PLASTICITY, FROZEN GROUND MECHANICS, GLA-CIERS.

CIERS.

This monograph contains a comprehensive review of the use of seismic methods and related techniques based on elastic waves, to gain information on the geometry and physical properties of the substrata in cold regions, particularly snow, ice and frozen ground Pettinent elastic properties of these materials are described and methods for determining seismic velocities are summarized Theories and application of reflection and refraction soundings on glaciers, continental ice sheets, ice shelves, and frozen ground are reviewed Surveys employing surface waves, and application included with the text are 73 figures and about 200 selected references

M II-B PHYSICS AND MECHANICS OF SNOW AS A MATERIAL.

Bader, H., et al. July 1962, 79p., AD-287 052, 60 refs. Kuroiwa, D

SNOW PHYSICS, ELECTRICAL PROPERTIES, THERMAL PROPERTIES, METAMORPHISM (SNOW), CLASSIFICATIONS, SNOW DENSITY. SNOW COMPRESSION, COMPRESSIVE STRENGTH, SNOW CREEP, TENSILE TENSILE STRENGTH, SHEAR STRENGTH

The paper summarizes existing (as of 1962) knowledge of the properties of snow as a material — Its structure, changes, permeability, classification, mechanics, thermal and electrical properties are described and illustrated

M II-C1

SNOW AND ICE ON THE EARTH'S SURFACE. Mellor, M., July 1964, 163p., AD-449 925, Chapter bibliographies. 24-3409

SNOW PHYSICS, GLACIER ICE, GLACIOLOGY, ICE FORMS

An extensive treatment is given to the various aspects of glaciers including classification, area and thickness, and distribution; flow, wastage, mass economy, temperatures, past glaciations, and study techniques

The natural forms of ice, tions, and study techniques The natural forms of ice, ie, snow, frost, lake ice, river ice, sea ice, icebergs, and ground ice are described Snow is treated from the viewpoint of its effects and changes after it has fallen to the surface.

M II-C2a

PHYSICS OF ICE.

Glen, J.W., April 1974, 81p., AD-778 009. 28-4125

ICE PHYSICS, ICE CRYSTAL STRUCTURE, ICE MELTING, ICE SURFACE.

Existing knowledge of ice physics is summarized lee crystalline structure including defects in structure, polycrystalline ice and grain boundaries, electrical properties, thermal properties, propagation of electromagnetic waves in ice and optical properties, nucleation and growth of ice crystals, melting and evaporation, and surface properties are covered A comprehensive bibliography is given.

M II-C2b

MECHANICS OF ICE. Glen, J.W., Dec. 1975, 43p, ADA-022 797, 134 refs.

MECHANICS, ICE ELASTICITY, ICE EP, PLASTIC DEFORMATION, BIBLIO-GRAPHIES.

This monograph summarizes knowledge of the mechanics of ice to 1970. It is concerned principally with the effect of stress on the nicchanical properties of ice, including clasticity, anelasticity, sound propagation, plastic deformation and creep in single crystals and in polycrystalline ice, fracture, and recrystallization and grain growth that accompanies plastic deformation. The monograph also includes a comprehensive bublicoreably.

M II-C3 MECHANICAL PROPERTIES OF SEA ICE.

Weeks, W.F, et al, Sept. 1967, 80p., AD-662 716, 199 refs.

Assur. 24-3410

SEA ICE, ICE COVER STRENGTH, TENSILE STRENGTH, FLEXURAL STRENGTH, SHEAR STRENGTH, COMPRESSIVE STRENGTH, ICE CREEP, MECHANICAL PROPERTIES

CREEP, MECHANICAL PROPERTIES

This review discusses the state of thinking of each of the main national groups investigating see ice and gives an overall appraisal of the field as a whole Emphasis is placed on (1) the physical basis for interpreting sea i.e strength (phase relations, air volume, and structural considerations), (2) theoretical considerations (strength modela, air bubbles and salt reinforcement, and interrelations between growth conditions and strength), (3) experimental results (tensile, flexural, shear, and compressive strength, elastic modulus, shear modulus and Poisson's ratio, time dependent effects, and creep), and (4) plate characteristics. The paper includes a review of problems in we are investigations, relates the chemical, crystallographic, mechanical, and physical aspects involved, and concludes by showing how to utilize this knowledge to solve practical problems

FREEZING PROCESS AND MECHANICS OF FROZEN GROUND.

Scott, R.F., Oct 1969, 65p., AD-697 136, 64 refs 24-3411

FROZEN GROUND MECHANICS, FREEZING, FROST ACTION, VISCOELASTICITY, SOIL STRENGTH.

Outlined are two current theories on the freezing of water in soils. The classification and description, standardized in the United States and Canada, of frozen soils, leads to some laboratory data on the incehanical behavior of frozen soils. The Monograph concludes with the application of linear viscoelastic theory to typical field problems. Twenty-one illustrations, 7 tables and 64 references are included

PROPERTIES OF SNOW.

Mellor, M., Dec. 1964, 105p., AD-611 023, Chapter

24-3412 SNOW PHYSICS, SNOW STRENGTH, LOADS (FORCES), SHEAR STRENGTH, SNOW CREEP, THERMAL PROPERTIES, ELECTRICAL PROP-ERTIES.

The paper summarizes existing (as of 1964) knowledge of the properties of snow Snow structure and structural changes are discussed as products of variations in grain size, porosity, density and as the result of loading variations which affect the ultimate strength and ereop of snow Emplayized after are waste in which have a transformatic terms. phasized also are ways in which heat is transferred through snow and the changes which result

M III-A2a METHODS OF BUILDING ON PERMANENT SNOWFIELDS.

Mellor, M., Oct. 1968, 43p., AD-681 889, 14 refs. 24-3413

24-3413
COLD WEATHER CONSTRUCTION, SNOW (CONSTRUCTION MATERIAL), UNDERSNOW FACILITIES, ANTARCTICA, GREENLAND.
Construction on the polar ice sheets of Greenland and Antarctication of the polar ice sheets of the polar ice sheets of the polar ice sheets of

tica is a challenge, mainly because of the mechanical and thermal sensitivity of snow, the major constructional material. Adverse weather, logistical difficulties, and lack of experience Adverse weather, logistical difficulties, and lack of experence add to the problem to make every project a costly experiment. This monograph describes the development of building in, on, and of, snow, beginning with the Eskimo snowhouse for temporary shelter, and leading to permanent installations like 6500-ton steel structures above the snow surface, and a large subsurface encampment maintained with the help of a nuclear reactor. The work is introductory to other monographs dealing with specific aspects of design, construction and operation.

M III-A2b

INVESTIGATION AND EXPLOITATION OF SNOWFIELD SITES.

Mellor, M., Jan. 1969, 57p., AD-686 314, 32 refs.

24-3414 COLD WEATHER CONSTRUCTION, SNOW (CONSTRUCTION MATERIAL), UNDERSNOW FACILITIES, MEASURING INSTRUMENTS, FACILITIES, MEASURING INST SNOW STRENGTH, EXCAVATION.

This monograph is the 2nd of a series of 5 It covers the site investigations and laboratory tests in connection with construction on a permanent snowfield, and then deals with the technology of excavation and building where snow is almost the only constructional maternal The author draws heavily on the work of the Cold Regions Research and Engineering Laboratory (CRREL) in the development of Camp Century and other projects on the Greenland ice sheet and shows the application of the techniques to Antarctic Research Stations.

FOUNDATIONS AND SUBSURFACE STRUC-TURES IN SNOW.

Mellor, M., Oct. 1969, 54p., AD-699 336, 31 refs.

FOUNDATIONS, SNOW PHYSICS, SNOW (CON-STRUCTION SUBSURFACE MATERIAL), STRUCTURES.

Various types of foundations suitable for use in very deep snow are described, and design principles are given Dependence of settlement rate on heaving pressure, size and shape of foundation, snow temperature, and snow density is treated analytically, and field data from test procedures for foundation analytically, and field data from test procedures for foundation design are outlined. In treating the design of tunnels, shafts and subsurface structures in very deep snow, the distributions of stress, strain and displacement in polar ice sheets are first obtained analytically. Observed patterns of deformation are given for a variety of excavations and deformable structures, and methods of analysis are put forward. The loading of rettraining structures is discussed, and finally some notes on the monitoring and maintenance of subsurface structures are size. structures are given

M III-A2d

UTILITIES ON PERMANENT SNOWFIELDS. Mellor, M., Oct. 1969, 42p., AD-699 337, 46 1cfs.

COLD WEATHER CONSTRUCTION, WATER SUPPLY, WASTE DISPOSAL, UTILITIES, FIRES, HEATING, VENTILATION.

HEATING, VENTILATION.

The topics covered in the monograph include water supply, waste disposal, heating, ventilating and fire protection at installations built on polar ice sheets. The section on water supply discusses energy requirements, consumption rates, water quality and treatment, techniques and equipment for melting snow and ice, and water distribution systems. A number of actual water supply systems are described in detail. The section on waste disposal deals with sewage and sewage sinks, latrines, garbage, trash and scrap and radioactive waste. Examples of sanitation systems at polar base are described in some detail. The section on heating discusses heating load, heat losses and insulation, energy sources, and heating systems. The ventilation section covers air demands, intakes and exhausts, ventilation of undersnow tunnels, and carbon monoxide problems. The report concludes with some notes on fire protection.

M III-A3a

EXPLOSIONS AND SNOW.

Mellor, M., June 1965, 34p., AD-623 418, 23 refs. 24-3415

EXPLOSION EFFECTS EXPLOSION EFFECTS, ATTENUATION, SHOCK WAVES, SNOW MECHANICS.

Described are experiments with blasting in snow of the charge and the depth placed are related to the size and configuration of the resulting crater and the permanent deformation of the snow. Shockwaves in the snow and in the air are discussed and engineering applications of snow blasting are indicated

M III-A3b SNOW REMOVAL AND ICE CONTROL. Mellor, M., April 1965, 37p., AD-615 795, 32 refs.

SNOW REMOVAL, ICE CONTROL

Climatology of snow cover in the northern hemisphere is briefly presented along with a description of significant snow properties. More extensively treated are the various equipments and methods used to control ice and snow. Snow plows, and methods used to control uce and snow. Snow plows, heating systems, and chemical means of snow removal are compared and details of costs and organization of removal techniques are presented

M III-A3c BLOWING SNOW.

Mellor, M., Nov. 1965, 79p., AD-630 328, 97 refs.

SNOWDRIFTS, BLOWING SNOW, WIND FACTORS, SNOW FENCES, TURBULENT DIFFU-

The monograph reviews available information on blowing The monograph reviews available information on blowing snow and the formation of snowdrifts. The mechanics of wind transport is discussed, with special emphasis on turbulent diffusion of snow particles in the surface boundary layer. The metering of blowing snow is explained, and field data are given for concentration and flux of snow particles as functions of wind speed and height above the surface. Deposition and erosion of snow is discussed and wind tunnel modeling is considered. The construction and deployment of snow fences is described, and snow fence. wind tunnel modeling is considered. The construction and deployment of snow fences is described, and snow fence performance is analysed. Snow drifting on highways and around structures is considered. Some electrical and optical phenomena are reviewed

M III-A3d

AVALANCHES.

Mellor, M., May 1968, 215p., AD-671 614, 134 refs. 24-3418

AVALANCHES, AVALANCHE COUNTER-MEASURES, AVALANCHE MECHANICS, AVA-LANCHE TRIGGERING, SLOPE STABILITY.

This monograph contains a comprehensive review of the formation and occurrence of avalanches together with a technical treatment of the principles and practice of avalanche defense. Major sections deal with avalanche hazard, snow-fall and snow cover, avalanche terrain, avalanche classification, tail and show cover, avalanche terrain, avalanche classification, stress and deformation in snow slopes, engineering mechanics, avalanche dynamics, avalanche defenses, design of supporting structures and galleries, avalanche triggering and slope stabilization, probability forecasting, warning and rescue, and ice avalanches. A glossary of avalanche terminology in English, German and French is given in an appendix

M III-A4

OVERSNOW TRANSPORT.

Mellor, M., Jan. 1963, 58p. plus appends., AD-404 778, 32 refs. 24-3419

VEHICLES, CREVASSE DETECTION. DESIGN CRIT_RIA.

Snow vehicles of various types are described and illustrated Use, capabilities, limitations, and design features are presented and the procedures used to test the vehicles are given. Characteristics of good oversnow vehicles in terms of speed, power, load capacity, flotation, and traction are described M III-Bla

WINTER REGIME OF RIVERS AND LAKES. Michel, B., April 1971, 131p., AD-724 121, 164 refs

LAKE ICE. RIVER ICE, ICE SURVEYS, ICE FOR-MATION, HEAT BALANCE, FRAZIL ICE, ICE BREAKUP, ICE CONTROL, ICE FORECASTING. The monographs summarizes existing knowledge of river and lake ice surveys, heat balance on open water in winter, frazil, ice cover formation, ice breakup and ice control M III-BIb

PRESSURE ON ENGINEERING STRUC-TURES.

Michel, B., June 1970, 71p., AD-709 625, 79 refs.

ICE PRESSURE, STRUCTURES, ICEBREAKERS, ICE BREAKING, STATIC LOADS, DYNAMIC LOADS

This monograph summarizes existing knowledge on forces exerted by an expanding ice sheet, impact forces of ice on structures, and vertical forces exerted by ice on hydraulic structures

Sections are also devoted to icebreakers and ice models

M III-C4

FOUNDATIONS OF STRUCTURES IN COLD REGIONS.

Sanger, F.J., June 1969, 91p., AD-694 371, 62 reis. 24-3420

COLD WEATHER CONSTRUCTION, FOUNDA-TIONS, FROST HEAVE, PERMAFROST ERVATION, SEASONAL FREEZE THAW.

This monograph describes the various kinds of foundations used for structures on permafrost with a brief discussion of foundations in areas of seasonal frost. Special attention is given to piled foundations in permafrost and the design of ventilation systems for controlling that under heated buildings. Appendixes outline techniques for computing the depth of freezing or of thawing, the design of refrigeration systems for artificial freezing, and the recommended procedure in the USSR for static pile tests. Included in the main text are 51 figures and 62 selected references

M III-C5a

WATER SUPPLY IN COLD REGIONS. Alter, A.J., Jan. 1969, 85p, AD-685 850, 228 refs.

24-3421

COLD WEATHER OPERATION, WATER SUP-PLY, WATER TREATMENT.

The monograph outlines the influence of a cold environment on sanitary engineering works and services. It then deals with water supply in cold regions sources, distribution systems, treatment processes and possible future supply from other than geological sources.

M III.CSh

SEWERAGE AND SEWAGE DISPOSAL IN COLD REGIONS.

Alter, AJ, Oct. 1969, 106p., AD-698 452, 225 refs.

SEWAGE DISPOSAL, SEWAGE TREATMENT, UTILITIES, WASTE DISPOSAL, COLD WEATHER OPERATION.

ER OPERATION.

The main items dealt with in this monograph are practice and problems encountered by the builder and operator of sewerage works facilities in cold regions, collection and transport systems; treatment and processing of sewage, thermology, reuse and regenerative processes for treating waste water, and construction and operation of sewage facilities. Six appendixes treat stabilization ponds, venetilation of buildings having sewage treatment plant, management of solid waste and classification of wastes and incinerators.

M III-D3

ICINGS DEVELOPED FROM SURFACE WATER AND GROUND WATER

Carey, K L., May 1973, 71p. AD-765 452, 80 refs. 28-2877

ICE FORMATION, GROUND WATER, ICE CON-TROL, ENGINEERING.

TROL, ENGINEERING.

This monograph summanzes existing knowledge of the occurrence, control, and prevention of teings It covers brief history of icing studies, general descriptions of icings, engineering significance of icings, origins of icings and factors affecting icing formation, techniques for studying icings, techniques for counteracting icings, avoiding icing problems in new construction, and selected bibliography

TECHNICAL DIGESTS

TD 81-01

USING ELECTRONIC MEASUREMENT EQUIPMENT IN WINTER.
Atkins, R.T., U.S. Army Cold Regions Research and Engineering Laboratory, July 1981, 7p., ADA-148 795, 5 refs. 39-2092

39-2092
ELECTRONIC EQUIPMENT, COLD WEATHER PERFORMANCE, MEASURING INSTRUMENTS, SEMICONDUCTORS (MATERIALS), THERMAL INSULATION, CABLES (ROPES), WINTER, TEMPERATURE EFFECTS.

TD 82-01 FREEZING AND BLOCKING OF WATER PIPES.

Carey, K.L., U.S. Army Cold Regions Research and Engineering Laboratory, May 1982, 11p., ADA-148 943, 10 refs. 39-2093

39-2093
PIPELINE FREEZING, WATER FLOW, ICE FOR-MATION, WATER PIPES, TEMPERATURE EF-FECTS, COUNTERMEASURES, DESIGN, ICE CONTROL, WATER PRESSURE, FREEZEUP.

MELTING ICE WITH AIR BUBBLERS.
Carey, K.L., U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1983, 11p., ADA-148 739, 7 refs.
39-2094

ICE MELTING, BUBBLING, FLOATING ICE, ICE BREAKING, ICE CONTROL, PORTS, PIERS, DOCKS, ANALYSIS (MATHEMATICS).

TD 83-02 ICE-BLOCKED DRAINAGE: PROBLEMS AND PROCESSES.

Carey, K.L., U.S. Army Cold Regions Research and Engineering Laboratory, Nov. 1983, 9p., ADA-148 738, 2 refs. 39-2095

39-2095
PIPELINE FREEZING, DRAINAGE, CULVERTS, ICE FORMATION, FREEZEUP, ICE REMOVAL, DESIGN, COUNTERMEASURES, HEAT TRANSFER, WINTER MAINTENANCE.

ENGINEER'S POTHOLE REPAIR GUIDE.

ENGINEER'S POTHOLE REPAIR GOIDE. Eaton, R.A., et al, U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1984, 12p., ADA-148 736, 3 refs. Wright, E.A., Mongeon, W.E

39-2096

ROAD MAINTENANCE, WINTER MAINTE-NANCE, DAMAGE, ENGINEERING, PAVE-MENTS.

TD 84-02 SOLVING PROBLEMS OF ICE-BLOCKED

DRAINAGE.
Catey, K.L., U.S. Army Cold Regions Research and Engineering Laboratory, Sep. 1984, 9p., ADA-148 737, 4 refs. 39-2097

DRAINAGE, ICE FORMATION, PIPELINE FREEZING, CULVERTS, ICE REMOVAL, ICE CONTROL, ENGINEERING, COUNTERMEAS-URES, FREEZEUP.

RADAR PROFILING OF ICE THICKNESS.

Arcone, S.A., U.S. Army Cold Regions Research and
Engineering Laboratory, July 1985, 11p., 18 refs.

43-3945
ICE THICKNESS, PROFILES, SUBSURFACE INVESTIGATIONS, RADAR.

INTRODUCTION TO HEAT TRACING.

Henry, K., U.S. Army Cold Regions Research and Engineering Laboratory, June 1986, 20p., Refs. p 18-

HEATING, HEAT TRANSFER, PIPELINE FREEZING, SHIP ICING, FREEZING, COUNTERMEASURES, PROTECTION.

TD 87-01 ELECTRICAL GROUNDING IN COLD RE-

GIONS. Henry, K., U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1987, 17p., 20 refs. 43-3639

ELECTRICAL RESISTIVITY, ELECTRICAL GROUNDING, FROZEN GROUND, PERMA-FROST.

TD 87-02 ATMOSPHERIC ICING OF TRANSMISSION

Henry, K., U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1987, 15p., 15 refs.

ICE ACCRETION, ICING RATE, POWER LINE ICING, COMPUTERIZED SIMULATION.

MISCELLANEOUS PUBLICATIONS

ACFEL MP BL 1
REPORT ON COLD ROOM AND EQUIPMENT FOR FROST INVESTIGATION. May 1950, 25p., AD-712 535.

25-4045 COLD CHAMBERS, TEST EQUIPMENT, SOIL FREEZING, FROST HEAVE.

A cold room has been constructed at the Frost Effects Laboratory, New England Division, Corps of Engineers, U S Army, for the purpose of conducting laboratory studies to determine the effect of various factors influencing ice segregation in soils and to study, in general, the frost phenomena in soils, with the objective of establishing design and evaluation criteria for roads, highways, and artifield runways constructed on frost susceptible soils which are subject to seasonal freezing

MP 843 ON THE USE OF TENSIOMETERS IN SNOW HYDROLOGY.

Colbeck, S.C., 1976, 17(75), p.135-140, 11 refs.

SNOW HYDROLOGY, MEASURING INSTRU-MENTS, WATER PRESSURE.

MENTS, WATER PRESSURE.

The construction and use of snow-water tensiometers is described. Water pressure at the base of a shallow, Arctic anow-pack was measured to illustrate the response of the basal layer to water percolation. Water tension above an ice layer and water flux through the ice layer were measured in glacial snow. The gravity flow theory is used to explain the close agreement between these parameters. This suggests that the ice layer has little effect on the flow field and that gravity (rather than tension gradients) controls the flow. Further work on water tensions is needed to identify the role of tension gradients in ripening and shallow snow covers. (Auth.)

MP 844 SNOW AND ICE. Colbeck, S.C., et al, July 1975, 13(3), p.435-441, 475-487, Refs. p.475-487. Thorndike, A.S., Willans, I.M., Hodge, S.M., Ackley, S.F., Ashton, G.D.

ICE SHEETS, ICE SHELVES, SNOW SURVEYS, SEA ICE, GLACIOLOGY, ICE PHYSICS, RESEARCH PROJECTS.

MP 845 THIRD INTERNATIONAL SYMPOSIUM ON ICE PROBLEMS.

Frankenstein, G E, ed, International Association of Hydraulic Research, 1975, 627p., For individual papers see 30-2708 through 30-2759.
30-2707

ICE NAVIGATION, RIVER ICE, ICE JAMS, SEA ICE, ICE LOADS, HYDRAULIC STRUCTURES, MEETINGS

MP 846 RESURVEY OF THE "BYRD" STATION, ANTARCTICA, DRILL HOLE.
Garfield, D.E., et al, 1976, 17(75), p.29-34, 4 refs.

Ueds, H.T. 30-3529

BOREHOLE INSTRUMENTS, ICE SHEETS, FLOW MEASUREMENT, MECHANICAL PROP-ERTIES, ANTARCTICA-BYRD STATION.

ERTIES, ANTARCTICA—BYRD STATION.

The drill hole at "Byrd" station, which was completed in Jan 1968 to a vertical depth of 7063 ft (2153 m) below the top of the hole casing, was resurveyed in Jan 1975 to a vertical depth of 4835 ft (1474 m). Inclination and azimuth measurements were made with a Parsons multiple shot inclinometer and compared with the earlier measurements made duning drilling. The results indicate a progressively increasing displacement with depth to a value of 51.2 ft (15.6 m) or about 7.3 ft/year (223 m/year) at the 4835 ft (1474 m) level. The direction of movement relative to the surface varies from south-west at 300 ft (915 m) to north-east at 4835 ft (1474 m), indicative of a complex twisting motion. An increase in accessible depth along the hole axis of 18 ft (549 m) beyond the 1969 depth was noted. No attempt was made to incasure the hole diameter or vertical strain. It is recommended that the hole be resurveyed in 3-5 years if it is still logistically feasible, using a more up-dated inclinometer. (Auth)

MP 847 GAS INCLUSIONS IN THE ANTARCTIC ICE SHEET AND THEIR GLACIOLOGICAL SIGNIFICANCE.

Gow, A.J., et al, Dec. 20, 1975, 80(36), p.5101-5108,

16 refs. Williamson, T.

30-2295

ICE SHEETS, DRILL CORE ANALYSIS, GAS IN-CLUSIONS, BUBBLES, AIR ENTRAINMENT, ICE PRESSURE, ANTARCTICA—BYRD STA-

TION.

ICE PRESSURE, ANTARCTICA—BYRD STATION.

Cores obtained to the bottom of the Antarctic Ice Sheet
at Byrd Station have been used to analyze some physical
properties of the air bubbles trapped in the ice. These
bubbles constitute the remnant air that is retained when
polar snow transforms into glacial ice. Parameters measured
include size, shape, abundance, and spatial distribution of
bubbles, gas volumes, and bubble pressures and their veriations
with depth in the ice sheet. Bubbles occur abundantly
in the top 300 m of ice but their gradually disappear until
they can no longer be detected optically below 1100 m.
This disappearance is not accompanied by any significant
loss of air from the ice, and the available evidence suggests
that the air is retained in the form of a gas hydrate of
clathrate. Because of the release of confining pressures
following drilling, the hydrate begins to decompose soon
after cores are pulled to the surface. This decomposition
is accompanied by the growth of gas-filled bubbleike cavities
that are easily distinguishable from original air bubbles. Bubble pressure measurements show that (1) bubbles with pressures
exceeding abtivit 16 bars begin to relax back to this value
soon after in situ pressures are relieved by drilling. (2)
further slow decompression is controlled to some extent by
the intrinsic structural properties of the ice and its thermal
and deformational history. Only small variations were
observed in the entrapped air content of the ice cores;
they probably reflect variations in the temperature and/or
pressure of the air at the time of its entrapment. Only
in ice from the bottom 483 m was the air content observed
of air coincided precisely with the first appearance of stratified
moraine in the cores, it is concluded that this ice originated
from the refreezing of air-depleted water produced under
pressure melting conditions at the bottom of the ice sheet.

MP 848

LEDGLET VARIATION ALONG SEA ICE PRES.

HEIGHT VARIATION ALONG SEA ICE PRES-SURE RIDGES AND THE PROBABILITY OF FINDING "HOLES" FOR VEHICLE CROSS-

Hibler, W.D., III, et al, Dec. 1975, 12(3/4), p.191-199. For this paper from another source see 28-3039.

Ackley, S.F.

INGS

SEA ICE, PRESSURE RIDGES, AIR CUSHION VEHICLES, ICE CROSSINGS, HEIGHT FIND-

Sea ice pressure ridges are major obstacles to vehicle mobility in the Arctic Basin. An estimate of the expectation of holes of various heights and widths in the ridges is desirable for optimum vehicle design. This study uses probability theory and ridge shadow measurements from aerial photographs of sea ice to determine the distribution of holes of various heights and widths in pressure ridges. General conclusions are drawn regarding trafficability of this terrain for vehicles of various sizes. Sea ice pressure ridges are major obstacles to vehicle mobility

MEASUREMENT OF SEA ICF DRIFT FAR FROM SHORE USING LANDSAT AND AERIAL PHOTOGRAPHIC IMAGERY.

Hibler, W.D., III, et al. International Symposium on Ice Problems, 3rd, Hanover, New Hampshire, 18-21 August 1975 Proceedings, International Association of Hydraulic Research, 1975, p.541-554, 6 refs Tucker, W.B., Weeks, W.F. 30-2755

SEA ICE, AERIAL SURVEYS, PHOTOGRAMME-TRY, ICE DEFORMATION, DRIFT, LANDSAT

This paper discusses recent work on the development of analysis procedures for obtaining drift and deformation meaanalysis procedures for obtaining drift and deformation mea-sured from sequential visual imagery of sea rec that is located far from land. In particular for LANDSAT images far from land a semi automatic procedure for transferring the location coordinates of a common set of see features from the Earth coordinate system of one image to another is discussed. Necessary inputs for the transfer are the location coordinates (latitude and longitude) of the center of each image and the location of two arbitrary points on a known line of longitude, all this information is available from LAND SAT, although with some error. These errors will produce

spurious apparent strains if velocities are estimated by simply taking position differences. With regard to measuring strain from sea ice aenal imagery without ground control, errors in such measurements are examined using uncorrected photographs. The errors in using such uncorrected imagery and using common undeformed ice floes to establish a common scale are found to be of the order of 1% whereas typical maximum differential motions are as large as 5%.

STATISTICAL VARIATIONS IN ARCTIC SEA ICE RIDGING AND DEFORMATION RATES.

Hibler, V.D., III, Ice Tech Symposium, Montreal, Canada, April 9-11, 1975. Proceedings, New York, Society of Naval Architects and Marine Engineers, 1975, p.J1-J16, 13 refs Includes discussions 30-1846

SEA ICE, PACK ICE, ICE DEFORMATION, ICE PRESSURE, OFFSHORE STRUCTURES, ICE CONDITIONS, STRESSES, ICE NAVIGATION, STATISTICAL DATA.

STATISTICAL DATA.

Past studies of statistics of pressure ridges have supplied useful information on the nature of pressure ridge height and spacing distributions as well as information on geographical and temporal variations in ridging. These statistics should be of some aid in the construction of Arctic offshore structures and in Lebreaking and shipping operations. By coupling these height and spacing statistics with information on ridge lengths, the amount of detouring necessary to avoid ridges may be estimated. Closely associated with ridging are drift and deformation studies. Two aspects of these studies applicable to this conference are (1) the prediction of the rate of opening and closing of the pack ice, and (2) estimation of typical geophysical stresses in the ice pack.

Theoretical and experimental work at CRREL indicates that certail approximate rules may be invoked to estimate the divergence. and experimental work at CRREL indicates that certain approximate rules may be invoked to estimate the divergence rate far from coastal boundaries, namely that ir. winter the pack ice should diverge in reasonably well localized high pressure systems, whereas in summer the ice typically diverges in low pressure systems. As regards estimates of geophysical stresses, estimates from a variety of sources suggest that maximum atresses integrated through the pack ice thickness are of the order of 10,000 to 100,000 N/m. The upper limit is approximately equal to the force required to crush 0.25-meter-thick sea ice

CONTINUOUS MONITORING OF TOTAL DIS-SOLVED GASES, A FEASIBILITY STUDY.

Jenkins, T.F., Gas Bubble Disease Conf-741033, Bat-telle, Pacific Northwest Laboratories, Richland, Wash-ington, Oct. 8-9, 1974, Proceedings, 1975, p.101-105,

31-1900

BUBBLES, WATER, GAS INCLUSIONS, SURVIV-AL, EXPERIMENTATION, MONITORS

AL, EAPERIMENTATION, MONTIORS

A preliminary investigation was undertaken to determine if a continuous analyzer could be configured to monitor dissolved gases in natural waters. A three-component system was designed consisting of a pumping system, a continuous stripper, and a detector. Prototypes of the first two components were assembled and evaluated under field conditions. Based upon these results, it is possible to configure an unattended, near-continuous monitor to measure total dissolved gas concentration. concentration in natural waters

ISLANDS OF GROUNDED ICE.

Kovacs, A., et al, Sep. 1975, 28(3), p 213-216, 10 refs. McKim, H.L., Merry, C.J. 30-3067

SEA ICE, GROUNDED ICE, ERTS IMAGERY. The report demonstrates the usefulness of ERTS-1 imagery for locating and identifying islands of grounded ice examples are cited

IDENTIFICATION OF NUCLEI AND CONCEN-TRATIONS OF CHEMICAL SPECIES IN SNOW CRYSTALS SAMPLED AT THE SOUTH POLE. Kumai, M., May 1976, 33(5), p.833-841, 16 refs. 30-3647

SNOW COMPOSITION, CLAY MINERALS, SNOW CRYSTAL NUCLEI, ANTARCTICA— SOUTH POLE.

SOUTH POLE.

A total of 380 electron micrographs and electron diffraction patterns of 93 snow crystal nuclei were analyzed in this observation. The nuclei were identified as mainly elay imperals and sodium chloride particles. The clay mineral nuclei were illite 20% kaoline 8%, halloysite 4%, vermiculite 3%, and related minerals 24%. For the other nuclei, sodium chloride accounted for 20%, and unidentified nu lei accounted for 5%. Fifteen percent of the snow crystals did not appear to have nuclei. Therefore, all nuclei found in snow crystals were terrestrial substances from oceans and

continents The shapes of snow crystals were single bullets, combinations of bullets, and hexagonal hollow column. The snow crystals formed at temperatures from -30 to -35C. The snow crystal diameters were from 0.1 to 1.0 mm. The mean mass concentration of sodium chloride in snow crystals was 40 6 ppb and that of clay minerals was 15 4 ppb. The sodium chloride nucleus concentration coincided within the experimental error with data taken from the chemical analysis of the South Pole snow cover made by several workers It was concluded that most of the sodium chloride contained in the South Pole snow cover was due to the sodium chloride nuclei of snow crystals nuclei of snow crystals

OPTICAL PROPERTIES OF SALT ICE.

Lane, J.W., 1975, 15(73), Symposium on Remote Sensing in Glaciology, Cambridge, 16-20 September, 1974, p.363-372, 12 refs., In English with French and German summaries. Includes discussion. 66 refs.

SALT ICE, ICE OPTICS, LIGHT SCATTERING The dependence of the extinction coefficient on salinity was investigated for both NaCl-ice and sali-ice made from the dependence of the estinction coefficient on sainity was investigated for both NaCl-ice and salt-ice made from natural sea-water. Specimens were prepared under a variety of conditions and examined over the wavelength range 4,000 to 8,000 A. The effects of scattering from air bubbles trapped in the ice were examined for ice made from distilled water. It was found that the method of preparing samples markedly affected their structure, but that, when prepared in the same manner, salt-ice made from natural sea-water and NaCl-ice did not show significantly different transmission properties. It was found that, for a wavelength of 6328 A, the data could be fit to the relation ke=[167-085 exp (-0.27x)/cm within an uncertainty of 26%, where ke is the extinction coefficient, and x is the salimity of the ice in g/kg. Within an uncertainty of 10%, there was no variation in transmission for ice at the same temperature and salimity over the wavelength range 4000 to 8000 A. All measurements were made at a temperature of -200C.

MECHANISMS OF CRACK GROWTH IN QUARTZ.

Martin, R.J., III, et al, Dec. 10, 1975, 80(35), p.4837-4844, 21 refs. Durham, W.B.

30-3068

ROCKS, CRACK PROPAGATION, WATER TRANSPORT, QUARTZ.

TRANSPORT, QUARTZ.

A previous study of time-dependent crack growth in single-crystal quartz has been expanded to examine the possibility of microfracturing events during stable crack growth, to look for evidence of plastic deformation associated with crack propagation, and to determine the dependence of crack growth on crystallographic orientation. No discernible effect of orientation on the temperature or change in applied stress or partial in visure of water dependencies during sequential crack g. ... episodes was observed, and no correlation was for ... ectiveen observed microfracturing events and the rate of crack propagation. However, the magnitude of the applied stress to achieve the desired rates of crack extension did vary with orientation. No evidence of plastic deformation has been found in samples of quartz undergoing time-dependent crack growth at temperatures up to 250C. Some Dauphine twins have been observed at temperatures above 125C. The fact that the stress, temperature, and water dependencies are independent or orientation is interpreted to suggest that the observed time-dependent cracking is controlled by the transport of water to the crack tip.

MP 856 GENERAL CONSIDERATIONS FOR DRILL SYSTEM DESIGN.

Mellor, M., et al. Ice core drilling, edited by J.F. actistoesser, Lincoln, University of Nebraska Press, 1976, p.77-111, 58 refs. Selimann, P.V.

30-3483

ICE CORING DRILLS, DRILLING, ROTARY DRILLING, THERMAL DRILLS

DRILLING, THERMAL DRILLS
Drilling systems are discussed in general terms, component functions common to all systems are identified, and a simple classification is drawn up in order to outline relations between penetration, material removal, hole wall support, and ground conditions. Energy and power requirements for penetration of ice and frozen ground are analyzed for both mechanical and thermal processes. An electromechanical coring drill and thermal processes An electromechanical coring drill has been used for deep drilling in Greenland and Antarctica Thermal drills have also been used for boring holes in ice Thermal drills have also been used for borng holes in ice although they are no' as efficient, in energetic terms, as mechanical drills Power requirements for removal of material and for hoisting of drill strings are considered, and total power requirements for complete systems are assessed.

Performance data for drilling systems working in ice and frozen ground are reviewed, and results are analyzed to obtain specific energy values. Specific energy data are assembled for drag-bit cutting, normal impact and identation, liquid jet attack, and thermal penetration. Torque and axial for capabilities of typical rotary drilling systems are reviewed and analyzed. The overall intent is to provide data and quantitive guidance tast can lead to systemside data and quantitive guidance tast can lead to systemside design procedures for drilling systems for cold regions (Auth. mod.)

COMPUTER SIMULATION OF THE SNOW-MELT AND SOIL THERMAL REGIME AT BAR-ROW, ALASKA.

Outcalt, S I., et al, Oct. 1975, 11(5), p.709-715, 17 refs. For another version of this paper see 29-4001. Goodwin, C., Weller, G., Brown, J.

COMPUTERIZED SIMULATION, SNOW TEM-PERATURE, SOIL TEMPERATURE, THERMAL DIFFUSION, SNOW FENCES, WATER SUPPLY. DIFFUSION, SNOW FENCES, WATER SUPPLY. An annual snow-soil simulator for arctic tundra was developed by using coupled models of surface equilibrium temperature and substrate thermal diffusion. Snow ripening, melt, and accumulation are modeled in the simulator which is forced with daily weather data. The simulator predicts that a snow fence array capable of producing drift deeper than 4.2 m will initiate a permanent snowfield at Barrow, Alaska Such a man-induced snowfield could serve as a reliable source of freshwater for Barrow and similar villages in the north slope region of Alaska Further analysis indicated that albedo reduction due to dust fall, snow removal, etc., is dominant over aerodynamic effects in producing the early spring meltout observed at Barrow Village

MP 858 FORCES ON AN ICE BOOM IN THE BEAU-HARNOIS CANAL

HARNOIS CANAL.

Perham, R.E., et al, International Symposium on Ice
Problems, 3rd, Hanover, New Hampshire, 18-21 August 1975. Proceedings, International Association of
Hydraulic Research, 1975, p.397-407, 7 refs. Racicot, L.

30-2743 ICE BOOMS, SHEAR STRESS, ICE PRESSURE. LOADS (FORCES).

LOADS (FORCES).

Ice booms are used to hasten the formation of a stable ice cover in early winter. Their main function is to reduce the area of open water where large amounts of ice floes and frazile ice can be generated This ice, if uncontrolled, can cause an ice jam or blockage at power house intakes and restrict its generating capacity A particular function of the forebay ice boom of the Beauharmois Power House is to prevent any ice upstream from moving down into the forebay. In the winter of 1974-75 CRREL obtained force measurements of both cross stream and downstream components in the forebay ice boom The purpose of this paper is to report these forces and their variations A limited amount of supplemental data such as water flow, ice thickness, and canal dimensions is provided All of the information should help in the understanding of interaction between an ice boom and its ice cover.

CONSTRUCTION AND PERFORMANCE OF THE HESS CREEK EARTH FILL DAM, LIVEN-GOOD, ALASKA.

GOOD, ALASKA.

Simoni, O.W., Fall 1975, 7(3), p.23-34. Also presented at the American Society of Civil Engineers, Alaska Section, Annual Meeting, Fairbanks, September 18-29, 1973 See also 27-177, TR 196.

EARTH DAMS, PERMAFROST STRUCTURES, PERMAFROST PRESERVATION, HYDRAULIC FILL, EARTH FILLS, UNITED STATES—ALASKA—LIVENGOOD.

MP 860 SNOW ACCUMULATION FOR ARCTIC FRESH-WATER SUPPLIES.

Slaughter, C.W., et al. 1975, 1(5), p 218-224, 15 refs. For another version see 29-3345.
Mellor, M., Sellmann, P.V., Brown, J., Brown, L.

WATER SUPPLY, SNOW ACCUMULATION, RUNOFF, MELTWATER, SNOW FENCES

APPROXIMATE ANALYSIS OF MELTING AND FREEZING OF A DRILL HOLE THROUGH AN ICE SHELF IN ANTARCTICA.
Tien, C., et al, 1975, 14(72), p 421-432, 3 refs.
Yen, Y.-C.
10.3105

30-3106

TESTS, ICE SHELVES, APALYSIS (MATHEMATICS).

An approximate analysis is made, of the processes of melting and freezing of a drill hole, 500 m in depth and 0.13 m in initial radius, through an ice shelf in Antarctica are expressed in graphical form showing the time available for experimentation under the hole as a function of heating duration. It is also found that refreezing has a much slower rate than melting (Auth.)

REMOTE SENSING PLAN FOR THE AIDJEX MAIN EXPERIMENT.

Weeks, W.F., et al, July 1975, No.29, p.21-48, 14 refs. Campbell, W.J.

REMOTE SENSING, SPACECRAFT, AIRBORNE EQUIPMENT, SEA ICE, ICE COVER THICKNESS, DATA PROCESSING.

NESS, DATA PROCESSING.

This operational plan describes the platforms and sensors that are expected to participate in AIDJEX, explains how they will be used to obtain the required data, discusses the analysis of those data, and points out weaknesses in the remote sensing plan as now formulated. The details of the plan have changed constantly as an overall remote sensing strategy was being developed. This document presents the state of the plan as of the start of the field program, in March 1975.

MP 863

ICE FORCES ON MODEL STRUCTURES.

Zabilansky, L.J., et al, 1975, 2(4), p.400-407, In English with French summary. 11 refs. Nevel, D.E., Haynes, F.D.

30-3095 ICE PRESSURE, HYDRAULIC STRUCTURES, PILE STRUCTURES, MODELS, LABORATORY TECHNIQUES.

TECHNIQUES.

Laboratory tests on freshwater nee were conducted by using model structures of various geometries. Vertical and sloping pile sections with diameters up to 36 in (91.4 cm) were pushed through the nee with an active testing system. The test variables investigated were size, shape, velocity, and slope or angle from the vertical. The data gathered in this study indicates that nominal ice pressure vanes indirectly with pile width/ice thickness (D/T) ratio in the range of 110. There was no apparent change in nominal ice pressure due to the change of the pile shape. Data gathered in the velocity tests suggests an inverse effect upon the ice pressure, especially at speeds greater than 3 in 1s (7 6 cm/s). In the sloping pile tests it was found that the ice pressure decreased with an increase in the sloping pile tests that failed in bending was developed. Values for this linear correlation were found graphically. A comparison of the test results with other investigations is also presented.

MP 864

ICE FORCES ON SIMULATED STRUCTURES. Zabilansky, L.J., et al, International Symposium on Ice Problems, 3rd, Hanover, New Hampshire, 18-21 August 1975. Proceedings, International Association of Hydraulic Research, 1975, p.387-396, 1 ref. Nevel, D.E., Haynes, F.D.

ICE PRESSURE, LOADS (FORCES), OFFSHORE STRUCTURES, PILE STRUCTURES, MODELS.

Simulated structures mounted on a portable apparatus were used to investigate ice force; in manne structures. Vanous geometric shapes of simulate structures or piles were pushed against natural lake ice. Parameters varied were size, shape, pile velocity, friction, initial pile-ice contact and slope of the pile. MP 865

INVESTIGATION OF WATER JETS FOR LOCK WALL DEICING.

Calkins, D J., et al, International Symposium on Jet Cutting Technology, 3rd, Chicago, May 11-13, 1976, Proceedings, 1976, p.G2/13-22, 17 refs Mellor, M.

31-1898 ICE REMOVAL, WALLS, CHANNELS (WATER-WAYS)

MP 866

TECHNIQUES FOR STUDYING SEA

IECHNIQUES FOR STUDYING SEA ICE DRIFT AND DEFORMATION AT SITES FAR FROM LAND USING LANDSAT IMAGERY. Hibler, W.D., III, et al, International Symposium on Remote Sensing of Environment, 10th, Oct.6-10, 1975, 1976, p.595-609, ADA-041 579, 12 refs Tucker, W.B., Weeks, W.F. 31-1995

SEA ICE, DRIFT, ICE DEFORMATION, REMOTE SENSING, SPACEBORNE PHOTOG-

RAPHY, ACCURACY. MP 867

UPLAND ASPEN/BIRCH AND BLACK SPRUCE STANDS AND THEIR LITTER AND SOIL PROPERTIES IN INTERIOR ALASKA.

Troth, J.L., et al, Mar 1976, 22(1), p 33-44, 17 refs Deneke, F.J., Brown, L.

ARCTIC LANDSCAPES, TREES (PLANTS), FOR-EST SOILS, SOIL CHEMISTRY. ALPINE VEGE-FATION. ALPINE SOILS

This study characterizes upland forest stands in interior Alaska and compares and contrasts their organic and soil properties. Stand data are presented for tree and sapling species in three aspen/bitch and four black spruce stands. Lutter

layers had greater mass and were more acidic beneath black spruce than beneath aspen/birch. Litter beneath aspen/birch contained higher concentrations of C, N, P, Ca, Mg, Mn, and Zn than did black spruce organic layers. Organic layer K and Fe concentrations were similar beneath the two stand groups. Total organic layer N, P, and Zn mass were similar in the two stand groups, more Ca, Mg, and Mn were present beneath hardwoods, and more K was present beneath black spruce. Extractable soil P decreased rapidly with increasing profile depth beneath aspen/birch stands, but increased with depth to a maximum at or below 15-30 cm beneath hardwoods than beneath coniferous communities. Soils beneath the two stand groups could not be consistently separated by differences in pH, %C, %N, or C/N ratio. Percentage soil carbon at all depths and in all stands was closely correlated with %N (r=0 97) and CEC (r=0.98).

MP 868

FEASIBILITY STUDY OF LAND TREATMENT OF WASTEWATER AT A SUBARCTIC ALASKAN

Sletten, R.S., et al, Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, 1976, 21p., 10 refs., Presented at the 8th Annual Waste Management Conference, Rochester, N.Y., April 28-30, 1976. Unpublished manuscript.

Uiga, A.

WASTE TREATMENT, WATER POLLUTION, SUBARCTIC LANDSCAPES, SUBARCTIC CLIMATE, TESTS, UNITED STATES—ALASKA.

MP 869

LET'S CONSIDER LAND TREATMENT, NOT LAND DISPOSAL.

Howells, D.H., et al, Mar. 1976, 46(3), p.60-62, Comments on J.V. Bentz's paper (see 31-1946).
Uiga, A., Wallace, A.T.
31-1947

WASTE DISPOSAL, WASTE TREATMENT, SEW-AGE TREATMENT, WATER POLLUTION, STANDARDS.

MP 870

WASTEWATER REUSE AT LIVERMORE, CALI-FORNIA.

Uiga, A., et al. Annual Cornell Agricultural Waste Management Conference, 8th, Rochester, N.Y., April 28-30, 1976. Proceedings, Ann Arbor, Mich., Ann Arbor Science Publishers, 1976, p.511-531, 24 refs. Iskandar, I.K., McKim, H.L. 31-1493

WATER TREATMENT, WASTE DISPOSAL, SOIL CHEMISTRY.

MP 871

ANALYSIS OF WATER FLOW IN DRY SNOW. Colbeck, S.C., June 1976, 12(3), p.523-527, 12 refs. 31-2958

SNOW PERMEABILITY, WATER RETENTION, WATER FLOW, SNOW THERMAL PROPERTIES, SNOW WATER CONTENT, METAMORPHISM (SNOW), WET SNOW, SNOW HYDROLOGY.

The equations describing water movement in a dry snow cover are derived, and examples of flow through ripe, refrozen, and fresh snows are given. The grain size of snow has a large effect on the timing of water discharge. Water is retained by dry snow to raise its temperature and satisfy the irreducible water saturation. These requirements delay and reduce runoff following rain on dry snow.

MP 872

RED AND NEAR-INFRARED SPECTRAL RE-

FLECTANCE OF SNOW.
O'Brien, H.W., et al, Operational Applications of Satellite Snowcover Observations. The proceedings of a workshop held Aug. 18-20, 1975, Waystation, South Lake Tahoe, Calif, ed. by A. Rango, Washington, D.C., National Aeronautics and Space Administration, 1975, p. 345-360, For the same article from a different source see 29-4002. 3 refs.

Munis, R.H. 30-3521

SNOW OPTICS, SNOW COVER DISTRIBUTION, REFLECTIVITY, INFRARED SPECTROSCOPY.

MP 873 USA CRREL SHALLOW DRILL.

Rand, J.H., Ice core drilling, edited by J.F. Splettst-oesser, Lincoln, University of Nebraska Press, 1976, p 133-137, 1 ref. 30-3485

ICE CORING DRILLS, DRILLING, FIRN

ICE CORING DRILLS, DRILLING, FIRN

The USA CRREL shallow drill is an electroniechanical device designed for continuous conng in firm and ice to a depth of 100 m. The drill bores a 14-cm-diameter hole while obtaining a core 10 cm in diameter at a penetration rate up to 1 m/min in -20C ice. The cultings are transported by spiral brush auger flights to a container above the corestorage section. The core and cultings are removed from the drill after each 1 m run. Additional components

include: 100 m of a seven-conductor electromechanical cable, a 6.8-m tower, a hoist which is ski-mounted, and a three-phase 220-V AC gasoline generator. All the equipment has been designed to be transported in a Twin Otter ski-equipped plane and assembled and operated by two men. The total weight of the drill and associated components is 818 kg. The minimum estimated time required to drill 100 m and retrieve core is 15 hours. Excellent is \$18 kg. The minimum estimated time required to drill 100 m and retrieve core is 15 hours. Excellent core was obtained in a record drilling time of 15 hr from a 100-m hole drilled in early Nov at the South Pole under the new geodesic dome. A second 100-m hole was drilled on the Ross Ice Shelf.

POLAR ICE-CORE STORAGE FACILITY.

Langway, C.C., Jr., Ice core drilling, edited by J.F. Splettstoesser, Lincoln, University of Nebraska Press, 1976, p.71-75, 8 refs.

ICE CORES, COLD STORAGE.

ICE CORES, COLD STORAGE.

The U.S. Army Cold Regions Research and Engineering Laboratory (USA CRREL) has responsibility for the central storage and curatorial activities of the ice cores recovered in the Office of Polar Programs/National Science Foundation (OPP/NSF) Arctic and Antarctic research programs — The main purpose of the central ice-core storage facility is to handle, process, catalog and distribute the ice cores drilled in the polar regions to OPP-approved recipients for glaciological research — Under the agreement with OPP, the ice cores are stored at CRREL, and in a commercial freezer facility at Littletown, N H; a technician handles and catalogs them. A core data bank is maintained for retrieval and information exchange, and starting with the Dye 3 ice core, is being computerzed. The storage facilities are described. Recent developments include a cooperative analysis program between CRREL, the University of Copenhagen, and the University of Bern, a particle analysis lab, a core stratigraphy and logging routine, and a surface pit/ice-core correlation and logging routine, and a surface pit/ice-core correlation

MP 875 HOVERCRAFT GROUND CONTACT DIREC-TIONAL CONTROL DEVICES.

Abele, G., International Hovering Craft, Hydrofoil and Advanced Transit Systems Conference, 2nd, Amsterdam, May 17-20, 1976. Proceedings, London, Kalerglic Publications, 1976, p.51-59, 6 refs.

ALL TERRAIN VEHICLES, AIR CUSHION VEHI-CLES, VEHICLE WHEELS, ENVIRONMENTAL IMPACT, TUNDRA TERRAIN, IMPACT.

IMPACI, IDDDRA IERRAIN, IMPACIT.

The maneuverability of a hovercraft can become a serious operational problem where the craft's travel route is restricted by obstacles or requires close-quarter turns, and during travel on slopes and in crosswind conditions. While improvement and perfection of serodynamic methods may be a more desirable approach, there is a practical limit to there methods, and the use of ground contact devices requires consideration to provide more positive directional control. Wheels deserve special attention and therefore are analyzed in more details. and the use of ground contact devices requires consideration to provide more positive directional control. Wheels deserve special attention, and therefore are analyzed in more detail because of their obvious application on a variety of land terrains. Brake rods and harrows are more suitable on water, ice and snow. The saucer would cause the least ecological impact on fragilic organic terrains such as tundra. The use of controlled ground contact with skirt sections having retractable rollers or special wearing surfaces may represent the least significant change to the basic design of the craft or its components. The relative directional stability is evaluated in terms of the total yawing moments produced by a variety of wheel arrangements (single, dual, tandem), location on the craft, and operational modes (free-rolling, braked, or a combination of the two). The available moments are plotted against the yaw angle of the craft to determine the most effective operational mode with a particular which arrangement for any yaw condition. The analysis is limited to retractable devices which act as moment-producing brakes or rollers and do not serve as either propulsion or load support aids. load support aids.

SPREA OF CETYL-1-C14 ALCOHOL ON A

MELTING SNOW SURFACE.
Meiman, JR, et al, Sep 1966, 11(3), p 5-8, 3 refs
Microform No. SIP 25051.
Slaughter, C.W.

31-3141 SNOW SURFACE, SNOW PERMEABILITY, SNOW MELTING, DISTRIBUTION, SNOW EVAPORATION.

EVAPORATION.

The primary objective of the study was to gain information on the rate of spread of cetyl alcohol on a melting snow surface. Point applications of radioactive cetyl-1-Cl4 alcohol were placed on the surface of snow contained in cubical wooden boxes 25 cm on each side. The boxes with snow were placed in a controlled environment of 2C and with a relative humidity of 25%. Under the study conditions, cetyl alcohol spread as far as 10 cm within 1 hr and 15 min. Patribution of the alcohol over the surface was highly variable. (Auth.)

MP 878

FIRE IN THE NORTHERN ENVIRONMENT-A SYMPOSIUM.

Slaughter, C.W., ed, Portland, Oregon, U.S. Pacific Northwest Forest and Range Experiment Station, 1971, 275p., Numerous refs. passim.

Barney, R.J., ed, Hansen, G.M., ed. 26-2733

FOREST FIRES, FIRES, ENVIRONMENTAL IM-PACT, PERMAFROST, TAIGA.

Comprised of 21 papers on fire, its control and effects on the Alaska environment.

MP 879

FLOATING ICE.

ON THE DETERMINATION OF HORIZONTAL FORCES A FLOATING ICE PLATE EXERTS ON A STRUCTURE.

Kerr, A.D., 1978, 20(82), p.123-134, 26 refs.

32-4451 PRESSURE, ICE LOADS, ICE COVER STRENGTH, STRUCTURES, LOADS (FORCES),

FLOATING ICE.

At first, the general approach for calculating the horizontal forces an ice cover exerts on structures is discussed. Ice-force determination consists of two parts: (1) the analysis of the in-plane forces, assuming that the ice cover remains intact; and (2) the use of a failure criterion, because an ice force cannot be larger than the force capable of breaking up the ice cover. For an estimate of the largest ice force an elastic plate analysis and a failure criterion are often sufficient. A review of the literature revealed that in the majority of the analyses, it is assumed that the failure load is directly related to a "crushing strength" of the ice cover. Observations in the field and tests in the laboratory show, however, that in some instances the ice cover failed by buckling. Subsequently, the ice-force analyses based on the buckling failure mechanism are reviewed, and their shortcomings are pointed out. A new method of analysis, which is based on the buckling of a floating ice wedge, is then presented.

MP 880 TUNDRA BIOME APPLIES NEW LOOK TO ECOLOGICAL PROBLEMS IN ALASKA.

Brown, J., Summer 1970, 2(2), p.9.

ECOSYSTEMS, ENVIRONMENTS, TUNDRA BIOME, ENVIRONMENTAL PROTECTION, RESEARCH PROJECTS, ARCTIC REGIONS, UNIT-ED STATES—ALASKA.

MP 981

is then presented.

TUNDRA BIOME PROGRAM. Brown, J., Feb.27, 1970, Vol.167, p.1278.

31.4049

ECOSYSTEMS, ENVIRONMENTS, TUNDRA BI-OME, RESEARCH PROJECTS. MP 882

HEAT TRANSFER BETWEEN A FREE WATER JET AND AN ICE BLOCK HELD NORMAL TO

Y.-C., Jul/Aug. 1976, 3(4), p.299-307, 2 refs. 31-242

HEAT TRANSFER COEFFICIENT, ICE MELT-ING, HYDRAULIC JETS, NOZZLES.

MP 883 GENERATION OF RUNOFF FROM SUBARC-TIC SNOWPACKS.

Dunne, T., et al. Aug. 1976, 12(4), P.677-685, 13 refs. Price, A.G., Colbeck, S.C.

SNOW COVER, RUNOFF, MODELS, CANADA— LABRADOR.

A physically based model of the movement of water through snowpacks was used to calculate hydrographs generated by durnal waves of snowmelt on the tundra and in the boreal forest of subarctic Labrador in the model was tested against measured hydrographs from hillside plots that sampled a range of aspect, gradient and length, vegetative cover, and snow depth and density. The model yielded good results, particularly in the prediction of peak runoff sates, though there was a slight overestimate of the lag time. A comparison of predictions with field measurements indicated that given the ranges ever which each of the controls is likely to say, the two most critical factors controlling the hydrograph are the snow depth and the melt rate, which must be predicted precisely for short time intervals. Permeability of the snowpack is another important control, but it can be estimated closely from published values.

MP 884 A physically based model of the movement of water through

MP 884 BEARING CAPACITY OF FLOATING ICE PLATES SUBJECTED TO STATIC OR QUASI-STATIC LOADS.

Kerr, A.D., 1976, 17(76), p.229-268. Bibliography p. 263-268. In English with French and German summaries.

FLOATING ICE, BEARING STRENGTH, STATIC LOADS, BIBLIOGRAPHIES.

This paper contains a critical survey of the literature on the bearing capacity of floating ice plates—It consists

of a discussion of general questions, a critical survey of analytical attempts to determine the bearing capacity of floating ice plates and a survey of field and laboratory tests on floating ice plates and their relation to the analytical results. It concludes with a systematic summary of the results, a discussion of observed shortcomings, and suggestions for needed investigations

MP 885

SUBSURFACE EXPLORATIONS IN PERMA-FROST AREAS.

Cass, J.R., Jr., Oct. 1959, 85(SM5), p.31-41, See also SIP-17852. Discussion by H.W. Stevens and W.P. Verville, Ibid., June 1960, 86(SM3), p 63-67. 10 refs. Stevens, H.W., Verville, W.P.

PERM'SFROST SAMPLERS, SUBSURFACE INVELTIGATIONS, CORE SAMPLERS, FROZEN GROUND, DRILLING.

Soil sampling techniques used in two subsurface investigation programs undertaken in the Arctic are described and compared Since the methods used were only partially successful in recovering samples for field testing, recommendations are made for the development of boring procedures which should prove to be more satisfactory

MP 886

PORTABLE INSTRUMENT FOR DETERMINING SNOW CHARACTERISTICS RELATED TO TRAFFICABILITY.

Parrott, W.H., et al, International Conference on Terrain-Vehicle Systems, 4th, Stockholm, April 24-28, 1972. Proceedings. Vol 2, Stockholm, Sweden, 1972. Proceedings. 1972, p.193-204, 7 refs. Ucda, H.T., Abele, G.

31-1796 SNOW STRENGTH. SNOW COVER STABILITY, MEASURING INSTRUMENTS, TRAFFICABILI-TY. SHEAR PROPERTIES.

TY, SHEAR PROPERTIES.

A new portable one-rian operated instrument was developed to simplify the inerturing of snow properties required for evaluating the trafficability of a snow cover and to predict while performance. The 16-16 instrument with interchangeable plates of various sizes is capable of providing data for computing the vertical strength parameters n and k and the horizontal strength parameters c and / The vertical load is applied manually, the predetermined contact pressures are indicated by a system of signal lights connected to a force control switch type force gage, the manually (push-button) activated torque motor for the shear test is driven by a 12-volt battery. A second man is needed to record sinkage and torque data during the test

MP 887 SOME EFFECTS OF AIR CUSHION VEHICLE OPERATIONS ON DEEP SNOW.

OPERATIONS ON SEEP SNOW.
Abele, G., et al. International Conference on Terrain-Vehicle Systems, 4th, Stockholm, April 24-28, 1972.
Proceedings Vol 2. Stockholm, Sweden, 1972, Proceedings Vop.214-241, 2 refs. Parrott, W H

31-1708

AIR CUSHION VEHICLES, SNOW DEPTH, ERO-SION, SURFACE PROPERTIES, TESTS

SION, SURFACE PROPERTIES, TESTS
Travel with an SK-5 ACV over soft snow results in surface deformation/erosion of a few inches, caused primarily by rear skirt drag, on windswept snow only scratches can be seen. During hovering on soft snow, deformation below the cushion chamber usually does not exceed a few inches. The action of the air flow (escape velocity 70 to 120 ft/sec) produces a 1-ft ditch below the peripheral skirt in less than a minute, thereafter the extent of crossion does not increase appreciably during continued hovering. A partial seal between the inner face of the skirt (above fingers) and the snow surface may easit, arresting further settling of the tween the inner face of the skirt (above lingers) and the schicle. Relatively cobesivelayers of snow surface may exist, arresting, further settling of the schicle. Relatively cobesivelayers of snow such as windslabs and crusts are not eroded. A level snow cover, regardless of how deep or soft, does not appear to be capble of immobilizing an ACV of this and larger size. Some operational problems and their degree of severity, such as visibility, snow accumulation and addresson to vehicle skirt drag, effect of terrain surface porosity and presence of vegetation, are also discussed.

ICE REMOVAL FROM THE WALLS OF NAVI-GATION LOCKS.

Frankenstein, G E., et al, Symposium on Inland Waters for Navigation, Flood Control and Water Diversions, Colorado State University, August 10-12, 1976. Proceedings, 1976, p.1487-1496, 4 refs. Wuebben, J.L., Jellinek, H.H.G., Yokota, R.

31-1800

ICE REMOVAL, WALLS, CHANNELS (WATER-WAYS), ICE PREVENTION PROTECTIVE COATINGS, ICE NAVIGATION, ICE ADHE-SION, DEICING.

MP 889

20-YR OSCILLATION IN EASTERN NORTH AMERICAN TEMPERATURE RECORDS. Mock, S.J., et al. June 10, 1976, 261(5560), p 484-486.

Hibler W.D. III

AIR TEMPERATURE, PERIODIC VARIATIONS, SOLAR ACTIVITY, METEOROLOGICAL DATA

MP 890 APPLICATIONS OF THERMAL ANALYSIS TO COLD REGIONS.

Sterrett, K.F., Roundtable Discussion on Thermal Analysis Techniques, Cincinnati, Ohio, June 1976. roceedings, 1976, p.167-181, 15 refs. 31-1802

THERMAL ANALYSIS, FROZEN GROUND PHYSICS, UNFROZEN WATER CONTENT, CLAY MINERALS, ICE WATER INTERFACE, LOW TEMPERATURE TESTS.

The author discusses the low temperature behavior samples of frozen soils taken from the dry valleys of Antarctica. The samples were composed of various clay minerals and had varying water contents. It is demonstrated that some of the water remains unfrozen and that there is a dependency between the unfrozer portion and the surface area of the sample. It was pointed out that problems arising from the unfrozer water content of soils are of great interest to CRREL researchers as is the analysis of ice cores from Greenland and Antarctica as a technique for establishing past climates and in predicting future climates.

MP 891
OVERVIEW OF LAND TREATMENT FROM
CASE STUDIES OF EXISTING SYSTEMS.
Uiga, A, ct al, Hanover, N H, U.S. Army Cold Re-

gions Research and Engineering Laboratory, 1976, 26p. Presented at the 49th Annual Water Pollution Control Federation Conference, Minneapolis, Minnesota, 4-8 October 1976. 16 refs.
Sletten, R.S.

31-1803

WASTE TREATMENT, WATER TREATMENT, WATER POLLUTION, SOIL CHEMISTRY, COST ANALYSIS, CLIMATIC FACTORS

ANALYSIS, CLIMATIC FACTORS
Wastewater treatment by land application is described for sites at Calumet, Michigan (88 years), Quincy, Washington (20 years), Manteca. California (11 years), and Livermore, California (8 years) — All sites meet on an average the USPHS drinking water limit of 10 mg/l for NO3-N Preapplication treatments vary for the site. Calumet, undisinfected, not treatment; Quincy, undisinfected, primary treatment; Manteca, undisinfected, secondary treatment. The preapplication treatment and total operation and maintenance costs are 3c/1000 gallons for Calumet, 20c/1000 gallons for Quincy, 27c/1000 gallons for Manteca, 35c/1000 gallons for Usermore Although minor individual site problems are discussed and solutions presented, the authors conclude that land application offers year round treatment alternatives within variable clioffers year round treatment alternatives within variable cli-

MP 892

LIFE-CYCLE COST EFFECTIVENESS OF MODULAR MEGASTRUCTURES IN COLD RE-GIONS. Wang, LR-L, et al, International Symposium on

Housing Problems, Atlanta, Georgia, May 24-28, 1976, 1976, p.760-776, 7 refs Tobiasson, W.

31-1804

RESIDENTIAL BUILDINGS, COLD WEATHER CONSTRUCTION. CONSTRUCTION COSTS, ARCTIC CLIMATE, WINTER MAINTENANCE, STRUCTURES

MP 893 ICE ENGINEERING COMPLEX ADOPTS HEAT PUMP ENERGY SYSTEM. Aamot, H.W.C., Jan 19'7, 14(1), p 25-26. Comments

HEAT RECOVERY, HEATING, COOLING SYSTEMS, HEAT TRANSPER, TRANSPER HEAT ING, PUMPS

MP 894

ARCTIC TRANSPORTATION: OPERATIONAL AND ENVIRONMENTAL EVALUATION OF AN CUSHION VEHICLE IN NORTHERN ALASKA.

ALASKA.
Abele, G., et al, American Society of Mechanical Engineers, 1976, 7p., Presented at the Petroleum Mechanical Engineering and Pressure Vessels and Piping Conference, Mexico City, Mexico, September 19-24, 1976. Paper No.76-Pet-41. 8 refs.

31-1845

AIR CUSHION VEHICLES, TRAFFICABILITY, COST ANALYSIS, ENVIRONMENTAL IMPACT, REVEGETATION, ARCTIC TERRAIN, TESTS.

Traffic tests conducted near Barrow, Alaska with a 7-ton SK-5 Air Cushion Vehicle have shown that these types of vehicles can provide year-round high-speed transport capability over a variety of relatively level, low strength terrains. The ecological impact of ACV traffic over easily degradable. tundra terrains is not nearly as significant as that of wheeled or tracked vehicle traffic

MP 895

CIRCULATION AND SEDIMENT DISTRIBU-TION IN COOK INLET, ALASKA. Gatto, L.W., 1976, No.4, Assessment of the Arctic

marine environment, edited by D.W. Hood, D.C. Burrell, and E Kelley. Based on a symposium held in conjunction with Third International Conference on Port and Ocean Engineering Under Arctic Conditions, POAC-75, held in Fairbanks, Alaska, Aug. 11-15, 1975., p.205-227, 18 refs.

SI-1935
SEDIMENT TRANSPORT, WATER FLOW, SEA ICE DISTRIBUTION, SPACEBORNE PHOTOGRAPHY, OCEAN CURRENTS, UNITED STATES—ALASKA—COOK INLET

—ALASKA—COOK INLET

The purpose of this investigation was to analyze surface inculation, suspended sediment distribution, water-type migration, and tidal flushing mechanisms, utilizing medium and high altitude aircraft and repetitive synoptic satellite imagery with corroborative ground truth data—LANDSAT-1 and -2 and NOAA-2 and -3 imagery provided observations of surface currents, water type migrations and sediment and sea ice distributions during different seasons and tides.

ASA NP-3A and U-2 aircraft multispectral imagery was used to analyze coastal processes, i.e., currents and sediment dispersion in selected areas.—Ground truth data were utilized in the interpretation of the aircraft and satellite imagery and verified many of the regional circulation patterns inferred from the suspended sediment patterns apparent on the imagery Several local circulation patterns not previously reported were identified.

MP 896
RECLAMATION OF WASTEWATER BY AP-PLICATION ON LAND.

Iskandar, I.K. et al. Hanover, N.H. U.S. Army Cold Regions Research and Engineering Laboratory, 1976, 15p., Presented at the U.S. Army Science Conference, Research Tri ngle Park, North Carolina, June 1976. 23 refs.

Leggett, D.C

WASTE TREATMENT, WATER TREATMENT, WATER CHEMISTRY, SEEPAGE, SOIL CHEMISTRY, WASTE DISPOSAL

TRY, WASTE DISPOSAL.

The capacity of a slow infiltration land treatment system to removate wastewater in cold regions was investigated using six outdoor test cells. The principal mechanisms for nitrogen removal were found to be plant uptake and dentirification, in the surface soil tayer, heavy metals were removed by softword or precipitation in the top few centimeters of soil. Nitrogen removal was found to be seasonally dependent, the greatest losses occurring in the spring and summer and the least during fall and winter. This was due to the absence of plant uptake during winter and the effect of temperature on the conversion of ammonium to nitrate nitrogen nutrification), which caused significant amounts of NH4 to temperature on the conversion of ammonium to nitrate nitrogen finitification), which caused significant amounts of NH4 to be stored during winter and released in spring, giving rise to a period of high NO3 concentration in the leachate Application of 15 cm week of secendary effluent to study from son resulted in diminished water quality (>10 mg. 1 of nitrate-N) during most of the year. With the exception of this heavy treatment experiment heavy metals and phosphonius were confined to the top 15 cm of the soil. Application of effluents containing ppin levels of heavy metals on all of other water quality parameters (organic-C, BOD), suspended soils, leval coliform) renovation of the wastewater was exentially complete.

MP 897 DEVELOPMENT OF A REMOTE-READING TENSIOMETER/TRANSDUCER SYSTEM FOR USE IN SUBFREEZING TEMPERATURES.

McKim, H.L., et al. Conference on Soil-Water Problems in Cold Regions, 2nd, Edmonton, Sep. 1976, Proceedings, 1976, p.31-45, 18 refs.

Berg, R.L., McGaw, R., Atkins, R.T., Ingersoll, J.

SOIL WATER, VAPOR PRESSURE, MEASURING INSTRUMENTS, SOIL FREEZING, FREEZE THAW TESTS, REMOTE SENSING.

MP 898

GALERKIN FINITE ELEMENT ANALOG OF FROST HEAVE.

Guymon, G.L., et al, Conference on Soil-Water Prob-lems in Cold Regions, 2nd, Edmonton, Sep. 1976, Proceedings, 1976, p.111-113, 3 refs.

Berg, R.L. 31-1911

FROST HEAVE, MATHEMATICAL MODELS.

MP 899

SIMPLE PROCEDURE TO CALCULATE THE VOLUME OF WATER REMAINING UNFROZ-EN IN A FREEZING SOIL.

McGaw, R., et al, Conference on Soil-Water Problems in Cold Regions, 2nd, Edmonton, Sep. 1976, Proceedings, 1976, p.114-122, 6 refs.

Tice. A.R 31-1912

FROZEN GROUND PHYSICS, SOIL FREEZING, UNFROZEN WATER CONTENT.

MP 900

SEASONAL VARIATIONS IN APPARENT SEA ICE VISCOSITY ON THE GEOPHYSICAL SCALE.

Hibler, W.D., III, et al, Feb. 1977, 4(2), p.87-90, 12

Tucker, W.B. 31-3240

SEA ICE, VISCOSITY, DRIFT, ICE GROWTH, ICE PHYSICS, VISCOUS FLOW, SEASONAL VARIA-

Using available atmospheric pressure and ocean current data Using available atmospheric pressure and ocean current data and estimating non-local stress transferral through the ice cover by employing a viscous drift model in the infinite boundary limit, predicted drift rates for one Russian and two US drifting stations are made over the time period May 1962 to April 1964. The viscosity values giving the best fit between observed and predicted values show a pronounced winter increase that correlates well with the ice growth rate. Phiscally this suggests that ice drift rates (for a given wind field) tend to decrease in winter because of increased stress transferral through the ice cover. An empirical linear relationship between viscosity and ice growth rate is derived which yields predictions in reasonable agreement with both long (yearly) and short term (monthly) observed drift rates.

MP 901

SEGREGATION-FREEZING TEMPERATURE AS THE CAUSE OF SUCTION FORCE.

Takagi, S., International Symposium on Frost Action in Soils, Lulea, Sweden, Feb. 1977. Proceedings, Vol.1, University of Lulea, 1977, p.59-66, 17 refs. 31-2067

GROUND ICE, ICE LENSES, SOIL WATER MI-GRATION, FROZEN GROUND THERMODY-NAMICS, SOIL PRESSURE

A new freezing mechanism, called segregation freezing, is A new iterang mechanism, called segregation receing, is proposed, to explain the generation of the suction force that draws pore water up to the freezing surface of a growing ice lens. The segregation-freezing temperature is derived by applying thermodynamics to soil mechanics concept that distinguishes the mechanically effective pressure from the mechanically neutral pressure. The frost-heaving pressure appears in the solution of the differential equations for the simultaneous flow of heat and water, of which the segregation-freezing temperature is one of the boundary conditions

MP 902

PERIODIC STRUCTURE OF NEW HAMP-SHIRE SILT IN OPEN-SYSTEM FREEZING.

McGaw, R., International Symposium on Frost Action in Soils, Lulea, Sweden, Feb. 1977 Proceedings, Vol 1, University of Lulea, 1977, p 129-136, 2 refs.

SOIL FREEZING, SOIL STRUCTURE, WATER TABLE, GROUND ICE.

The periodic frozen structure of a glacially-deposited silt The periodic froren structure of a glacially-deposited silt soal is analyzed using a metric grouping of sizes. Four specimens were frozen simultaneously in open-system freezing with initial water tables ranging from 15 cm (6 in). It is not 105 cm (42 in). Rate of freezing varied from near zero to 0.80 mm/hr. Measurements on the average thekness of individual toe layers and residual soil layers are tabulated and graphed for each specimen, with water-table depth and rate-of-freezing as independent variables. The data show that the ice-layer thickness decreases continuously with freezing ing rate for each of the four water-table depths. The maximum ice-layer thickness (45 mm) occurred with the highest water table and the slowest freezing. In contrast, the residual soil layer develops a maximum thickness thickness for this soil in the 0.30 to 0.40 mm/hr range of freezing rates. The peak value (2.5 mm) occurred with water table depths of 45 cm (18 in) and 75 cm (30 in). In addition, the two specimens with the highest water tables developed a more recorders each at very layer than the freeze of freeze for the state of a major secondary peak at very slow rates of freezing (less than 0.10 mm/hr), giving evidence of a separate mode of

MP 903

CARBON DIOXIDE DYNAMICS ON THE ARC-TIC TUNDRA.

Covne, P.I., et al. International Biological Program Tundra Biome. Structure and function of the tundra ecosystem. Vol.1, Progress report and proposal abecosystem. stracts. 1971, p.48-52.

31-2097

TUNDRA VEGETATION, CARBON DIOXIDE, SNOW COVER EFFECT.

SEASONAL CYCLES AND RELATIVE LEVELS OF ORGANIC PLANT NUTRIENTS UNDER ARCTIC AND ALPINE CONDITIONS.

McCown, B.H., et al, International Biological Program. Tundra Biome. Structure and function of the tundra ecosystem. Vol.1, Progress report and proposal abstracts 1971, p.55-57.

Tieszen, L.L.

TUNDRA VEGETATION, SEASONAL VARIA-TIONS, PLANT PHYSIOLOGY.

ECOLOGICAL EFFECTS OF OIL SPILLS AND SEEPAGES IN COLD-DOMINATED ENVIRON-MENTS.

McCown, B.H., et al, International Biological Program. Tundra Biome. Structure and function of the tundra ecosystem. Vol. 1, Progress report and proposal abstracts. 1971, p.61-65.

Brown, J., Tieszen, L.L. 31-2101

TUNDRA SOILS, TUNDRA VEGETATION, OIL SPILLS, DAMAGE, ENVIRONMENTAL IM-PACT.

ABIOTIC OVERVIEW.
Weller, G., et al, International Biological Program. Tundra Biome. Structure and function of the tundra coopystem. Vol 1, Progress report and proposal abstracts. 1971, p 173-181.

31-2114

RESEARCH PROJECTS, TUNDRA, MICRO-CLIMATOLOGY, SOIL TEMPERATURE, MOD-ELS, BOUNDARY LAYER, SNOW COVER EF-FECT, VEGETATION PATTERNS.

MP 907

PREDICTION AND VALIDATION OF TEMPER-

ATURE IN TUNDRA SOILS.

Brown, J, et al, International Biological Program
Tundra Biome Structure and function of the tundra Structure and function of the tundra ecosystem Vol 1, Progr stracts, 1971, p.193-197. Vol 1, Progress report and proposal ab-

Nakano, Y. 31-2116

TUNDRA SOILS, SOIL TEMPERATURE, THAW DEPTH, IATHEMATICAL MODELS, FORE-CASTING.

TRACE GAS ANALYSIS OF ARCTIC AND SUBARCTIC ATMOSPHERE.

Murrmann, R.P. International Biological Program Tundra Biome Structure and function of the tundra Tundra Biome Structure and function of the tundra ecosystem Vol 1, Progress report and proposal abstracts. 1971, p 199-203 ecosystem

31-2118

ATMOSPHERIC COMPOSITION, GASES,

U.S. TUNDRA BIOME CENTRAL PROGRAM 1971 PROGRESS REPORT.

Brown, J. International Biological Program. Tundra Biome Structure and function of the summer tem Vol 1. Progress report and proposal abstracts Structure and function of the tundra ecosystem Vol 1, 11, 1971, p 244-270

RESEARCH PROJECTS

SEA ICE CONDITIONS IN THE ARCTIC.

Weeks, W F, Dec. 1976, No.34, p.173-205, Includes, as Appendix 1, a section on Ice Terminology. 24 refs.

ICE CONDITIONS, SEASONAL VARIATIONS, TERMINOLOGY, ICE PHYSICS, DRIFT.

MP 911

PROCEEDINGS.

Colloquium on Water in Planetary Regoliths, Hanover, N.H., October 5-7, 1976, Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, 1977, 161p., Refs. passim. For selected papers see 31-2494 through 31-2511.

EXTRATERRESTRIAL ICE, PERMAFROST HY-DROLOGY, SOIL WATER, ICE SPECTROS-COPY.

MP 912

MARS SOIL-WATER ANALYZER: INSTRU-MENT DESCRIPTION AND STATUS.

Anderson, D.M., et al, Colloquium on Water in Plane-tary Regoliths, Hanover, N.H., Oct 5-7, 1976. Pro-ceedings, Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, 1977, p.149-

Stephens, J.B., Fanale, F P., Tice, A.R.

MARS (PLANET), SOIL WATER, EXTRATERRE-STRIAL ICE, PERMAFROST HYDROLOGY, MEASURING INSTRUMENTS, RADIOMETRY, PERMAFROST SAMPLERS.

MP 913

APPLICATIONS OF REMOTE SENSING FOR CORPS OF ENGINEERS PROGRAMS IN NEW ENGLAND.

McKim, H L., et al, International Symposium on Remote Sensing of Environment, 10th, Ann Arbor, Oct. 6-10, 1975, Ann Arbor, Environmental Research Institute of Michigan, 1975, 8p. + 14 figs. and tables, 8 refs.

Merry, C.J., Cooper, S., Anderson, D.M., Gatto, L.W.

31-3652
REMOTE SENSING. AERIAL SURVEYS, SPACE-BORNE PHOTOGRAPHY, ENVIRONMENTS, UNITED STATES—NEW ENGLAND.

BORNE PHOTOGRAPHT, ENVIRONMENTAL, UNITED STATES—NEW ENGLAND.

The utility of satellite, high altitude and low altitude aerial imagery is presently being critically evaluated by the Corps of Engineers. The most significant contribution to date has been to increase confidence limits by more accurately estimating parameters used in models. Within the last three years several new cooperative remote sensing programs addressing environmental and hydrologic problems have been implemented. The objectives of these programs were to determine the availability, type, scale and resolution required and to show how remote sensing methods can be utilized to augment or update conventional procedures. Imagery from LANDSAT mission provided valuable information for site evaluation, definition of geologic lineations and monitoring snow and ice accumulation and ablation. The Skylab program has defined the detail of land use mapping that can be accomplished from the \$190A and \$190B photography. Low altitude aircraft photography (scale 133,600) was used to determine the location of materials at a potential dam construction site which could allow a large cost saving for transportation of material as compared to original design estimates. In another program, the effect of inundation at six New Engl-ind flood control reservoirs was investigated. The extent and severity of tree damage were mapped and analyzed statistically. These results will be used by the The extent and severity of tree damage were mapped and analyzed statistically These results will be used by the Corps in the reservoir management program

MP 914 EVALUATION AND RECOMMENDATIONS FOR SNOWDRIFT CONTROL AT FAA ILS FACILITIES, BARROW AND DEADHORSE, ALASKA, FINAL REPORT.

Calkins, D.J., Sep. 1976, FAA-NA-76-165, 41p., ADA-030 401.

SNOWDRIFTS, SNOW FENCES, UNITED STATES—ALASKA—BARROW, UNITED STATES—ALASKA—DEADHORSE.

STATES- ALASKA—DEADHORSE.

The easting snowdrifting conditions are described at the Barrow and Deadhorse airfields and recommendations made for minimizing the drifting snow at the ILS facilities. The problem of drifting snow at the localiter and glide slope facilities was a result of the structures themselves creating drifts and causing outages. The most economical method of eliminating the problem at the glide slope was relocation of the instrument shelters such that they are not in line with the antenna masts and the prevailing wind direction. The localizer snowdrifts were caused by the bulkiness of the supporting structure carrying the antenna, although it is elevated on piles severe turbulence develops behind the structure and the snow deposits. Wooden snowlences, 10 ft high, in parallel rows 200 ft apart vill control the snow during an average snow year. Meles studies of each alternative method were carried out to validate the various proposals. (Auth.)

MP 915

APOR PRESSURE OF 2,4,6-TRINITROTOL-UENE BY A GAS CHROMATOGRAPHIC HEADSPACE TECHNIQUE.

eggett, D.C. 1977, Vol.133, p.83-90, 23 refs.

VAPOR PRESSURE, GAS CHROMATOGRAPHY, TRINITROTOLUENE.

TRINITROTOLUENE.

The vapor pressure of 2,4,6-trinitrotoluene was determined by a gas chromatographic headspace technique. The vapor pressure from 12-40C was derived from the experimental data using the ideal gas law and then compared to extrapolations of literature data obtained by the Knudsen effusion technique. Excellent agreement was obtained. Advantages of the chromatographic headspace method over the effusion method were: (1) scrupulous purity was found to be unnecessary since volatile impurities were chromatographically separated fr in the compound of interest, (2) the method was highly sensitive using an electron capture detector, and (3) the method was experimentally simple, requiring materials that are readily available, 1 e., a gas chromatograph, a temperature bath, a few septum-capped bottles, and gas-tight syringes.

ON THE ORIGIN OF PINGOS—A COMMENT. Mackay, J.R., 1976, Vol.30, p 295-298, Comment to H. Ryckborst's paper (see 31-2549). 10 refs. 31-2679

PINGOS, GROUND ICE, SOIL WATER, SUBSUR-FACE STRUCTURES, ACTIVE LAYER, PERMA-FROST HYDROLOGY, ICE LENSES, ORIGIN

HIGH-LATITUDE BASINS AS SETTINGS FOR CIRCUMPOLAR ENVIRONMENTAL STUDIES. Slaughter, C.W., et al, Circumpolar Conference on Northern Ecology, Ottawa, Sep. 15-18, 1975. Pro-ceedings, Ottawa, National Research Council, Cana-da, 1975, p.IV/57-IV/68, 48 refs., In English with French summary. Santeford, H.S.

31-2564

RESEARCH PROJECTS, WATERSHEDS, ENVI-RONMENTS, INTERNATIONAL COOPERA-TION

RONMENTS, INTERNATIONAL COOPERATION.

Much environmental research (both small scale and large)
may logically be conducted within the larger context of
entire drainage basins—Research Watersheds. These are
catchments which represent major environmental settings (e.g.,
Arctic tundra, substrict taiga) and are specifically dedicated
to research. The hydrologic cycle of a complete catchment
considered from precipitation through basin yield provides
a functional and conceptual base for considering mass, nutrent,
and energy transfer questions relevant to ecosystem functioning. With proper planning and execution, advantages to
be gained may include economy of effort, better cooperation
between disciplines, improved application of results to realworld problems, and enhanced potential for comparative studies among circumpolar settings. In high latitudes, where
climate, transportation and logistics, available scientific manpower, and lack of good background data often combine
to render research both difficult and expensive, increased
efficiency through integration of complementary biological
and physical studies is especially attractive. In 197475 a start was made toward such a circumpolar program
Through the International Hydrological Decade (HHD), initial
meetings of Swedish, Canadian, and US scientists have
considered objectives of facilitating communication and data
exchange, and ultimately improving understanding of hydrologic functioning in high-latitude environments. In Alaska
the 104-sq-km Canbou-Poker Creeks Research Watershed
provides one example of multi-disciplinary, multi-agency research into environmental and hydrological behaviour of
subarctic uplands, with provision for physical and biological
investigations and experimentation. Similar circumpolar
efforts should prove useful in a wide variety of disciplinespecific and integrated scientific efforts.

MP 918

SEA ICE PROPERTIES AND CECMETTIV.

SEA ICE PROPERTIES AND GEOMETRY.

Weeks, W.F., Dec. 1976, No.34, p.137-171, Refs p.167-171. 31-2290

SEA ICE, ICE MECHANICS, ICE PHYSICS, ICE STRENGTH, ICE COVER THICKNESS, PRES-SURE RIDGES

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al., Environmental assessment of the Alaskan Continental Shelf Vol 4 Principal inves-tigators' reports July-September 1976, Boulder, Colorado, Environmental Research Laboratories, 1976, p.53-60, 3 refs.
Berg, R.L., Brown, J., Blouin, S.E., Chamberlain, E.J.,

Iskandar, A., Ucda, H.T

31-2621

OFFSHORE DRILLING, DRILL CORE ANALYSIS, ENGINEERING GEOLOGY, SUBSEA PER-MAFROST.

MP 920

LAND TREATMENT OF WASTEWATER—CASE STUDIES OF EXISTING DISPOSAL SYSTEMS AT QUINCY, WASHINGTON AND MANTECA, CALIFORNIA.

Murrmann, R.P., et al, Waste Management Conference, 8th, Rochester, N.Y., April 28-30, 1976. Proceedings, Rochester, N.Y., 1976, 36p., 21 refs.

31-3656

WASTE TREATMENT, WATER TREATMENT. GATION, UNITED STATES—WASHINGTON— QUINCY, UNITED STATES—CALIFORNIA—

MANTECA.

Evaluations of long-term systems for wastewater disposal on land by slow infiltration at Manteca, California, and Quincy, Washington, are presented Factors considered include site history, operational characteristics. Domestic undisinfected wastewater has been applied at these locations by flood irrigation for up to 20 years. At Manteca, forage vegetation (rye grass) has been continuously maintained while at Quincy a crop rotation has been practiced at Quincy has been relatively heavily loaded by application of approximately 15 cm/A (6 in./A) per week while at Manteca an average of only 4 5 cm/A (1.8 in./A) of wastewater has been applied per week. At both sites a control field and two disposal fields were investigated for companson Representative soil samples were collected at intervals to a depth of 150 cm. These were analyzed for about 30 pertinent chemical parameters including total and plant-available heavy metals.

Soil solution samples were collected. pertinent chemical parameters including total and plant-available heavy metals Soil solution samples were collected at 80- and 160-cm depths with suction lysameters. Pretreatment water samples, peripheral drainage water and ground water samples were also collected. All water samples were analyzed in the fields for pH, NH4-N, NO3-N and ortho-P during three periods in 1974.

MP 921

PROPOSED SIZE CLASSIFICATION FOR THE TEXTURE OF FROZEN EARTH MATERIALS. McGaw, R., 1975, 10p., Presented at Les problèmes posés par la gélifraction. Recherches fondamentales et appliquées. Colloque interdisciplanaire, Paris-Le Havre, 23-25 April, 1975. Report No.311. 4 refs. 32-626

FROZEN GROUND, SOIL STRUCTURE, CLASSIFICATIONS, GROUND ICE.

SIFICATIONS, GROUND ICE.
The macroscopic fabric, or texture, of frozen earth materials represents a point-by-point summation of the microscopic nucleation, moisture flow, and heat flow around and between individual mineral particles. As such, frozen texture is intimately related to the basic mechanisms of ice segregation. A study of the details of frozen texture can lead to fundamental new knowledge on the formation and structural effects of segregated ice. A size classification derived from laboratory tests is proposed for the systematic measurement of the characteristic (banded) element of interleaved soil and ice in fine-grained granular materials. Graphs are presented showing the relationship between the frozen texture of New Hampshire. Sitt and measured values of freezing rate as determined by the 0°C isotherm.

MP 922

DYNAMICS OF NEAR-SHORE ICE.

Weeks, W.F., et al. Environmental assessment of the Alaskan Continental Shelf, Vol.4. Principal investigators' reports July-September 1976. Boulder, Colorado, Environmental Research Laboratories, 1976, p 267-275. Kovacs, A.

SEA ICE, REMOTE SENSING, ICE CONDITIONS, RESEARCH PROJECTS

MP 923

INTERESTING FEATURES OF RADAR IMAGE-RY OF ICE-COVERED NORTH SLOPE LAKES. Weeks, W.F., et al, 1977, 18(78), p.129-136, In English with French and German summaries. 15 refs Sellmann, P.V., Campbell, W.J.

LAKE ICE, RADAR PHOTOGRAPHY, ICE WATER INTERFACE, ICE SOLID INTERFACE, ICE SOLID INTERFACE, ICE COVER THICKNESS, REFLECTIVITY, UNITED STATES—ALASKA—NORTH SLOPE Side-looking airborne radar (SLAR) imagery obtained in April-May 1974 from the North Slope of Alaska between Barrow and Harrison Bay indicates that funda lakes can be separated into two classes based on the strength of the radar returns Correlations between the areal patients of the returns, limits ground observations on lake depths and water compositions, and information obtained from LANDSAT imagery strongly suggest that areas of fresh water lakes giving weak returns are frozen completely to the bottom while areas giving strong returns are not. This is a reasonable interpretation inasmuch as the reflection coefficient associated with the high-dielectire-LAKE ICE. RADAR PHOTOGRAPHY. as the reflection coefficient associated with the high-dielectricas the relication coefficient associated with the high-dielectric-contrast to-e-water interface would be roughly twelve times that associated with the low-contrast icc-soil interface. Brackish lakes also give weak returns even when they are not completely frozen. This is the result of the brine present in the lower portion of the ice cover limiting the

penetration of the X-band radiation into the ice. The ability to separate tundra lakes rapidly and easily into these two classes via SLAR should be useful in understanding a wide variety of problems.

MP 924

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan Continental Shelf, Vol 4. Principal investigators' reports October-December 1976. Boulder, Colorado, Environmental Research Laboratories, 1977, p.106-112.
Weeks, W.F.

31-2776

SEA ICE, FAST ICE, ICE MECHANICS, RADAR

ECHOES, LOGISTICS.

PRELIMINARY EVALUATION OF NEW LF RADIOWAVE AND MAGNETIC INDUCTION RESISTIVITY UNITS OVER PERMAFROST TERRAIN.

Sellmann, P.V., et al, June 1977, No 119, Symposium on Permafrost Geophysics, Vancouver, Oct. 12, 1976. Proceedings. p.39-42.

Arcone, S.A., Delaney, A J. 32-2614

MEASURING INSTRUMENTS, ELECTRICAL RESISTIVITY RESISTIVITY, ELECTROMAGNETIC P. PECTING, PERMAFROST DISTRIBUTION.

SNOW AND SNOW COVER IN MILITARY SCIENCE.

Swinzow, G.K., Fuse/Ammunition/Environment Symposium, Picatinny Arsenal, Dover, N.J., 1978, p.1-239-1-262, 26 refs. 32-2679

SNOW COVER EFFECT, MILITARY OPERA-TION, MILITARY EQUIPMENT.

TION, MILITARY EQUIPMENT.

Pertinent properties of a snow cover are thicknesses of individual layers, snow density, hardness, grain sizes and temperatures. A snow cover is subject to constant metamorphism and its occurrence is subject to seasonal and geographic distribution. A snow cover is a serious obstacle for traffic, especially military transportation. As a maternal, snow may be used for shelters, camouflage and fortification. Observations of attenuation of fast projectiles and fragments are reported. It is concluded that snow may be a maternal seriously affecting fuze mechanisms of certain projectiles and may degrade ammunition effects. Cited and recommended literature covers most of the aspects of the role of snow in warfare.

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al, Environmental assessment of the Alaskan Continental Shelf, Vol 4. Principal investigators' reports October-December 1976. Boulder, tigators reports of the Colorado, Environmental Research Laboratories, 1977, p.234-237, 1 ref.
Berg, R.L., Brown, J., Blouin, S.E., Chamberlain, E.J., Iskandar, A., Ueda, H.T.

SEA ICE, SUBSEA PERMAFROST.

MP 928

UTILITY DISTRIBUTION PRACTICES IN NORTHERN EUROPE.

MCFAdden, T., et al, Jan. 1977, EPS 3-WP-77-1, Symposium on Utilities Delivery in Arctic Regions, March 16-18, 1976, Edmonton, Alberta, Canada, p.70-95, Aamot, H.W.C. 31-3076

PIPELINES, PLASTICS, POWER TILITIES. LINE ICING, FROST PROTECTION.

CHETTES, PPELINES, POWER LINE ICING, FROST PROTECTION.

This report represents information on utility distribution systems gathered on a study trip to Scandinavia and Great British and Iceland. The information concerns new technology and materials in cold weather related problems and solutions. The distribution systems involved are water and sewage lines, vacuum sewage and pneumatic solid waste collection lines, heat distribution lines and electrical transmission lines. In Sweden much information was obtained on plastic pipes for water and sewage lines, and frost penetration protection. There are large district heating systems in operation and much information was found on heat distribution pipe systems and long distance heat transmission. In Norway, where almost all electricity is produced by hydroelectic, stations, information was collected on electric transmission line iscing problems and self supporting aerial cables for electrical distribution. A wealth of information was arbitred in London where the water and sewage systems are among the oldest and largest in the world and where some material and methods have a long history of success and other new ones are being introduced. District heating technology is also highly developed in London, but large systems have not yet evolved. Pneumatic solid wastes collection systems are being introduced. systems have not yet evolved. Pricum collection systems are being introduced

MP 929 PREEZE DAMAGE PREVENTION IN UTILITY

DISTRIBUTION LINES. McFadden, T., Jan 1977, EPS 3-WP-77-1, Symposium on Utilities Delivery in Arctic Regions, March 16-18, 1976, Edmonton, Alberta, Canada, p.221-231, 3

refs 31-3082

PIPES, PIPELINE FREEZING, ICE PRESSURE, PRESSURE CONTROL.

FIELD PERFORMANCE OF A SUBARCTIC UTILIDOR.

Reed, S.C., Jan. 1977, EPS 3-WP-77-1, Symposium on Utilities Delivery in Arctic Regions, March 16-18, 1976, Edmonton, Alberta, Canada. p.448-468.

UTILITIES, COLD WEATHER PERFORMANCE, FOUNDATIONS, WATER SUPPLY, WASTE DIS-POSAL.

This paper describes the design, construction, performance and ultimate failure of a functioning utilidor. It is hoped that the lessons learned in this case study description will be of interest and use to engineers concerned with planning and design of such systems.

MP 931

SCANNING ANTARCTIC SOILS WITH A SCANNING ELECTRON MICROSCOPE.

Kumai, M, et al, Dec. 1976, 11(4), p.249-252, 5 refs

Anderson, D.M. Ugolini, F.C. 31-2963

SOIL CHEMISTRY, WEATHERING, MINERALOGY, X RAY ANALYSIS, ELECTRON MICROSCOPY, ANTARCTICA—BEACON VALLEY, ANTARCTICA—WRIGHT VALLEY.

Results are reported of an investigation by scanning electron microscopy (SEM) and energy dispersion X-ray analysis (EDXA) of the morphology, degree of weathering, and chemical species of six samples of soils from Beacon Valley, lateral valley adjoining Beacon Valley, and lower Wright Valley. EDXA revealed 11 elements in the soil samples sodium, magnesium, aluminum, silicon, sulfur, chlorine, potassum, calcium, titanium, manganese, and tron Chromium, palladium, and gold, used in shadowing, were also founded a typical SEM of soil from Beacon Valley showed rounded grains, which had been subjected to much mechanical and chemical weathering Chemical species identified by EDXA included Ca, Mg, and Na chlorides, and CaSO4 The soil of Beacon Valley is shumic, saline soil EDXA of the sandy soil of first lateral valley revealed a quartz particle showing weathering, with contamination by Na, Ca, and Fe, and CaSO4 The abumic, saline soil of lower Wright Valley shows grains with sharp edges, indicating weak weathering and thus a relatively young age. Magnetite and silicate were found, and Fe, CaCl2, and KCl were identified using EDXA.

GEOPHYSICAL METHODS FOR HYDROLOGI-CAL INVESTIGATIONS IN PERMAPROST RE-

Hoekstra, P., Conference on Soil-Water Problems in Cold Regions, 2nd, Editionton, Sep. 1976, Proceedings, 1976, p.75-90, 6 refs.

GEOPHYSICAL SURVEYS, PERMAFROST HY-DROLOGY, ELECTROMAGNETIC PROSPECT-ING, PERMAFROST INDICATORS, DISCON-TINUOUS PERMAFROST.

EFFECT OF SNOW COVER ON OBSTACLE PERFORMANCE OF VEHICLES.

Hanamoto, B., Oct. 1976, 13(3), p.121-140, 11 refs For another version see 27-2795.

TRACKED VEHICLES, SNOW COVER EFFECT, COLD WEATHER PERFORMANCE, TOPO-GRAPHIC FEATURES, TRAFFICABILITY, SNOW VEHICLES

SNOW VEHICLES

Trafficability of terrain is a function of soft soil, hard in rough ground, geometric obstacles, segetation, and the riserine environment. All of these terrain aspects are altered by cold temperatures and snow cover. This paper examines the effect of snow cover on obstacle crossing performance of vehicles. The mathematical expressions describing step negotiation, trends crossing. In slope climbing on snow covered obstacles are given in terms of tracked vehicles on snow covered slopes, stream crossings, steps and trenches were conducted, and some of the results were compared with computed values. Differences between computed and experimental values are attributed to negrecting slip-sinkage and track deflection in the computations. (Auth.)

MP 934

REMOTE SENSING OF ACCUMULATED FRA-ZIL AND BRASH ICE.

Dean, A.M., Jr., National Hydrotechnical Conference, 3rd (with the participation of the Municipal Section), Quebec, May 30-31, 1977. Proceedings, Université Laval, Canadian Society for Civil Engineering, 1977. p.693-704, In English with French summary. 31-3434

SENSING, ICE CONDITIONS, REMOTE SENSING, ICE COVER THICKNESS, IMPACT STRENGTH, AERIAL RECONNAISSANCE, COMPUTER APPLICATIONS, ICE NAVIGA-

The use of a broad-banded impulse radar system for aerial detection of accumulated frazil and brash ice in a 9.5 km reach of the St. Lawrence River is described. The impact of excessive frazil ice accumulation on the extended navigation. season and on power generation is discussed Equipment and technique are evaluated, while the data are presented as a contour map of ice thickness

MP 935

AIR PHOTO INTERPRETATION OF A SMALL

DenHartog, S.L., National Hydrotechnical Conference, 3rd (with the participation of the Municipal Section), Quebec, May 30-31, 1977. Proceedings, Université Laval, Canadian Society for Civil Engineering, 1977, p.705-719, In English with French summary. 31-3435

ICE JAMS, ICE MECHANICS, PHOTOINTER-PRETATION, VELOCITY, SLOPES, AERIAL **PHOTOGRAPHS**

Air photos of a stiall ice jam on the Pemigewasett River near Plymouth, N.H., were taken three days after the jam and compared with photos taken after the ice went out. The winter photos show a marked and sudden decrease the winter photos show a marked and sudden decrease in flow size apparently indicative of faster and longer movement of the ice. The spring photos show a number of shallows and obstructions that apparently had no effect on the ice movement. It is concluded that this jam was caused by a change in slope and subsequent reduction in velocity.

NUMERICAL SIMULATION OF AIR BUBBLER SYSTEMS

Ashton, G.D., National Hydrotechnical Conference, Ashton, G.D., National rygnotectimes Constitute, 3rd (with the participation of the Municipal Section), Quebec, May 30-31, 1977. Proceedings, Université Laval, Canadian Society for Civil Engineering, 1977, p. 765-778. In English with French summary. 7 refs. p.765-778, In English with French summary.

BUBBLING, ICE PREVENTION, ICE CONTROL, HEAT TRANSFER, MECHANICAL ICE PRE-VENTION, EQUIPMENT, ANALYSIS (MATH-EMATICS).

The use of air bubbler systems to suppress ice formation is a technique which has been applied in a variety of situations and with saying degrees of success. Recently two-dimensional line source bubbler systems were analyzed (Ashton. 1974) in an effort to make available a tool which may be used in the design of a bubbler installation. That analysis was a steady-state evaluation of the melting rate of an ice cover above a bubbler system predicted on the basis of the input variables (depth, air discharge rate, water temperature). In actual operation, however, a bubbler "sees" changing conditions such as diurnal and longer-term weather conditions, varying water temperatures, and depletion of the available thermal reserve. The simulation presented herm uses the steady-state analysis developed earlier (Ashton, 1974) and steps it in time with each new condition determined from the results of the previous time step. In this sense the analysis herein may be considered quasi-steady. Results of the simulation are presented for an example case for a winter in Duluth. Minnesota and illustrate selection of time step size, effect of various strategies of intermittent operation, and variation in width of open water area with changing weather conditions. The use of air bubbler systems to suppress ice formation

MP 937

REVIEW OF ICE PHYSICS BY P.V. HOBBS. Ackley, S.F., June 1977, 58(6), p.341-342, 31-3517

ICE PHYSICS

LONG DISTANCE HEAT TRANSMISSION WITH STEAM AND HOT WATER.

Aamot, HWC, et al. International Total Energy Congress, Copenhagen, Oct. 4-8, 1976, Proceedings, 1976, 39p., 9 refs.

Phetteplace, G 32-2680

LINES, COST ANALYSIS, COMPUTER PROGRAMS. HEAT TRANSMISSION, STEAM, WATER PIPE-

ICE ENGINEERING FACILITY HEATED WITH

A GENERAL HEAT PUMP SYSTEM.

Aamot, H.W.C., et al, Energy Environment Conference, Kansas City, Mar. 27-31, 1977. Proceedings.

Kansas City, Missouri, 1977, 4p.

Sector, P.W.

37-7681

BUILDINGS, HEATING, HEAT RECOVERY, RE-FRIGERATION.

MP 940

SEA ICE THICKNESS PROFILING AND UN-DER-ICE OIL ENTRAPMENT. Kovacs, A., Offshore Technology Conference, 9th Houston, May 2-5, 1977. Proceedings, Vol.3, Hous-ton, Texas, 1977, p.547-550, 3 refs. 32-2682

SEA ICE, ICE COVER THICKNESS, MEASUR-ING INSTRUMENTS, RADAR ECHOES.

ING INSTRUMENTS, RADAR ECHOES.
Results obtained with a unique dual-antenna impulse radar system used to profile first- and multi-year sea ice near Prudhoe Bay, Alaska, are discussed. A description of the radar system is given along with representative field data. From the radar impulse travel times obtained with the use of dual antennas, calculations of thickness, electromagnetic impulse velocity and effective dielectric constant of the ice were made. Ice thicknesses determined by direct measurement and those calculated using the radar impulse travel times were found to be in good agreement. Continuous ice thickness profiles obtained with the radar were analyzed to provide representative cross sections reveal the undulating bottom surface relief of both ice types. Calculations are presented that indicate a significant amount of oil could be trapped within this bottom relief should the oil be released under the ice from a sea-floor oil-production system.

MP 941 MP 941

IONIC MIGRATION AND WEATHERING IN FROZEN ANTARCTIC SOILS. Ugolini, F.C., et al, June 1973, 115(6), p.461-470, 34

refe.

Inderson, D.M.

28-617 FROZEN GROUND CHEMISTRY, SOIL WATER, SOIL CHEMISTRY, UNFROZEN WATER CON-TENT, ION DIFFUSION.

IENT, ION DIFFUSION.

Soils of continental Antarctica are forming in one of the most severe terrestrial environments. Continuously low temperatures and the searcity of water in the liquid state result in the development of desert-type soils. In an earlier experiment to determine the degree to which radioactive NaCl36 would migrate from a shallow point source in permitrost, movement was observed. To confirm this result, a similar experiment involving Na22Cl has been conducted. Significantly less movement of the Na22 iou was observed. Ionic movement in the unifozen interfacial films at mineral surfaces in frozen ground is held to be important in chemical weathering in Antarctic and other desert soils. weathering in Antarctic and other desert soils

MP 942

MANAGEMENT OF POWER PLANT WASTE

HEAT IN COLD REGIONS.

Aamot, H.W.C., Sep.-Oct. 1975, 16(5), p.22-24. For a detailed treatment of this topic see 29-2708 (CRREL 32.2683

BUILDINGS, HEATING, HEAT RECOVERY, COST ANALYSIS.

MP 943

WORD MODEL OF THE BARROW ECOSYS-TEM.

Brown, J., et al, Conference on Productivity and Conservation in Northern Circumpolar Lands, Edmonton, Alberta, Oct.15-17, 1969 Proceedings. Edited by W.A. Fuller and P.G. Kevan, Morges, Switzerland, International Union for Conservation of Nature and National Resources, 1970, p.41-43 Pitcha, F.A., Coulombe, H.N.

31-4099

31-4099 ECOSYSTEMS, TUNDRA VEGETATION, TUNDRA SOILS, GRAZING, TEMPERATURE EFFECTS, MOISTURE FACTORS, ANIMALS, UNITED STATES—ALASKA—BARROW

MP 944 SYNTHESIS AND MODELING OF THE BAR-ROW, ALASKA, ECOSYSTEM.

Coulombe, H.N., et al., Conference on Productivity and Conservation in Northern Circump slar Lands, Edmonton, Alberta, Oct. 15-17, 1969 "roccedings, Edited by W.A. Fuller and P.G. Kevan, Morges, Switzerland, International Union for Conservation of Nature and National Resources, 1970, p 44-49, 6 refs Brown, J.

DRA SOILS, MODELS, ANIMALS, COMPUTER APPLICATIONS, UNITED STATES ALASKA BARROW

MP 945
ENVIRONMENTAL SETTING. BARROW.

ALASAA.

Brown, J., Conference on Productivity and Conservation in Northern Circumpolar Lands, Edmonton, Alberta, Oct.15-17, 1969 Proceedings. Edited by
W.A. Fuller a...J P.G. Kevan, Morges, Switzerland,
International Union for Conservation of Nature and National Resources, 1970, p.50-64, 67 refs.

31-4101 ENVIRONMENTS. ENVIRONMENTS, ARCTIC LANDSCAPES, TUNDRA VEGETATION, TUNDRA SOILS, THERMAL REGIME, PERMAFROST, GEOMORPHOLOGY, SHORELINE MODIFICATION, UNITED STATES—ALASKA—BARROW.

UNITED STATES—ALASKA—BARROW.

The Barrow environment can be characterized as follows.

(1) Situated at the northern extremity of the Arctic Coastal Plain, it has a climste consisting of long, dry, cold winters and short, moist, cool summers. The latter is moderated by the influence of the Arctic Ocean. (2) Vegetation is meadow-like with an abundance of sedges, grasses, herbs and a few dwarf shrub species. (3) Sulls are predominantly wet, with an average seasonal thaw of apposimately 40 cm. (4) Perennially frozen ground underlies the antire land surface to depths in access of 300 meters. (5) The near-surface coastal plann sediments are manne in origin and mid-to late-Pleistocene in age. (6) The tundra landscape is charcterized by active geomorphic processes such as lake erosion, polygonal ground formation and frost stirring of the soil.

MP 946

BIBLIOGRAPHY OF THE BARROW, ALASKA, IBP ECOSYSTEM MODEL

BBOWN, J., Conference on Productivity and Conserva-tion in Northern Circumpolar Lands, Edmonton, Al-berta, Oct 15-17, 1969. Proceedings. Edited by W.A. Fuller and P.G. Kevan. p.65-71.

BIBLIOGRAPHIES, ECOSYSTEMS, BIOMASS, ARCTIC REGIONS, MODELS, UNITED STATES -ALASKA-BARROW.

MP 947 CRREL IS DEVELOPING NEW SNOW LOAD DESIGN CRITERIA FOR THE UNITED

Tobiasson, W., et al. Feb. 1976, 33rd, p.70-72, Extended abstract only. 10 refs

Redfield, R. 31-4210

SNOW LOADS, ROOFS, DESIGN CRITERIA.

EFFECTS OF RADIATION PENETRATION ON SNOWMELT RUNOFF HYDROGRAPHS.

Colbeck, S.C., Feb. 1976, 33rd, p.73-82, 10 refs. For this paper in another form see 31-4171.

SNOWMELT, RUNOFF, SOLAR PADIATION, WATER FLOW.

Water flow through the unsaturated portion of a snowpack Water flow through the unsaturated portion of a snowpack to relevalized itsing various assumptions about adiastors penetration into the snow. The results show that for the purposes of hydrologi, forecasting, it is sufficiently accurate to assume that all of the radiation absorption occurs on the surface. The error in the calculation of flow is largest for very shallow snowpacks but this error is reduced by radiation absorption at the base of the snow and by the routing of meltwater through the saturated hasal layer.

MP 949

ATMOSPHERIC TRACE METALS AND SUL-FATE IN THE GREENLAND ICE SHEET. Herron, M.M., et al, July 1977, 41(7), p.915-920, 22

Langway, C.C., Jr., Weiss, HV., Cragin, J.H. 31-4306

ICE SHEETS, CHEMICAL ANALYSIS, METALS, GREENLAND.

GREENLAND.

Chemical analyses of surface snow and dated deep see core samples from Central Greenland suggest that In. Pb and sulfate are presently being deposited there at two to three times the natural rates. No recent increases in Cd or veneratizations were observed. Pre 1900 see thoses no measurable effect of the activities of man and represents a good natural aerosol baseline. High enrichment factors relative tin average crustal material were observed for In. Po. Cd and sulfate in all samples indicating a natural source other than continental dust is responsible. A high temperature process or vapor phase origin for these enriched elements, possibly volcanism, seems likely.

MP 950 WINTER MAINTENANCE RESEARCH NEEDS. WINTER MAINTENANCE RESEARCH NEEDS. Minsk, L.D., National Research Council. Transportation Research Board. Highway maintenance research needs; report of a workshop held October 7-10, 1974, Washington, D.C., 1975, p.36-38, FHWA-RD-75-511, PB-247 125. 32-240

WINTER MAINTENANCE, ROAD MAINTENANCE, ICE REMOVAL, ANTIFREEZES, ICE CONTROL, SOIL POLILITION.

MP 951 COMPRESSIVE AND SHEAR STRENGTHS OF FRAGME* IED ICE COVERS—A LABORATO-RY STUDY

Cheng, S.T., et al, Aug. 1977, No.206, 82p., ADA-045 246, 7 refs.

Tatinclaux, J.C. 32-1809

SHEAR STRENGTH, AIR TEMPERATURE, WATER TEMPERATURE, ICE STRUCTURE.

MP 952

PROCEEDINGS OF THE SECOND INTERNA-TIONAL SYMPOSIUM ON COLD REGIONS ENGINEERING.

Burdick, J., ed, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, 597p., For individual papers see 32-283 through 32-

Johnson, P., ed.

32-282 MEETINGS, ENGINEERING, LOW TEMPERA-

TURE RESEARCH

MP 953

FREEZE DAMAGE PROTECTION FOR UTILI-TY LINES.

McFadden, T., International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, p.12-16, 2 refs. 32-284

WATER PIPES, PIPELINE FREEZING, PIPE-LINE INSULATION, ICE PRESSURE.

LINE INSULATION, ICE PRESSURE.

A method for positioning freeze damage and resultant pipe failures was developed using insulation to position the pressure buildup and subsequent damage area. A pressure relief device fabricated largely from common pipe corriponents was designed and tested. Results show that a significant portion of the failures can be eliminated. Experiments into the mechanism involved in pipe freezing has shown that some of the old concepts are incorrect and new insight into the actual freezing process has resulted.

MP 954

USE OF A LIGHT-COLORED SURFACE TO REDUCE SEASONAL THAW PENETRATION BENEATH EMBANKMENTS ON PERMA-

Berg. R.L., et al, International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, p.86-99, 9 refs. Quinn, W.F. 32-289

PERMAFROST CONTROL, EMBANKMENTS. THAW DEPTH, SURFACE STRUCTURE, SOLAR RADIATION, ABSORPTIVITY

RADIATION. ABSORPHY11 I
The construction of embankments on permafrost, particularly
in regions where the mean ground temperature is close
to the inclining point, usually results in melting of the permafrost
which may cause excessive settlement. The depth of melting
(than penetration) is considerably increased should the surface (this penetration) is considerably increased should the surface of the embankment be consered with a bitumosous pasement. This increased melting results from greater absorption of solar radiation by the dark surface. A light-colored surface (white traffic paints has been used on the asphalt remay at Thule AB, Greenland (a cold permafront sites and on high-ay test sections rear Fairbanks, Alaika (a warm permafront site). The selection of light-colored uniforming material for embankments on permafront can have a considerable beingin influence on the depth of thaw penetration and ultimate is than consolidation.

MP 955

PERMAFROST EXCAVATING ATTACHMENT FOR HEAVY BULLDOZERS.

Garfield, D.E., et al. International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold. Regions. Engineers. Professional. Association, 1977, p 144-151, 5 refs

Mellor, M

EXCAVATION, FROZEN GRAVEL, FROZEN GROUND STRENGTH

In anticipation of military needs for grading and excavating froren ground an attachment for heavy engineer tractors was developed. The attachment consists of a hydraulically driven bestrontal cutter driam that attaches to build-over push arms, together with an auxiliary power source that attaches to the rear of the tractor. The machine is indicated to break up frozen soil so that it can be liancied by conventional to break upfrozen sod so that it can be landled by conventional carthmoung equipment. Tests in frozen gravel and in rock outcrops demonstrated that the machine and its ceiting pasks could withstand the most severe ceiting conditions that would normally be met. In frozen gravel, ceiting rates at a drum operating depth of 10 ft (0.3 m) averaged 15 ft mm (7.6 mm/s) at a 30-resumm drum speed and 17 ft frimm (8.6 mm/s) at 15 resumm. Operating at the same depth in frozen silt, cutting rates averaged 18 ft min (9.1 mm/s) at both 30-resumm and 15-resumm medium speed, however, cutting rates varied considerably at the lower drum speed. Modifications suggested for future designs include changes in the teeth lacing pattern and changes in the method of attaching the drum to the tractor.

MP 956

FOG SUPPRESSION USING MONOMOLECULAR FILMS.

McFadden, T., International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, p.361-367, 6 refs.

p.361-. 32-306 FOG. COUNTERMEASURES. FILMS, CHEMICAL REACTIONS.

CHEMICAL REACTIONS. Experiments in see fog suppression using the evaporation reduction abilities of several chemical films are discussed. Advantages and lisadvantages of different films are considered and techniques for minimizing some of the disadvantages are described. Fog reduction, both see fog and cold vapor fog, can be achieved very economically using these films. Up to 45% of the fog normally generated can be suppressed, however, the remaining 15% cannot be eliminated by this technique. technique

MP 957

MEASURING UNMETERED STEAM USE WITH A CONDENSATE PUMP CYCLE COUN-TER.

Johnson, P.R., International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, p.434-442, 2 refs. 32-313

BUILDINGS, HEAT LOSS, STEAM, PUMPS, MEASUREMENT.

MEASUREMENT.
The strain heat used in a combination dominiory and office building at histon AFB, Alaska, was measured over a 301-day period using a counter on the condensate return runny line general relationships between pump cycle frequency and condensate flow were denived. This information was used to calibrate the system and express condensate flow and heat use with the number of pump cycles per hoc. The heat used by the building consisted of a constant load for water heating and heat loss within the building and a variable load for space heating. The variable space heating I ad was strongly controlled by the outside air temperature and apparently consists of two temperature-dependent heat ions in handsom. The first is conduction through the walls it is speculated that the second is open-window air exchange for conditional are occurred form temperatures. The condensate pump cycle counter general to be an increparative. an extending the ventilation and to control form temperature. The condensate pump cycle countries growed to be an mergen sive means of measuring steam use suitable for engineering and energy construction studies. Further studies of actual heat consumption by various types of bondings in Aliaba. tecommended

MP 958

REINSULATING OLD WOOD FRAME BUILD-INGS WITH UREA-FORMALDEHYDE FOAM. Tobiasson, W., et al, International Symposium on Cold

Regions Engineering, 2nd, Fairbanks, Aug. 19.6, Proceedings, Fairbanks, University of A. da, Cold Regions Engineers Professional Association, 1977, p 478-487, 6 refs

Frances, S N

BUILDINGS, WALLS, THERMAL INSULATION,

BUILDINGS, WALLS, THERMAI INSULATION, HEAT LOSS, CELLULAR PLASTICS.

I reasostraidebade of his fearn was investigated for one as an involation retrofit material mass made in stoll frame after that force hasks in Magar. 375. The months after a moderation we see a consumption for months after a moderation to some an infrared camera reveiled a marked improvement on the mass insuring performance. Cuts in test areas right months after received outding filling and showed shimings to be under 1. The implications of these and other factings for the softwared with the form as an insulation retrofit material are discussed. We are can an insulation retrofit material are discussed. focuse optimate that it from his good potentia for the investigation of regions.

MP 959 ECONOMIC BENEFITS OF ICE SOME BOOMS.

Perham, R.E., International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, p.570-591, 29 refs. 32-319

ICE BOOMS, ICE CONTROL, RIVER ICE, LOADS (FORCES), COST ANALYSIS, ECONOM-

ICADS (FORCES), COST ANALYSIS, ECONOM-ICS.

In early winter, ice booms are used to assist nature in quickly forming a solid ice cover on rivers. The open water, insulated in this way, is no longer the source of frazil ice which, in the past, has caused ice jams, flooding, and the loss of electrical generating capacity. They function in other ways as well such as strengthening the ice sheet edge against subsequent damage and restraining its movement. Ice booms are basically lines of floating timbers or pontoons held in place by heavy cable structures connected to buried anchors. They were developed and are used mainly by hydroelectine power groups but they also help facilitate ship navigation in winter. The cost of these ice control devices over the past 17 years has ranged from about \$48/t (\$156/m)\$ to \$333/ft (\$1094/m) with one set costing approximately \$1,500,000. The value of many ice booms can best be related to the cost of replacing the electric power that could be lost if they were not present, as opposed to trying to choose a cost basis for a flood. A rough estimate of \$0.01/kWh for the value of replacement power is used here. The most valuable ice boom could be the Lake Ene Ice boom which saves an estimated \$13,000,000 per year. Next are the ice booms on the Beauharnois Canal which are used with particular operating techniques to save approximately \$4,300,000 per year. Ice booms can also help save millions in shipping costs as well by stopping excessive ice movements during the navigation season in winter on the Great Lakes

MP 960

YUKON RIVER BREAKUP 1976.

Johnson, P., et al, International Symposium on Cold Regions Engineering, 2nd, Fairbanks, Aug. 12-14, 1976, Proceedings, Fairbanks, University of Alaska, Cold Regions Engineers Professional Association, 1977, p.592-596, 8 refs.
Burdick, J., Esch, D., McFadden, T., Osterkamp, T.E.,

Zarling, J.

32-320

RIVER ICE, ICE BREAKUP, ICE LOADS, OFF-SHORE STRUCTURES.

A recently completed bridge across the Yukon River, north of Fairbanks, Alaska, provides an opportunity for studying breakup processes and measuring ice forces on a structure in a major river where ice conditions are near the continental extreme Above the bridge the river flows through the 200-mile long Yukon Flats, a marshy, lake-dotted area. The multiple channels of the river meander back and forth providing a very larse water surface for winter toe production. The multiple channels of the river meander back and forth providing a very large water surface for winter ice production. The winters are long and severely cold with only light snowfall so the Flats produce very large quantities of thick ice which pass through the bridge each spring. The bridge is a six-span continuous orthotropic-deck structure spanning a 2,000-foot channel Five reinforced concrete piers secured to bedrock with prestressed rock anchors are subject to river ice. Steel legs rise from the tops of the piers to carry the deck USACRREL, University of Alaska, and Alaska Department of Highways personnel observed including speed Super 8 movie and 35mm still photographs were taken. Several types of ice failure were observed including crushing along the full width of the piers, splitting, combined splitting and crushing and non-failure

MP 961

INFRARED DETECTIVE: THERMOGRAMS AND ROOF MOISTURE.

Korhonen, C., et al, Sep. 1977, 19(9), p.41-44. Tobiasson, W., Dudley, T.

INFRARED EQUIPMENT, ROOFS, MOISTURE, INSULATION.

INSOLATION.

Four building roofs at Pease AFB were surveyed with a hand-held infrared camera to detect wet insulation. Areas of wet insulation on these roofs were marked with spray paint, and 3-in-dia core samples of the built-up membrane and insulation were taken to verify wet and dry conditions. Plashing defects are considered responsible for most of the wet insulation uncovered in this survey Recommendations for maintenance, repair, and replacement were developed from the infrared surveys, core samples and visual examinaMP 962

REPETITIVE LOADING TESTS ON MEM-BRANE ENVELOPED ROAD SECTIONS DUR-ING FREEZE THAW.

Smith, N., et al, Preprints of papers presented at a specialty session of the ASCE Fall Convention and Exhibit, San Francisco, California, Oct. 17-21, 1977, American Society of Civil Engineers, 1977, p.171-197,

Eaton, R.A., Stubstad, J.

32-562 32-302 FREEZE THAW TESTS, ROADS, SUBGRADE PREPARATION, PROTECTIVE COATINGS, SOIL AGGREGATES, SOIL STRENGTH, DY-NAMIC LOADS.

MP 963

DYNAMIC IN-SITU PROPERTIES TEST IN FINE-GRAINED PERMAPROST.

Blouin, S.E., Preprints of papers presented at a special-ty session of the ASCE Fall Convention and Exhibit, San Francisco, California, Oct. 17-21, 1977, American Society of Civil Engineers, 1977, p.282-313, 19 refs.

PERMAFROST PHYSICS, EXPLOSION EFFECTS, BLASTING.

MP 964 CASE FOR COMPARISON AND STANDARDI-ZATION OF CARBON DIOXIDE REFERENCE

Kelley, J.J. et al, Interbiome Workshop on Gaseous Exchange Methodology, Terrestrial Primary Productivity, Oak Ridge National Laboratory, 1973. Proceedings, 1973, p.163-181, 18 refs. Coyne, P.I. 32-675

CARBON DIOXIDE, ENVIRONMENTS, PHOTO-SYNTHESIS, MEASURING INSTRUMENTS, TUNDRA BIOME, SPECTROMETERS.

TUNDRA BIOME, SPECTROMETERS.

Infrared gas analytical techniques have made it possible to detect small amounts and changes in carbon dioxide in the environment. The reliability and intercomparison of these measurements depends on the ability to calibrate the IRGA with a high degree of precision and accuracy. A mutual comparison scheme is presented to provide a method for calibrating an infrared gas analyzer and to document changes that occur in CO2 reference gas standards. It is suggested that a need exists to establish a central reference gas laboratory for the purpose of supply investigators with accurate reference gas standards. (Auth.)

WASTEWATER TREATMENT IN COLD RE-GIONS.

Sletten, R.S., et al, 1976, 15p., ADA-026 156, Unpublished report.

Uiga, A. 32-1274

WASTE TREATMENT, WATER TREATMENT, MILITARY FACILITIES.

Wastewater treatment at remote military installations in Alaska Wastewater treatment at remote military installations in Alaska presently consists of aerated lagoons and extended aeration package plants. Although performance data for these systems are either very limited or in most cases nonexistent, indications are that most of these systems can not meet secondary ffluent or 'eria as defined by the EPA. Processes for upgrading to meet the new criteria must be as simple as possible to design, build and operate. In particular, the requirements for operation and maintenance should be minimal due to the remote, isolated nature of most of the camps. Processes which appear to be feasible include land application, intermittent filtration, and variations of ponding.

MP 966 PASSAGE OF ICE AT HYDRAULIC STRUC-

Calkins, D.J., et al, Annual Symposium of the Waterways, Harbors and Coastal Engineering Division of ASCE, 3rd, Fort Collins, Colorado, Aug. 10-12, 1976. (Proceedings, New York, American Society of Civil Engineers, 1976, p.1726-1736, 32 refs. Ashton, G.D. 32-836

MYDRAULIC STRUCTURES, ICE LOADS, ICE MECHANICS, ICE BOOMS, ICE STRENGTH, RIVER ICE, ICE CONTROL.

The passage of ice through hydraulic structures is an importent consideration in the construction of such works in the northern areas. The performance of various structures in passing ice has been documented mainly in descriptive terms, however, ice has been documented mainly in descriptive terms, however, some physical measurements have been made on the volumetric ted discharge through such openings. By expressing the ice discharge as a surface concentration, meaningful site comparisons can be made. Physical model studies on various aspects of ice related problems in rivers and at their structures have been increasing within the lest five years. One major problem area is the assessment and influence of the strength of ice, which applies to both the field and laboratory studies

MP 967

ON MIGRATION OF VARIOUS CHEMICAL CONSTITUENTS DURING DISPOSAL OF CONSTITUENTS DUE DREDGED MATERIAL

Blom, B.E., et al, May 1976, WES-CR-D-76-7, 183p., ADA-027 394.

Jenkins, T.F., Leggett, D.C., Murrmann, R.P.

SEDIMENT TRANSPORT, WASTE DISPOSAL, WATER POLLUTION, WATER CHEMISTRY, DREDGING

MP 968

WASTEWATER TREATMENT ALTERNATIVE NEEDED.

Iskandar, I.K., et al, Nov. 1977, 14(11), p.82-87, Refs. Sletten, R.S., Jenkins, T.F., Leggett, D.C.

WASTE TREATMENT, WATER TREATMENT, SEEPAGE, SEWAGE TREATMENT.

MP 969

ICE DECAY PATTERNS ON A LAKE, A RIVER AND COASTAL BAY IN CANADA.

Bilello, M.A., Canadian Association of Geographers.

Programme and abstracts (of the CAG Conference, 1977₃, University of Regina, 1977, p.120-127, 4 refs. 32-929

ICE COVER THICKNESS, ICE BREAKUP, ICE DETERIORATION, LAKE ICE, RIVER ICE, SEA

MP 970

RATE-THE INFLUENCE OF GRAZING ON THE ARCTIC TUNDRA ECOSYSTEMS. Batzli, G.O., et al. 1976, 2(9), p 153-160.

Brown, J. 31-394

RESEARCH PROJECTS, TUNDRA VEGETA-TION, ECOSYSTEMS, ANIMALS, GRAZING, PLANTS (BOTANY), TUNDRA SOILS.

COMPUTER MODELING OF TERRAIN MODIFICATIONS IN THE ARCTIC AND SU-

Outcalt, S.I., et al, Symposium: Geography of polar countries. XXIII International Geographical Congress, Leningrad, USSR, 22-26 July 1976, edited by J. Brown. Selected papers and summaries. CRREL SR 77-6, Hanover, New Hampshire, U.S. Army Cold Regions Research and Engineering Laboratory, 1977, p.24-32, ADA-038 379, In English with Russian summary. 41 refs.

32-1305

TERRAIN IDENTIFICATION, COMPUTERIZED SIMULATION, MODELS, VEGETATION, PER-MAFROST STRUCTURE, HUMAN FACTORS.

MP 972 LOCK WALL DEICING.

Hanamoto, B., Lock wall deicing studies, edited by B. Hanamoto. CRREL SR 77-22, Hanover, New Hampshire, Cold Regions Research and Engineering Laboratory, 1977, p 7-14, ADA-044 943. 32-1350

ICE REMOVAL, ICE PREVENTION, INFLATA-BLE STRUCTURES, PROTECTIVE COATINGS, LOCKS (WATERWAYS).

LOCK WALL DEICING WITH HIGH VELOCITY

LOCK WALL DEICING WITH HIGH VELOCITY WATER JET AT SOO LOCKS, MI. Calkins, D.J., et al, Lock wall deicing studies, edited by B. Hanamoto. CRREL SR 77-22, Hanover, New Hampshire, Cold Regions Research and Engineering Laboratory, 1977, p.23-35, ADA-044 943, 2 refs. Mellor, M., Ueda, H.T. 22-135!

ICE REMOVAL, WATER EROSION, HIGH PRES-SURE TESTS, LOCKS (WATERWAYS).

LABORATORY EXPERIMENTS ON LOCK WALL DEICING USING PNEUMATIC DE-VICES.

tagaki, K, et al, Lock wall deiging studies, edited by B Hanamoto CRREL SR 77-22, Hanover, New Hampshire, Cold Regions Research and Engineering Laboratory, 1977, p 53-68, ADA-044 943, 1 ref Frank, M., Ackley, S.F. 32-1352

ICE REMOVAL, INFLATABLE STRUCTURES, ABORATORY. TECHNIQUES, LOCKS (WA-TERWAYS).

MP 975

MP 975
LAND APPLICATION OF WASTEWATER: FORAGE GROWTH AND UTILIZATION OF APPLIED NITROGEN, PHOSPHORUS AND
POTASSIUM.

Palazzo, A.J., Cornell Agricultural Waste Management Conference, Ithaca, N.Y., 1976. Proceedings. Land as a waste management alternative. Edited by R.C. Loehr, Ann Arbor, Mich., Ann Arbor Science, 1977, p.171-180, 8 refs. 32-1526

WASTE DISPOSAL, SOIL CHEMISTRY, WATER CHEMISTRY, LAND DEVELOPMENT, PLANTS (BOTANY), GRASSES, GROWTH.

(BOTANY), GRASSES, GROWTH.

Data have been presented on the growth and chemical composition of forages when influenced by various application rates of wastewater during 1974 and 1975. The results show that the greatest average annual forage yields and N and Premoval occurred at the highest application rate (15 cm/wk). However, forage removal efficiency of applied N and P was greatest at the lowest application rate of 5 cm/wk. At this rate an average of 97 percent of the applied N and 35 percent of the applied P was contained in the forage Analyses performed in 1974 and 1975 showed a reduction in the levels of K in the soil and forage in 1975, relative to 1974, which indicates a requirement for K fertilization for sustained productivity The reduction in K was related to the large quantities of this element required by crops and its low concentration in the wastewater. Soil analyses also showed reductions in soil pH and total exchangeable cations to levels which could be corrected by liming

MP 976 PRELIMINARY EVALUATION OF 88 YEARS RAPID INFILTRATION OF RAW MUNICIPAL SEWAGE AT CALUMET, MICHIGAN.

SEWAGE AT CALUMET, MICHIGAN.
Baillod, C.R., et al, Cornell Agricultural Waste Management Conference, Ithaca, N.Y., 1976. Proceedings. Land as a waste management alternative. Edited by R.C. Loehr, Ann Arbor, Mich., Ann Arbor Science, 1977, p.489-510, 16 reis.
Waters, R.G., Iskandar, I.K., Uiga, A. 32,1527

WASTE DISPOSAL, WATER TREATMENT, LAND DEVELOPMENT, SEEPAGE, SEWAGE DISPOSAL, WATER CHEMISTRY.

URBAN WASTE AS A SOURCE OF HEAVY MET-ALS IN LAND TREATMENT.

Iskandar, I.K., International Conference on Heavy Iskandar, I.K., international Conterence on Heavy Metals in the Environment, Toronto, Ont., Canada, Oct. 27-31, 1975. Proceedings, Toronto, Canada, (1976), p.417-432, In English with French summary. 36 refs.

32-1528 WASTE DISPOSAL, SOIL CHEMISTRY, MICRO-ELEMENT CONTENT, PLANTS (BOTANY), LAND DEVELOPMENT, SOIL POLLUTION, GRASSES, METALS.

Heavy metal accumulation in soils and forages of a slow infiliration prototype land treatment system over a two year period is discussed. Uptake of heavy metals by plants and soils vaned according to the amounts applied, soil type, and mode of wastewater application. Charlton silt loam soil retained more heavy metals than Windsor sandy loam Heavy metals were confined to the top 15 cm of the soil and vertical movement occurred only in the soil from the treatment receiving the highest application rate (15 cm/wk) Movement of heavy metals in this treatment was thought to be due to a redistribution of organic matter (hydraulic effect), a decrease in soil pH or both. Forages (quack grass) from all the treatments contained much higher concentrations of heavy metals than the control There were significant differences in plant tissue heavy metals accumulation between the different cuts. This was related to the concentration of heavy metals in the applied effluent. Forages from the second cut contained Cd and Ni and to some extent Cu at "toxic" levels, while Zn, Cr, Hg and Pb were present in normal or slightly higher amounts. Spray irrigation of heavy metal-spiked wastewater resulted in much higher concentrations in the plant tissue than in those from flood irrigation treatments. This could be due to absorption of heavy metals by the leaves in the sprayed forages Heavy metal accumulation in soils and forages of a slow of heavy metals by the leaves in the sprayed forages

FREEZE-THAW ENHANCEMENT OF THE DRAINAGE AND CONSOLIDATION OF FINE GRAINED DREDGED MATERIAL IN CON-FINED DISPOSAL AREAS.

Chamberlain, E.J., Oct. 1977, TR-D-77-16, 94p., ADA-046 400

Blouin, S.E.

32-1515 WASTE DISPOSAL, DREDGING, SOIL COM-PACTION, SOIL FREEZING, FREEZE THAW CYCLES, PERMEABILITY.

Fine-grained dredged material obtained from disposal sites in the Great Lakes region was subjected to controlled freeze-thaw cycling in a special laboratory consolidometer. Volume changes and permeabilities were observed after full convolida-

tion and freeze-thaw cycling for applied pressures in the range of 0.93 to 30.73 kPa It was observed that as much as 20 percent or more volume reduction results when dredged material with liquid limits in the range of 60 to 90 percent is subjected to one cycle of freezing and thawing The degree of overconsolidation by freezing and thawing appears to decrease with increasing amounts of coarse materials and with increasing plasticity. The vertical permeability of all materials examined was increased as much as two orders of manifulcing the examined was increased as much as two orders of magnitude, the greatest increase in permeability occurring for the fine-grained materials at the lowest stress

WASTEWATER REUSE AT LIVERMORE, CALI-FORNIA.

Uiga, A., et al, Cornell Agricultural Waste Management Conference, Ithaca, N.Y., 1976. Proceedings. Land as a waste management alternative. Edited by R.C. Loehr, Ann Arbor, Mich., Ann Arbor Science, 1977, p.511-531, 24 refs.

Iskandar, I.K., McKim, H.L. 32-1529

WASTE TREATMENT, WATER TREATMENT, WATER CHEMISTRY.

Wastewater reuse occurs at Livermore, California by applica-Wastewater reuse occurs at Livermore, California by application of treated effluent to a golf course, to a farmland, to an airport area and to a stream. Sainity problems occurred on the clay soils of the golf course because requirements for daily site access and wastewater application were contradictory. The effluent was successfully reused at the agriculture site and disposal area. The outfall discharge increased the total dissolved solids of the receiving water and discharged large quantities of chlorine. Soil chemical phosphorus, soluble phosphorus, pH, and organic carbon were changed but not critically by effluent reuse. The changes, except in pH, could be explained by existing agronomic techniques for irrigation in a semi-and climate

DETERMINATION OF 2,4,6-TRINITROTOL-UENE IN WATER BY CONVERSION TO NI-

Leggett, D.C., 1977, Vol.49, p.880, 5 refs. 32-1530

WATER TREATMENT, WATER CHEMISTRY, WASTE DISPOSAL, WASTE TREATMENT.

WATER VAPOR ADSORPTION BY SODIUM MONTMORILLONITE AT -5C.
Anderson, D M, et al, 1978, Vol.34, p.638-644, 8 refs Schwarz, M.J., Tice, A.R. 33-634

WATER VAPOR, ADSORPTION, LOW TEMPER-ATURE TESTS, CLAY MINERALS, MARS (PLA-

A large amount of interest has recently been expressed pertaining to the quantity of physically adsorbed water by the Martian regolith. Thermodynamic calculations based on experimentally determined adsorption and desorption isotherms and extrapolated to subzero temperatures indicate that physical adsorption of more than one or two monomolecular layers is highly unlikely under Martian conditions. Any additional water would find ice to be the state of lowest energy and therefore the most stable form. To test the validity of the thermodynamic calculations, we have measured adsorption and desorption isotherms of sodium monimorillomite at -5C. To a first approximation it was found to be valid A large amount of interest has recently been expressed

ROOF LOADS RESULTING FROM RAIN ON SNOW; RESULTS OF A PHYSICAL MODEL. Colbeck, S.C., Dec. 1977, 4(4), p.482-490, In English with French summary. 11 refs. See also 32-1151 (CR 77-12).

32-1648 ROOFS, SNOW LOADS, RAIN, MATHEMATI-CAL MODELS.

CAL MODELS.

A physical model is used to calculate roof loads due to rain on a snow covered roof. A snow depth of 0.5 m and the twenty-five year rainstorm in Hanover. New Hampshire, are used in the examples. For a flat roof with 10 m parallel flow to gutters, the total liquid weight can increase the roof load by about 50%. The weight of the transient liquid is greatly increased if the mode of flow is radial to central drains and is decreased if the roof is slightly inclined or if significant melt channels form in the basal layer. However, the acting of the snow over its entire depth will still cause a significant weight of transient liquid. Snow drifting can cause very large, local loads but the effects of snow temperature and antecedent mosture are not too important. Depending on the circumstances, the largest load can occur for either a long duration, low intensity rainstorm or a short durition, high intensity rainstorm the former occurs if the saturated layer makes a significant contribution to the total live load whereas the latter occurs when the liquid weight is due mainly to the unsaturated layer. Further study is needed to establish the joint probabilities of combined snow and rain loads, especially when rain and snowmeth occur simultaneously. layer. Further study is needed to establish the joint probabili-ties of combined snow and rain loads, especially when rain and snowmelt occur simultaneously

MP 983

EXAMINATION OF THE VISCOUS WIND-DRIVEN CIRCULATION OF THE ARCTIC ICE COVER OVER A TWO YEAR PERIOD. Hibler, W.D., III, et al, Sep. 1977, No.37, p.95-133, 27

refs.

32-1696

SEA ICE, WIND FACTORS, VISCOUS FLOW, MATHEMATICAL MODELS, BOUNDARY VALUE PROBLEMS.

VALUE PROBLEMS.

A detailed re-examination of the viscous approach is made by companing predicted with observed ice drift in the Arctic basin over a two-year period employing a viscous constitutive law having both bulk and shear viscosities. Numerical drift calculations for the Arctic Basin are carried out at 4-day intervals over a two-year period employing periodic boundary conditions. Drift predictions are compared with the observed drift of three contemporaneous drifting stations with reasonable agreement. The largest errors are found to occur in late summer, and may be due to nonsteady current effects. Boundary value calculations show that reduction of the shear viscosity (while still maintaining allarge bulk viscosity) reduces the excessive stiffening often found in viscous models while still maintaining substantial changes in drift direction due to boundaries. Sensitivity studies show steady current effects to be small for drift rates over tens of days but not negligible for cumulative drift over years.

MP 984
ANALYSIS OF ENVIRONMENTAL FACTORS
AFFECTING ARMY OPERATIONS IN THE
ARCTIC BASIN.

Sater, J.E, ed, Montreal, Quebec, Feb. 1962, 11p., For a more extensive report see SIP 21843. Arctic Institute of North America.

32-1902

ENVIRONMENTS, MILITARY OPERATION, RESEARCH PROJECTS, MILITARY RESEARCH, ARCTIC REGIONS.

MP 985

ARCTIC TRANSPORTATION: OPERATIONAL AND ENVIRONMENTAL EVALUATION OF AN AIR CUSHION VEHICLE IN NORTHERN ALASKA.

Abele, G., et al, Feb. 1977, 99(1), p.176-182, 8 refs. Brown, J.

32-1801 AIR CUSHION VEHICLES, TRANSPORTATION, TRAFFICABILITY, ARCTIC LANADSCAPES, ENVIRONMENTS, ENVIRONMENTAL IM-PACT, TUNDRA VEGETATION, DAMAGE.

SEA ICE ENGINEERING.

Ocean Engineering Under Arctic Conditions, 3rd, Fairbanks, Aug. 11-15, 1975, Vol.1, University of Alaska, 1976, p.231-234, Extended summary only.

SEA ICE, ICE MECHANICS, ENGINEERING.

MP 987

ISLANDS OF GROUNDED SEA ICE.

Kovacs, A., et al. Environmental assessment of the Alaskan continental shelf; Vol. 14, Ice. Principal Inrussian continental snell; vol. 14, Icc. Principal Investigators' reports for the year ending March 1976, Boulder, Colorado, Environmental Research Laboratories, 1976, p 35-50, 28 refs. Preprint from 1975 POAC Conference.

Gow, A.J., Dehn, W.F. 31-629

ICE ISLANDS, REMOTE SENSING. BORNE PHOTOGRAPHY, BATHYMETRY.

BORNE PHOTOGRAPHY, BATHYMETRY.

Large areas of grounded sea ice have been reported by early arctic explorers and more recently by the U.S. Coast Guard The ESSA, ERTS, NOAA, and DMSP satellites now provide multi-spectral imagery with sufficiently high resolution to allow detailed sequential observations to be made of the movement and spatial extent of arctic sea ice. This report discusses the location, formation, and decay of five large (>30 sq km) islands of grounded sea ice in the southern Chukchi Sea as observed for an extended period of time using satellite imagery. Measurements of the bathymetry around one grounded sea ice feature are presented along with observations made and photos taken from the ice surface. The potential use of these sea ice islands as research stations is also discussed.

IMPACT OF SPHERES ON ICE. CLOSURE. Yen, Y-C, et al. April 1972, 98(EM2), p.473. For original article and prior discussion see 25-2241 and 26-0978 respectively

Odar, F. Bracy, L.R.

ICE MECHANICS, IMPACT STRENGTH

MP 989 PROGRESS REPORT ON 25 CM RADAR OB-SERVATIONS OF THE 1971 AIDJEX STUDIES. Thompson, T.W., et al, Feb. 1972, No.12, p.1-16. Bishop, R.J., Brown, W.E.

RADAR PHOTOGRAPHY, ICE FLOES.

MP 990 USE OF INSTRUMENTATION UNDER ARCTIC CONDITIONS.

Atkins, R.T., Arctic Logistics Support Technology. Proceedings of a symposium held at Hershey, Pennsylvania, Nov. 1, 1971, Arctic Institute of North America, 1972, p.183-188, AD-744 669. 27.630

INSTRUMENTS.

MP 991

ARCTIC AND SUBARCTIC ENVIRONMENTAL ANALYSES UTILIZING ERTS-1 IMAGERY; BI-MONTHLY PROGRESS REPORT, 23 JUNE - 23

Anderson, D.M., et al, Aug. 23, 1972, NASA-CR-128095, 3p., N72-31361.
Haugen, R.K., Gatto, L.W., Slaughter, C.W., Marlar,

27-1441

REMOTE SENSING, ARCTIC ENVIRONMENT, SPACECRAFT.

MP 992 SURFACE-WAVE DISPERSION IN BYRD LAND, ANTARCTICA. Acharya, H.K., Aug. 1972, 62(4), p.955-959, 12 refs.

27-1490

ICE SHEETS, WAVE PROPAGATION, SNOW ACOUSTICS, SEISMIC VELOCITY, ANTARCTICA—MARIE BYRD LAND.

Assuming constant density and Poisson's ratio of 0 25, theoretical surface-wave dispersion has been computed for the Byrd Land area in Antarctica, where the velocity increases monotonically with depth. Comparison with observed dispersion indicates 8 to 10 per cent anisotropy in the ice cap Such anisotropy was also detected from ultrasonic velocity measurements on snow cores. (Auth.)

MP 993
SMALL-SCALE STRAIN MEASUREMENTS ON A GLACIER SURFACE.
Colbeck, S.C., et al, July 1971, 10(59), p.237-243, Also published as Washington (State) University. Department of Atmospheric Sciences. Technical report TR-12, Nov. 25, 1970. In English with French and German summaries. 10 refs. man summaries. 10 refs.

Evans, R.J.

GLACIER FLOW, CREVASSES, ICE DEFORMA-TION, STRAIN MEASUREMENT.

TION, STRAIN MEASUREMENT.

Surface deformations in the neighborhood of a crevasse field were measured over short (3 m) gape lengths in order to study flow conditions associated with crevasse formation. The results obtained were unusual in that they were inconsistent with large-scale results found by previous workers it was concluded that the presence of small-scale surface effects, such as fractures, porholes and healed crevasses give rise to small-scale deformation fields with large spatial and temporal variations, and that there is a lower limit of seve length

to similar-scale deformation fields with large spatial and temporal variations and that there is a lower limit of gage length below which deformation measurements pertinent to regional flow phenomena cannot be made. This lower limit is apparently an order of magnitude greater than the spacing of the features which give rise to localized effects.

MARIE BYRD LAND QUATERNARY VOLCAN-ISM: BYRD ICE CORE CORRELATIONS AND POSSIBLE CLIMATIC INFLUENCES. LcMasurier, W.E., Sept.-Oct. 1972, 7(5), p.139-141, 4

27-1956

ICE CORES, DRILL CORE ANALYSIS, VOLCAN-IC ASH, ANTARCTICA—MARIE BYRD LAND. IC ASH, ANTARCTICA—MARIE BYRD LAND. Published petrographic descriptions of the volcanic ash bands in the Byrd Station deep drill core (Gow. 1971; E-10325, and Gow and Williamson, 1971, F-10462) have suggested some sources for ash among the volcanoes in Byrd Land and some possible climatic implications of this volcanism. The available petrographic and age data on volcanoes that are known to have erupted in Byrd Land in Quaternary time. Mt. Murphy, Toney Mountain, Mt. Takahe, and Mt Waesche - suggest that Mt Waesche and Mt Takahe were the major sources of ash. Events recorded in the core occurred within the last 75,000 yr The most distinctive petrographic characteristics of the Quaternary volcanic rocks are the abundance of olivine, plagioclase, and titanaugite phenocrysts in the basalts, and of alkali feldspar and agerine phenocrysts in the acid rocks.

MP 995 SUMMARY OF THE 1971 US TUNDRA BIOME PROGRAM.

Brown, J., International Biological Programme, Tun-dra biome; Proceedings IV. International Meeting on dra biome; Proceedings IV. International Meeting on the Biological Productivity of Tundra, Leningrad USSR, October 1971. Edited by F.E. Wielgolaski and Th. Rosswall. Stockholm, Tundra Biome Steering Committee, April 1972, p.306-313.

RESEARCH PROJECTS. TUNDRA BIOME

UNITED STATES—ALASKA.

Briefly outlined are the U.S. Tundra Biome studies including the interrelationship's between tundra fauna and flora, photo-synthesis, carbon dioxide budget, wet tundra soil science, and lake and pond ecosystems. Activities were centered primarily on the Barrow, Alaska area.

INTERPRETATION OF THE TENSILE STRENGTH OF ICE UNDER TRIAXIAL STRESS

Nevel, D.E., et al. International Conference on Port and Ocean Engineering Under Arctic Conditions, 3rd, Fairbanks, Aug. 11-15, 1975, Vol.1, University of Alaska, 1976, p.375-387, 12 refs. Haynes, F.D.

32-2219

ICE MECHANICS, ICE STRENGTH, TENSILE STRENGTH, STRESSES.

Griffith, and later Babel, have previously developed a tensile fracture enterion for a two-dimensional state of stress

This theory is extended to the compression region region from this theory the angle of fracture is developed. For unaxial compression, the angle may be anywhere from 0 to 30 degrees measured from the direction of loading, dependent to the strength of the anytics. to 30 egrees measured from the direction of loading, depending upon the shape of the cavity. The theory is extended conceptually to three dimensions

Traxual test data by Haynes for snow-ice are shown in this three-dimensional fracture theory

The test data are slightly less than that predicted when the void in the snow-ice is spherical.

MP 997 OXYGEN ISOTOPE PROFILES THROUGH THE ANTARCTIC AND GREENLAND ICE SHEETS.

Johnsen, S.J., et al, Feb 25,1972, 235(5339), p.429-434, 37 refs.

Dansgaard, W., Clausen, H.B., Langway, C.C., Jr.

27-3046
ISOTOPE ANALYSIS, ICE SHEETS, OXYGEN
ISOTOPES, PALEOCLIMATOLOGY, ICE
CORES, GREENLAND, ANTARCTICA—BYRD
STATION.

The Camp Century, Greenland, deep ice core reveals seasonal The Camp Century, Greenland, deep ice core reveals seasonal variations in the isotopic composition of the ice back to 8,300 y.b.p. This is not the case for the Byrd Station, Antarctica, deep ice core. Both cores show iong-term perturbations in isotopic composition reflecting climatic changes from before the beginning of the last glaciation But the complexity of the glaciology regime at Byrd Station precludes a rational choice of a time scale Pole-to-pole correlations of the palaeoclimatic data therefore become speculative except for the more pronounced features and

MP QQR

CLIMATIC OSCILLATIONS DEPICTED AND PREDICTED BY ISOTOPE ANALYSES OF A GREENLAND ICE CORE.

Dansgaard, W., et al. 1971, 1st, Vol.1, p.17-22, 8 refs. Johnsen, S.J., Clausen, H.B., Langway, C.C., Jr.

ICE CORES, ISOTOPE ANALYSIS, CLIMATIC CHANGES, GREENLAND.

MP 1000

TECHNIQUE FOR PRODUCING STRAIN-FREE FLAT SURFACES ON SINGLE CRYSTALS OF ICE: COMMENTS ON DR. H. BADER'S LETTER AND DR. K. ITAGAKI'S LETTER.

Tobin, T.M., 1973, 12(66), p.519-520, 3 refs. 28-2375

ICE CRYSTALS, CRYSTAL STUDY TECHNIQUES, MICROSCOPY.

MP 1001

CUTTING ICE WITH HIGH PRESSURE WATER JETS.

Mellor, M, et al, U.S Coast Guard. Report USCG-D-15-73, Hanover, New Hampshire, U.S. Army Cold Regions Research and Engineering Laboratory, 1973, 22p., AD-766 172.

Gagnon, F. 28-2886

ICE CUTTING, ICE BREAKING, HYDRAULIC

The report describes high pressure water jet ice cutting experiments conducted in support of the Coast Guard domestice icebreaking program. The test objectives were to determine power requirements for cutting two feet of fresh

water ice at a speed of advance of 5 knots. The results of the tests show extremely high power requirements even when using state-of-the art equipment pumping at 100,000

MP 1002

RIVER-ICE PROBLEMS: A STATE-OF-THE-ART SURVEY AND ASSESSMENT OF RE-SEARCH NEEDS.

Burgi, P.H., et al, Jan. 1974, 100(HY1), p.1-15, 36 refs. Childers, J.M., Frankenstein, G.E., Kennedy, J.F., Ashton, G.D. 28-2918

RIVER ICE, ICE JAMS, ICE FORMATION, SEA-SONAL FREEZE THAW, ICE MECHANICS, ICE THERMAL PROPERTIES.

MP 1003

ARCTIC AND SUBARCTIC ENVIRONMENTAL ANALYSES USING ERTS-1 IMAGERY. PROG-RESS REPORT DEC. 72-JUNE 73. Anderson, D.M., et al, June 23, 1973, NASA-CR-138858, 75p., E74-10017. McKim, H.L., Haugen, R.K., Gatto, L.W.

REMOTE SENSING, MAPPING, PERMAFROST DISTRIBUTION, VEGETATION PATTERNS, SEDIMENT TRANSPORT.

SEDIMENT TRANSPORT.

Physiognomic landscape features were used as geologic and vegetative indicators in preparation of a surficial geology, vegetation, and permafrost map at a scale of 1:1 million using ERTS-1 band 7 imagery. The detail from this map compared favorably with USGS maps at 1 250,000 scale Physical boundaines mapped from ERTS-1 imagery in combination with ground truth obtained from existing small scale maps and other sources resulted in improved and more detailed maps of permafrost terrain and vegetation for the same area. ERTS-1 imagery provides for the first time, a means of monitoring the following regional estuarine processes daily and periodic surface water circulation patterns, changes in the relative sediment load of rivers discharging into the inlet, and, several local patterns not recognized changes in the relative sediment load of rivers discharging into the inlet, and, several local patterns not recognized before, such as a clockwise back eddy offshore from Clam Gulch and a counterclockwise current north of the Forelands. Comparison of ERTS-1 and Manner imagery has revealed that the thermokarst depressions found on the Alaskan North Slope and polygonal patterns on the Yukon River Delta are possibly analogs to some Martian terrain features

MP 1004 MORPHOLOGY OF THE NORTH SLOPE.

Walker, H.J., Alaskan arctic tundra. Edited by M.E. Britton. Arctic Institute of North America. Technical paper No.25, Washington, D.C., Sept. 1973, p.49-52, Numerous refs. 28-3606

PERMAFROST STRUCTURE, ARCTIC TOPOGRAPHY, GEOMORPHOLOGY, TUNDRA TERRAIN, CRYOGENIC PROCESSES, PERMAFROST HYDROLOGY, GROUND ICE, PATTERNIC CONTROL OF STRUCTURE, ARCTIC TOPOGRAPHY, GEOMETRIC TOPOGRAPHY, GROUND ICE, PATTERNIC TERNED GROUND.

MP 1005 PEDOLOGIC INVESTIGATIONS IN NORTH-ERN ALASKA.

Tedrow, J.C.F., Alaskan arctic tundra. Edited by M.E. Britton. Arctic Institute of North America. Technical paper No.25, Washington, D.C., Sept. 1973, p.93-108, Numerous refs 28-3607

TUNDRA SOILS, ARCTIC SOILS, RESEARCH PROJECTS.

MICROMETEOROLOGICAL INVE TIONS NEAR THE TUNDRA SURFACE. INVESTIGA-

Kelley, J.J., Alaskan arctic tundra Edited by M.E. Britton. Arctic Institute of North America. Technical paper No.25, Washington, D.C., Sept. 1973, p.109-126, Numerous refs 28-3608

20-3000 RESEARCH PROJECTS. MICROCLIMATOLO-GY, RADIATION BALANCE. TUNDRA SOILS, SOIL CHEMISTRY

MP 1007

ARCTIC LIMNOLOGY: A REVIEW.

Hobbie, J.E., Alaskan arctic tundra Edited by M.E.
Britton Arctic Institute of North America Techni-Britton Arctic Institute of North America Technical paper No 25, Washington, D.C., Sept. 1973, p. 127-168, Numerous refs

LIMNOLOGY, RESEARCH PROJECTS

VEGETATIVE RESEARCH IN ARCTIC ALASKA. Johnson, P.L., et al, Alaskan arctic tundra. Edited by M.E. Britton. Arctic Institute of North America. Technical paper No.25, Washington, D.C., Sept. 1973, p.169-198, Numerous refs.

Tieszen, L.L.

TUNDRA VEGETATION, ARCTIC VEGETA-TION, VEGETATION PATTERNS, RESEARCH PROJECTS.

MP 1909

INFLUENCE OF IRREGULARITIES OF THE BED OF AN ICE SHEET ON DEPOSITION RATE OF TILL.

Nobles, L.H., et al, Till: a symposium. Edited by R.P. Goldthwait, Columbus, Ohio State University Press, 1971, p.117-126, 8 refs. Weertman, J.

28-3686

GLACIAL TILL, GLACIAL DEPOSITS, GLACIAL GEACHE TIEL, GLACIER DEPOSITS, GLACIAL FEATURES, GLACIER ICE, SEDIMENT TRANS-PORT, ICE THERMAL PROPERTIES, GLACIER ABLATION, GLACIER FLOW.

MP 1010

MODEL SIMULATION OF NEAR SHORE ICE DRIFT, DEFORMATION AND THICKNESS. Hibler, W.D., III, International Conference on Port

and Ocean Engineering Under Arctic Conditions, 4th, St. John's, Sep. 26-30, 1977, Memorial University of Newfoundland, 1978, p.33-44, 15 refs.

SEA ICE, ICE MODELS, ICE MECHANICS, MATHEMATICAL MODELS.

MATHEMATICAL MODELS.
Simulation results for sea ice drift, deformation and ice thickness variations in the Arctic Basin are presented using a dynamic-thermodynamic model which treats the ice as a rigid plastic continuum. Using available observed atmospheric and oceanic forcing data, numerical model simulations are made over a four year long period employing one day time steps in a finite difference code with a resolution of 125km. Drift, deformation, stress and ice thickness time series from the simulation results in the near shore region off the Alaskan and Canadian North slope are reported and briefly examined in light of available observations

DIELECTRIC CONSTANT AND REFLECTION COEFFICIENT OF THE SNOW SURFACE AND NEAR-SURFACE INTERNAL LAYERS IN THE MCMURDO ICE SHELF.

Kovacs, A, et al, Oct 1977, 12(4), p.137-138, 9 refs.

SPOW SURFACE, SNOW ELECTRICAL PROPERTIES, ICE SHELVES, ICE ELECTRICAL PROPERTIES, RADAR ECHOES, ANTARCTICA—MCMURDO ICE SHELF.

—MCMURDO ICE SHELF.

An impulse radar system was used to profile the shape and lateral extent of the brine layer in the McMurdo Ice Shelf.

A small antenna was also used to determine if reflective layers could be detected in the upper 5 m of snow. The radiated impulse center frequency was 626 megahertz with an estimated frequency spectrum of 375 and 875 at the -3 decibel points. The measurement technique is described. The study indicates that layers of dielectric discontinuity can be detected at shallow depths in polar snow. The shallow depth at which the internal layers were detected suggests that they represent density variations in the snow, perhaps associated with summer melt features less than 5 mm thick.

MP 1012 ICEBERG THICKNESS PROFILING USING AN IMPULSE RADAR.

Kovacs, A., Oct. 1977, 12(4), p.140-142, 5 refs.

ICEBERGS, ICE COVER THICKNESS, RADAR ECHOES, MEASURING INSTRUMENTS.

ECHOES, MEASURING INSTRUMENTS.

Thickness measurements taken on a 100 to 500 m tabular iceberg in McMurdo Sound using an impulse radar system are discussed and illustrated

Calculated Jepths of the brine layer at the south and north ends of the iceberg were 13 7 and 17 4 m, respectively

The calculated Interpolation of the ceberg were 13 7 and 17 4 m, respectively

The calculated thickness of the teeberg at station 4.5 and stations 5 through 17 ranged from 900 to 60.5 m

The capparent freeboard-to-thickness ratio was 1 to 5.2, which is higher than the 1 to 3.6 freeboard-to-thickness analysis of Gow (1968, 1-6274) for antarette ice shelves of similar thickness. The data suggest a glacial rather than a shelf origin

MP 1013 SUBSURFACE MEASUREMENTS OF THE ROSS ICE SHELF, MCMURDO SOUND, AN-

Kovacs, A., et al, Oct. 1977, 12(4), p.146-148, 2 refs. Gow, A.J.

ICE SHELVES, BRINES, ICE COVER THICK-NESS, FIRN, ICE COMPOSITION, ANTARC-TICA—MCMURDO ICE SHELF.

TICA—MCMURDO ICE SHELF.

Depth characteristics, lateral continuity, and inland boundary of sea water infiliration in the McMudo Ice Shelf were monitored using a dual-antenna impulse radar profiler. The studies have provided new information on the brine infiliration zone, including data on changes in the elevation of the brine-soaked layer and ice shelf thickness as a function of distance from the shelf edge. The features of the brine layer are described and illustrated. Observations on the glacial ice/saline-ice transition on the Koettlitz Glacier tongue are summarized.

MP 1014 SEA ICE STUDIES IN THE WEDDELL SEA RE-GION ABOARD USCGC BURTON ISLAND. Ackley, S.F., Oct. 1977, 12(4), p 172-173, 2 refs. 32-2123

SEA ICE DISTRIBUTION, ICE COVER THICK-NESS, PACK ICE, ICE SALINITY, WEDDELL SEA.

SEA.

Sea ice studies in the Weddell Sea aboard Burton Island consisted of ice salinity measurements on meltwater from ice cores and thickness measurements taken in drilled holes. Ploes in the northern region were generally thicker than 2 m and in two regions exceeded 3 m on average. At higher latitudes in the middle of the Weddell Sea ice thicknesses exceeded 3 5 m. The thinnest ice was measured at the southernmost locations. It is concluded that advection is an important component in accounting for ice distribution in the Weddell Sea. In vivo fluorescence ineasurements of core meltwater revealed apparent relationships between ice salinity and biological activity (ice algae)

ENGINEERING PROPERTIES OF SNOW.

Mellor, M., 1977, 19(81), p.15-66, In English with French and German summaries. Refs p.62-65.

SNOW IMPURITIES, SNOW MECHANICS, SNOW THERMAL PROPERTIES, SNOW ELECTRICAL PROPERTIES, SNOW OPTICS, ENGINEERING, SNOW CRYSTALS, SNOWFALL, BLOWING SNOW.

NEERING, SNOW CRYSTALS, SNOWFALL, BLOWING SNOW.

The general properties of snow are described with a view to engineering applications of data. Following an introduction and a short note on the origins of snow, data are given for fall velocities of snow particles, and for mass flux and particle concentrations in falling snow and blowing snow. Notes on the structural properties of deposited snow cover grain size, grain bonds, bulk density, overburden pressure, and permeability. A section on impurities deals with stable and radioactive isotopes, chemical impunities, insoluble particles, living organisms, acidity, and gases. Mechanical properties are treated only selectively, and the reader is referred to another paper for comprehensive coverage. The selective treatment deals with stress waves and strain waves, compressibility, effects of volumetric strain on deviatoric strain, and specific energy for comminition on thermal properties covers heat capacity, latent heat, conductivity, diffusivity, heat transfer by vapor diffusion, heat transfer and vapor transport with forced convection, and thermal strain. The section on electrical properties opens with a brief discussion on dielectric properties of ice, and proceeds to a summary of the dielectric properties of ice, and proceeds to a summary of the dielectric properties of see, and proceeds to a summary of the dielectric properties of snow, including dielectric dispersion, permittivity, dielectric loss, and deconductivity. There are also notes on the thermoelectric effect and on electrical charges in falling and blowing snow. The section on optical properties deals with transmission and attenuation of sisble radiation, with spectral reflectance, and will congruence missivity. The review concludes with some comments on engineering problems that involve snow, and the requirements for research and development. (Auth.)

MP 1016

STRUCTURES IN ICE INFESTED WATER.

Assur, A., 1972, (Vol.2), Symposium on Ice and its Action on Hydraulic Structures, 2nd, Leningrad, Sept. 26-29, 1972. Papers, p.93-97, 7 refs

ICE LOADS, OFFSHORE STRUCTURES, ICE PRESSURE, ICE MODELS.

A method is presented to calculate the effective ice load A method is presented to calculate the effective (ce load on vertical structures depending upon width of structure related to ice thickness and fundamental (ice properties (anisotropic venurestrained crushing strength, Young's modulus, Poisson's ratio, internal friction). The bave equation satisfies the theoretical identation solution for a straight wall. Both extremes appear as simple intercepts on a plot which futhermore can be linearized. The concept is compared with largely Russian (ext material and equations which show gow, agreement. Internal friction must be considered in the analysis since it increases possible (ice forces. Due to this local identation forces by ice can be higher as previously assumed for the design of ships.

Buckling instability, introduced complications in model tests.

the field the random configuration of ice collars must be considered. For this a complete solution is still not available

MP 1017

REPORT ON ICE FALL FROM CLEAR SKY IN

GEORGIA OCTOBER 26, 1959. Harrison, L.P., et al, Washington, D.C., U.S. Weather Bureau, 1960, 31p. plus photographs, 12 refs. Friedman, I., Saylor, C.P., Swinzow, G.K. 28.3913

ICE STRUCTURE, CHEMICAL ANALYSIS, METEOROLOGICAL FACTORS, AIRPLANES.

The U.S. Weather Bureau, Geological Survey, National Bureau of Standards, National Institutes of Health, and SIPRE investigated the circumstances which resulted in the fall of a 30-40 pound chunk of ice from a clear sky.

These agencies concluded that the ice originated from a jet aircraft known to have been flying over the area where the fall was reported. The paper by Swinzow comprises Appendix J of the report.

MP 1018

DESTRUCTION OF ICE ISLANDS WITH EX-PLOSIVES.

Mellor, M., et al, International Conference on Port and Ocean Engineering Under Arctic Conditions, 4th, St. John's, Sept. 26-30, 1977, Vol 2, Memorial University of Newfoundland, 1978, p 753-765, 20 refs. See also 31-4112.

Kovacs, A., Hnatiuk, J. 32-2384

ICEBERGS, ICE ISLANDS, EXPLOSION EF-FECTS.

Past attempts at explosive demolition of icebergs and ice Past attempts at explosive demolition of icebergs and ice islands are reviewed, and more recent studies are described. Relevant properties of ice are compared with those of typical rocks, and data are given for crater blasting in ice and in rocks. Ice island destruction is analyzed for schemes involving (1) crater blasting, (2) blasting in water underneath the ice, (3) bench blasting, and (4) controlled presplit blasting. The analyses favor crater blasting as the most practical method of attack for small bergs and ice islands.

ICEBERG THICKNESS PROFILING.

Kovacs, A., International Conference on Port and Ocean Engineering Under Arctic Conditions, 4th, St. John's, Sept. 26-30, 1977, Vol.2, Memorial University of Newfoundland, 1978, p.766-774, 16 refs.

ICEBERGS, ICE COVER THICKNESS, RADAR ECHOES, PROFILES.

ECHOES, PROFILES.
Results obtained with an impulse radar system used to profile the thickness of a tabular iceberg in McMurdo Sound, Antarctica, and an ice island in the Beaufort Sea near Flaxman Island, Alaska, are presented. Graphic records are shown of the radar impulse travel time which clearly reveal, for the first time, the bottom relief of each ice formation. Also detected and shown are echo signatures from internal cracks and an infiltration-brine layer. The time of flight of the radar impulse in the ice island is compared with a 24 05-m drill hole measurement of the ice thickness. The effective velocity of the radar impulse in the ice island was found to be 0 16 m/ns and the effective delectric constant of the ice to be 3.5. (Auth.) MP 1020

TOWING ICEBERGS.

Lonsdale, H K, et al, March 1974, 30(3), p 2, Includes response by W F Weeks and W J Campbell 2 refs. Weeks, W.F., Campbell, W.J. 28-3927

ICEBERGS, WATER SUPPLY, LOGISTICS, ICE MELTING, ECONOMICS.

MELTING, ECONOMICS.
Referring to the article by Wecks and Campbell (1973, F-12650 or 28-898) the author questions the following facets of towing icebergs the costs of surveillance, the capital costs of the super-tug, the methods of melting, collecting the fresh water on the high seas, and transporting to the Atacama desert or central Australia, and how the total cost compares with the value of water at the intended use site Wecks and Campbell cite their paper on this subject (1973, F-12780 or 28-1322) which has included the costs of capitalization and a method of melting and collecting fresh water. It is suggested that surveillance costs would be small, and the authors do not believe their estimates of water costs for irrigation purposes to be unrealistically high

USE OF EXPLOSIVES IN REMOVING ICE JAMS.

Frankenstein, G.E., et al, Symposium on Ice and its Action on Hydraulic Structures, Reykjavík, Iceland, Sept 7-10, 1970 Papers and discussions, Reykjavík, Iceland, International Association for Hydraulic Research, 1970, 10p. Session 3.13 6 refs. Smith, N.

ICE JAMS, ICE CONTROL. EXPLOSIVES ICE REMOVAL

A brief history of the use of explosives for ice jam removal is discussed. Ammonium nitrate mixed with fuel oil is corsid red the best explosive for ice jam control because of its jost and safety features. For maximum effect, the

charge should be placed in the water below the ice. A curve is included which gives maximum crater hole diameter as a function of the cube root of the charge weight.

MP 1022

CLASSIFICATION AND VARIATION OF SEA ICE RIDGING IN THE ARCTIC BASIN Hibler, W.D., III, et al, Jan. 1974, No.23, p.127-146, 16 refs.

Mock, S.J., Tucker, W.B.

28-4069

SEA ICE, ICE STRUCTURE, ICE PRESSURE, ICE MODELS, PRESSURE RIDGES.

MODELS, PRESSURE RIDGES.

A one-parameter model for pressure ridges is developed and compared with good agreement to more than 3000 km of laser profile data taken from November 1970 to February 1973 in the Arctic basin.

Using a parameter called ridging intensity, which may be determined for a region from the mean number of ridges per unit length and the mean ridge height, the number of ridges per kilometer at any height level may be predicted. Results from a study of regional and temporai variation in ridging indicate that although magnitudes of ridging intensity vary in time, the relative regional variations are similar. Consequently, three distinct regions of ridging intensity having relatively stable boundaries can be defined. Annual variation in new ice production due to ridging is sufficiently large to suggest that ridging plays an important role in the overall mass balance of the Arctic basin.

MP 1023

SALINITY VARIATIONS IN SEA ICE.

Cox, G.F.N., et al, 1974, 13(67), p.109-122, In English with French and German summaries. 3 refs. Weeks, W.F.

29-72

SEA ICE, CHEMICAL ANALYSIS, SALINITY, ICE COVER THICKNESS.

The salinity distribution in multi-year sea ice is dependent on the ice topography and cannot be adequately represented by a single average profile. The cores collected from by a single average profile. The cores collected from areas beneath surface hummocks generally showed a systematic increase in salinity with depth from 0 per mile at the surface to about 4 per mille at the base. The cores collected from areas beneath surface depressions were much more saline and displayed large salinity fluctuations Salinity observations from sea see of varying thicknesses and ages collected at various Arctic and sub-Antarctic locations revealed collected at various Arctic and sub-Antarctic locations revealed a strong correlation between the average salinity of the ice Sand the ice thickness h. For salinity scriples collected from cold sea ice at the end of the growth season, this relationship can be represented by two linear equations: S=14.24-19.39 h (h<0.4 m); S=7.88-159 h (h>0.4 m); S=7.88-159 h (h>0.4 m). It is suggested that the pronounced break in slope at 0.4 m is due to a change in the dominant brine drainage mechanism from brine expulsion to gravity drainage. A linear regression for the data collected during the melt season gives <math>S=158+01 h An annual cyclic variation of the mean salinity exists for multi-year sea ice. The mean salinity reaches a maximum at the end of the growth season and a minimum at the end of the melt season.

MP 1024

ICE FORCES ON VERTICAL PILES.

Nevel, D.E., et al, U.S. Army Science Conference, West Point, N.Y., June 20-23, 1972. Proceedings. Vol. III, Washington, D.C., U.S. Army Research and Development Office, 1972, p.104-114, AD-750 358,

Perham, R.E., Hogue, G.B.

SEA ICE, ICE PRESSURE, PILE STRUCTURES.

SEA ICE, ICE PRESSURE, PILE STRUCTURES.

The force that floating ice sheets can exert on vertical piles is important to the design of both military and civilian structures. Present design codes call for 400 psi as the crushing strength of ice without regard to the influencing factors and their variation. The forces which drive the ice into the structure can be water currents, wind, or thermal expansion. These driving forces may be large enough to cause the ice to fail at or near the surface. The purpose of this research is to define this limiting force level and gain a better understanding of the failure process in the ice. (Auth.)

MP 1025

WATER PERCOLATION THROUGH HOMO-GENEOUS SNOW.

Colbeck, S.C., et al, The role of snow and ice in hydrology; proceedings of the Banff Symposia, Sept. 1972, Vol.1, Geneva, Switzerland, WMO-1AHS, Unesco, 1973, p.242-257, With French summary. 7 refs. Includes discussions.

Davidson, G.

29-211 SNOW WATER CONTENT, SNOWMELT, SNOW COVER STRUCTURE, SNOW PERMEABILITY.

The gravity flow theory of water percolation through snow is generalized to include any power law relationship between permeability to the water phase and effective water saturation. Experimental observations of water percolation through homogeneous snow are described. It is found that the exponent in the power law is about 3 for homogeneous snow. The theory is used to construct durinal meltweier waves and these compare favorably with the observed waves. The

differences between the results found for natural snow and those found for repacked snow are discussed The lower limit of applicability of the gravity flow theory is uncertain.

MP 1026 SEASONAL REGIME AND HYDROLOGICAL SIGNIFICANCE OF STREAM ICINGS IN CEN-TRAL ALASKA.

TRAL ALASKA.

Kane, D.L., et al, The role of snow and ice in hydrology; proceedings of the Banfi Symposia, Sept. 1972, Vol.1, Geneva, Switzerland, WMO-IAHS, Unesco, 1973, p. 528-540, With French summary. 16 refs. Includes discussions.

Slaughter, C.W.

29.232

RIVER ICE, FREEZEUP, ICE FORMATION, AERIAL PHOTOGRAPHY, METEOROLOGICAL FACTORS. HYDROLOGIC CYCLE.

FACTORS, HYDROLOGIC CYCLE.

Many streams in Arctic and sub-Arctic regions are characteized by accumulations of ice in the channel and nearby
floodplain during the winter months Field data on the
rates of growth of this icing and on vanous climatic factors
has been collected at a small research watershed near Fairbanks,
Alaska. The volume of icing growths is estimated from
aerial photographs. Hydrologic implications are derived
by comparing the volume of these icings with other elements
of the hydrologic cycle Discussion on how the hydrologic
cycle is modified by these ice accumulations is also included.

LIP 1027 MEASURING THE UNIAXIAL COMPRESSIVE

STRENGTH OF ICE.
Haynes, F.D., et al, 1977, 19(81), p.213-223, In English with French and German summaries.

32-1445

COMPRESSION, COMPRESSIVE ICE. STRENGTH, ICE STRENGTH, SHEAR STRESS, ICE CRYSTALS, MEASURING INSTRUMENTS. ICE CRYSTALS, MEASURING INSTRUMENTS.

An attempt was made to develop a simple but accurate method for making compressive strength tests on right circular cylinders. Compliant loading platens were designed to apply uniform normal stress without introducing significant interface radial shear stresses. The compliant platens gave reproducible results that agree well with results obtained by a precise conventional technique. Accurate results were obtained with simple specimen preparation, and with short specimens where the length-to-diameter ratio was less than unity. Platens were made from a rubber-like urethane which was molded in aluminum cylinders to provide lateral unity. Uniaxial compression tests on cylindrical polycrystalline ice specimens were made to determine the characteristics of the platens. For 21 specimens with ends prepared on a lapping plate to obtain a mirror finish, the measured istics of the platens For 21 specimens with ends prepared on a lapping plate to obtain a mirror finish, the measured strength showed a variation of only 13% for length-to-diameter ratios from 0.74 to 2.5, with no systematic trend. Another 21 specimens with length-to-diameter ratios of about 2.35 were tested with various platens and various methods of specimen end preparation. The strength for specimens with saw-cut ends and for those with ends lapped showed very little difference when tested with the rubber platens

INVESTIGATION OF AUTOMATIC DATA COL-LECTION EQUIPMENT FOR OCEANOGRAPH-IC APPLICATIONS.

Dean, A.M., Jr., International Conference on Port and Ocean Engineering Under Arctic Conditions, 4th, St. John's, Sept. 26-30, 1977, Vol.2, Memorial University of Newfoundland, 1978, p.1 11-1121, 13 refs. 32-2407

REMOTE SENSING, MONITORS, OCEANOG-RAPHY, DATA PROCESSING, METEOROLOGI-CAL DATA

This paper deals with the instrumentation requirements for in-situ monitoring of specified factors in open water— It contains application information suitable for an organization initiating or extending an oceanographic data collection program. The analysis includes an investigation and evaluation of sensing methodology, sensors, monitoring equipment, and available data collection systems. A comparison of available equipment for a first-year effort is presented.

MP 1029

MESOSCALE MEASUREMENT OF SNOW-COVER PROPERTIES.

Bilello, MA, et al, The role of snow and ice in hydrology; proceedings of the Banff Symposia, Sept 1972, Vol.1, Geneva, Switzerland, WMO-IAHS, Unesco, 1973, p.624-643, With French summary. 16 rrfe

Bates, R.E., Riley, J.

SNOW DEPTH, SNOW DENSITY, METEORO-LOGICAL FACTORS. SNOW TEMPERATURE.

LOGICAL FACTORS, SNOW TEMPERATURE. Physical characteristics of the snow cover and associated meteorological conditions we e observed at nineteen sites in and around Fort Greely, Alaska, during the winter of 1966-67. Snowfall totaled 245 cm and maximum snow depths of 80 to 100 cm were observed in a major portion of Fort Greely. Measurements at nine sites showed the snow density to be light, for example, the average density in the forest was less than 0.24 g.cc. However, exceptions

could be precised as observed at Ja. * Creek, where the densit. * craged 0.33 g/cc Daily t. pperature measurements made within the snow pack at a showed that the snow in the forest was colder than the at exposed sites. Associations between snow cover properies and weather were tested and the results substantiated revious studies, which showed good relationships between seasonal snow cover density and windspeed/air temperatives.

ARCTIC AND SUBARCTIC ENVIRON: FENTAL ANALYSES UTILIZING ERTS-1 IMAGERY. BIMONTHLY FROGRESS REPORT, 23 AUG. -23 OCT, 1973.

Anderson, D.M., et al, Oct. 23, 1973, NASA-CR-135846, 3p., N74-11146.

McKim, H.L., Haugen, R.K., Gatto, L.W., Slaughter,

C.W., Marlar, T.L. 29-535

REMOTE SENSING, ERTS IMAGERY.

MP 1031

ARCTIC AND SUBARCTIC ENVIRONMENTAL ANALYSES UTILIZING ERTS-1 IMAGERY.
BIMONTHLY PROGRESS REPORT, 23 OCT. - 23 **DEC. 1973.**

DEC. 1973.

Anderson, D.M., et al, Dec. 23, 1973, NASA-CR-156293, 6p., N74-14034.

McKim, H.L., Haugen, R.K., Gatto, L.W., Slaughter, C.W., Marlar, T.L.

REMOTE SENSING, ENVIRONMENTS, ERTS IMAGERY.

RESULTS OF THE US CONTRIBUTION TO THE JOINT US/USSR BERING SEA EXPERI-

Campbell, W.J., et al, May 1974, NASA-TM-X-70648, 197p., N74-22971, Refs. Chang, T.C., Fowler, M.G., Gloersen, P., Ramseier, R.O., Kuhn, P.M., Ross, D.B., Stambach, G., Webster, W.J., Jr., Wilheit, T.T.

SEA ICE, ICE MECHANICS, ICE STRUCTURE, DRIFT, METEOROLOGICAL FACTORS.

DRIFT, METEOROLOGICAL FACTORS.

The atmospheric circulation which occurred during the Bering Sea Experiment, 15 February to 10 March 1973, in and around the experiment area is analyzed and related to the macroscale morphology and dynamics of the sea ice cover. The ice cover was very complex in structure, being made up of five ice types, and underwent strong dynamic activity. Synoptic analyses show that an optimum variety of weather situations occurred during the experiment an initial strong anticyclonic period (6 days), followed by a period of strong exclonic activity (6 days), followed by a period of strong exclonic activity (3 days), and simily a period of weak exclonic activity (3 days), and simily a period of weak exclonic activity (4 days). The data of the mesoscale test areas observed on the four sea ice option flights, and ship weather, and drift data give a detailed description of mesoscale ice dynamics which correlates well with the macroscale view anticyclonic activity advects the ice southward with strong ice divergence and a regular lead and polynya pattern, cyclonic activity advects the ice northward with ice convergence, or slight divergence, and a random lead and polynya pattern. (Auth.) (Auth.)

MP 1033

PROPANE DISPENSER FOR COLD FOG DISSI-PATION SYSTEM.

Hicks, J.R., et al, U.S. Air Force Electrical Systems Division, L.G. Hanscomb Field, Mass., ESD-TR-73-208, Hanover, New Hampshire, Cold Regions Research and Engineering Laboratory, 1973, 38p. AD-762 292. Includes as App. B. Evaluation of cloud seeding with liquefied propane by Veal and Auer. 4 refs. Lukow, T.E. Veal, D.L., Auer, A.H., Jr. 29-1286

FOG DISPERSAL, AIRCRAFT LANDING AREAS, AEROSOLS, SMOKE GENERATORS, COST ANALYSIS

MP 1034

ICE-CRATERING **EXPERIMENTS** BLAIR LAKE, ALASKA.

Kurtz, M K, et al. Nov. 25, 1966, NCG/TM 66-7,

Various pagings, No microfiche available. Benfer, R. H., Chostopher, W. G., Frankenstein, G.E., Van Wyhe, G., Roguski, E.A. 29-192

LAKE ICE, EXPLOSION EFFECTS, ICE BREAK-HP

Operation BREAKUF, FY 66, was a series of small, single Operation BREAKLF, FY 66, was a series of small, single and now charge, chemical explosive detonations fired in fresh water to crater the overlying sheet ice. The experiments were conducted in the winter of 1966 to there feet of ice at Blair Lake, 33 miles SSE of Fa. 3, Alaska. The operation had the following purposes (2) o determine the cratering effects of single and row charges detonated below an ice layer, (2) to study bubble coalescence, and (3) to support theoretical studies of cratering physics. Technical programs included crater measurements, ice surface nical programs included crater measurements, ice surface

motion, engineering properties, and fish surveys Some results and conclusions were: (1) the relationship between depth of detonation and ice crater radius has been defined for 136 pound C4 spherical charges for various experimental conditions; (2) shock wave reflection from the lake bottom did not appear to enhance the crater dimensions; (3) row charge crater dimensions were defined for three charge spacings; (4) cracks appeared to propagate better from larger yield explosions under ice of the same thickness, (5) there did not appear to be any evidence of bubble coelescence in the experiments, (6) commonly used scaling laws may be used to estimate the effects of higher yield ice creating explosions; (7) the procedures used are adaptable to civil application; (8) a detailed evaluation was made of the effects of under-ice explosions on fish, and (9) maintenance of open water gaps created by explosions is affected by refreezing and water currents. Examples of practical engineering applications of the BREAKUP results are included.

MP 1035 MESO-SCALE STRAIN MEASUREMENTS ON THE BEAUFOURT SEA PACK ICE (AIDJEX

Hibler, W.D., III, et al, 1974, Vol 43-44, p.119-138, ln

Russian. 21 refs. Weeks, W.F., Ackley, S.F., Kovacs, A., Campbell,

29-2023

PACK ICE, ICE DEFORMATION, DRIFT, AERIAL RECONNAISSANCE, ICE REPORTING, AERIAL PHOTOGRAPHS

LAND TREATMENT OF WASTEWATERS. Reed, S.C., et al, No.,-Dec, 1974, p.12-13. Buzzell, T.D.

WASTE TREATMENT, SEEPAGE, SURFACE DRAINAGE

MP 1037 USE GF DE-ICING SALT—POSSIBLE ENVI-RONMENTAL IMPACT. Minsk, L.D., 1973, No.425, p.1-2.

CHEMICAL ICE PREVENTION, SALTING. Hamorous introduction to a series of 8 reports on various series of salting

MP 1038

DEPTH OF WATER-FILLED CREVASSES THAT

ARE CLOSELY SPACED.
Robin, G. de Q., et al, 1974, 13(69), p.543-544, Robin's comments on Weertman's article "Can a waterfilled crevasse reach the bottom surface of a glacier?" and Weertman's reply. 5 refs.

Weertman, J.

GLACIER ICE, CREVASSES, UNFROZEN WATER CONTENT, ATMOSPHERIC PRES-

NEW ENGLAND RESERVOIR MANAGEMENT: LAND USE/VEGETATION MAPPING IN RESERVOIR MANAGEMENT (MERRIMACK RIVER BASIN)

Cooper, S., et al, June 14, 1974, NASA-CR-139239, 30p, E74-10669.

McKim, H.L., Gatto, L.W., Merry, C.J., Anderson, 29-2456

REMOTE SENSING, AERIAL PHOTOGRAPHY, VEGETATION PATTERNS, MAPPING.

VEGETATION PATTERNS, MAPPING. It is evident from this companison that for lard use/vegetation mapping the S190B Skylab photography compares (avorably with the RB-57 photography and is much superior to the ERTS-1 and Skylab 190A imagery. For most purposes the 12.5 meter resolution of the S190B imagery is sufficient to permit extraction of the information required for rapid land use and vegetation surveys necessary in the management of reservoir or watershed. The ERTS-1 and S190A data products are not considered adequate for this purpose, although they are useful for rapid regional surveys at the level 1 category of the land use/vegetation classification system.

REMOTE SENSING PROGRAM REQUIRED FOR THE AIDJEX MODEL.

Weeks, W.F., et al, Nov. 1974, No.27, p.22-44, 18 refs. Coon, M.D., Campbell, W.J.

RESEARCH PROJECTS, SEA ICE, REMOTE SENSING, ICE MODELS, ICE COVER THICK-NESS, STRAINS, SURFACE ROUGHNESS, AERI-AL PHOTOGRAPHS, MEASURING INSTRU-

MP 1041 INVESTIGATION OF ICE FORCES ON VERTI-CAL STRUCTURES.

Hirayama, K., et al, June 1974, No.158, 153p., 57 refs. Schwarz, J., Wu, H.-C

ICE LOADS, OFFSHORE STRUCTURES, ICE CRACKS, FRACTURE ZONES, TENSILE STRENGTH, PILE STRUCTURES, STRAIN

TESTS.

The lowa Institute of Hydraulic Research has undertaken model studies on the investigation of ice forces on vertical piles. Model techniques for the study of ice-breaking phenomena have been developed, and the similarity between the model indications and prototype conditions has been demonstrated. Tests on the relationships between ice forces (ice strength) and pile diameter, ice thickness, and relative velocity (strain rate) between ice and structure have been completed. The experimental results were satisfactorily explained by a theoretical approach, and the combination of these relationships led to a basic empirical formula for a circular pile, which agrees with available field measurements and also in part with model investigations in Russia. The suggested formula was modified for application to different structural shapes and degree of contact between ice and structure as well as for application to the indentation case of pile-ice interaction. of prience interaction.

MP 1042

STABILITY OF ANTARCTIC ICE.
Weertman, J., Jan. 17, 1975, 253(5488), p.159.

ICE SHEETS, ICE SHELVES, FLOW RATE, ICE COVER THICKNESS, ANTARCTICA—ROSS ICE SHELF.

SHELF.

The author comments of the continued existence of the apparently unstable Wes. Antarctic Ice Sheet and Ross Ice Shelf.

The new Feld data on the Ross Ice Shelf and fast moving ice streams obtained by G. Robin (29-3125 or F-14813) is considered essential to the future solution of this geophysical puzzle. It is possible that the West Antarctic Ice Sheet is indeed disintegrating as suggested by T. Hughes (29-0067 or F-12956). A more accurate answer to this question should be obtainable from a three dimensional glacier mechanics analysis carried cut with the aid of computer calculations or with field observations. It is hoped that Robin's data on ice streams may also help to solve the problem of why fast moving ice streams form near the edge of the West Antarctic Ice Sheet.

SOIL PROPERTIES OF THE INTERNATIONAL TUNDRA BIOME SITES.

Brown, J., et al, International Biological Programme Tundra Biome. Microbiology, Decomposition and Invertebrate Working Groups. Meeting, University of Alaska, Fairbanks, August 1973. Proceedings (Soil organisms and decomposition in tundra), Stockholm Sweden, International Biological Program, Tundra Biome Steering Committee, 1974, p 27-48, 31 refs Veum, A.K.

TUNDRA SOILS, SOIL COMPOSITION, SOIL CHEMISTRY, TUNDRA BIOME, SOUTH GEORGIA, SIGNY ISLAND, MACQUARIE IS-

29-3348

LAND.

The soils of the national Tundra Biome sites, which include subantarctic locations, reflect a significantly wide range of soil-forming factors and conditions. It is the purpose of this report to present the most representative set or sets of soil data available for each national project. Presentation of data is confined to the upper three to four soil layers or horizons since these act the most biologically significant for purposes of this volume and other Tundra Biome synthesis activities. The main emphasis here is to provide physical, chemical and thermal soils properties which supplement data presented elsewhere in this volume and which are required for subsequent interpretations of those reports. A hiref summary of major soil conditions at each site is given in order to provide the uninitiated reader with a cursory understanding of the soil physical environment. standing of the soil physical environment

MP 1044
CAN A WATER-FILLED CREVASSE REACH
THE BOTTOM SURFACE OF A GLACIER?.
Weertman, J., 1973, No.95, p.139-145, 7 refs., In
English with French summary.

29-3729

79-3729
CREVASSES, SUBGLACIAL DRAINAGE, PENETRATION. TENSILE STRESS, ICE PRESSURE, ANALYSIS (MATHEMATICS), CREEP PROPERTIES, MAGMA.

MP 1045

ELECTRICAL RESISTIVITY PROFILE OF PER-MAFROST

Hockstra, P., Nov. 1974, No.113, p 28-34, 6 refs.

SU-SUO ELECTRICAL RESISTIVITY, PERMAFROST STRUCTURE, DIELECTRIC PROPERTIES, UN-FROZEN WATER CONTENT.

MP 1046

AIRBORNE E-PHASE RESISTIVITY SURVEYS OF PERMAFROST - CENTRAL ALASKA AND MACKENZIE RIVER AREAS.

Sellmann, P.V., et al, Nov. 1974, No.113, p.67-71. McNeill, J.D., Scott, W.J.

PERMAFROST INDICATORS, ELECTRICAL RESISTIVITY, AIRBORNE EQUIPMENT, SUR-FACE STRUCTURE, DISCONTINUOUS PERMA-FROST

MP 1047

ARCTIC AND SUBARCTIC ENVIRONMENTAL ANALYSIS UTILIZING ERTS-1 IMAGERY. FINAL REPORT JUNE 1972-FEB. 1974.

Anderson, D.M., et al, Feb. 28, 1974, NASA-CR-142538, 128p.
McKim, H L, Gatto, L.W., Haugen, R.K., Crowder, W.K., Slaughter, C.W., Marlar, T.L.
30-1296

RIVER FLOW, SEDIMENTS, PERMAFROST DIS-TRIBUTION, SNOW COVER, RIVER ICE, SEA ICE, MAPPING, REMOTE SENSING, ERTS IM-AGERY.

AGERY.

The author has identified the following significant results. ERTS-1 imagery provides a means of distinguishing and monitoring estuarine surface water circulation patterns and changes in the relative sediment load of discharging rivers on a regional basis. Physical boundaries mapped from ERTS-1 imagery in combination with ground truth obtained from existing small scale maps of permafrost terrain and vegetation for the same area. Snowpeck lover within a research watershed has been analyzed and, compared to ground data. Large river icings along the preposed Alaska pipeline route from Prudhoe Bay to the Brooks Range have been monitored. Sea ice deformation and drift northeast of Point Barrow, Alaska have been measured diring a four day period in March and shore-fast ice accumulation and ablation along the west coast of Alaska have been mapped for the spring and early ummer seasons.

MP 1048

WASTE MANAGEMENT IN THE NORTH. Rice, E., et al, Winter 1974-75, 6(4), p.14-41.

30-1598 WASTE TREATMENT, SEWAGE TREATMENT, SANITARY ENGINEERING.

MP 1049

ELECTRICAL GROUND IMPEDANCE MEAS-UREMENTS IN ALASKAN PERMAFROST RE-

Hockstra, P., April, 1975, FAA-RE 75-25, 60p., ADA-011 458, 18 refs.

FLECTRICAL RESISTIVITY, WAVE PROPAGA-TION, PERMAFROST CEPTH, PERMAFROST CHICKNESS, RADIO WAVES

THICKNESS, RADIO WAVES

New results about ground conductivity in North Americe became available from gooph, sical studies near Fairbanks, from sites along the Alaska Pipeline and in several areas of the Canadian Arctic: at these locations ground and/or airborne conductivity measurements were made by measuring the waveful and/or the surface impedance of radio ground-waves. The results showed that the ground conductivity in permafrost areas of North America is very heterogeneous, so that it is not directly apparent how to assign an effective conductivity value to a path of practical length (approx. 100 km). The geological and permafrost conditions vary much in Alaska, so that measurements at a location are representative of a small area only, leaving large areas of Alaska open to question. Thereficial evaluations of the seasoial changes in ground conductivity and their effect on radiowave propagation and electrical grounding are also discussed.

MP 1050

BARROW, AL ASKA, USA.
Bunnell, F.L., et al., 1975, No 20, International Meeting on Biological Productivity of Tundra, 5th: IBP Tundra Biome, Auisko, Sweden, April 16-24, 1974. Structure and function of tundra ecosystems, edited by T. Rosswall and O.W. Heal, p 73-124, 79 refs. MacLean, S.F., Jr., Brown, J.

JU-2199
TUNDRA CLIMATE, SOLAR RADIATION,
SNOWMELT, TUNDRA VEGETATION,
MOSSES, LICHENS, SOIL, COMPOSITION,
UNITED STATES—ALASKA—BARROW.

RADIATION AND EVAPORATION HEAT LOSS DURING ICE FOG CONDITIONS. McFadden, T., Jan. 1975, No 114, p.18-27, 8 tefs.

30-2552 ICE FOG. HEAT LOSS, EVAPORATION, WATER

TEMPERATURE, RADIATION, WIND (METEOROLOGY), UNITED STATES ALAS-

MP 1052

C-14 AND OTHER ISOTOPE STUDIES ON NATURAL ICE.

Oeschger, H., et al, International conference on radiocarbon dating, 8th, Oct. 18-25, 1972. Proceedings. Vol. 1, Wellington, Royal Society of New Zealand, 1972, p.D70-D92, 26 refs.

way, C.C., Jr., Hansen, B.L., Clausen, H.B. 30-3086 Stauffer, B., Bucher, P., Frommer, H., Moll, M., Lang-

ICE DATING, ISOTOPE ANALYSIS, GLACIER ICE.

On several field projects in Greenland, Antarctica and the On several field projects in Greenland, Antarctica and the Swiss Alps, the extraction technique of traces from several trus of ice has been developed and perfected. The procedures are as follows. Surface ice samples are melted in vacuum melt vessels, whereas in bore holes the ice is melted in situ under vacuum at the desired depth. Until now the maximum depth from which samples have been extracted is 780 m. The gasse scaping during the melting process are pumped through a molecular sieve for drying and collection of CO2. The remaining gases are compressed for further treatment in the laboratory Soluble chemistry and collection of CO2. The remaining gases are compressed for further treatment in the laboratory may be carned out either on the melt water pumped to the surface (collection of Si) or down hole by circulating the melt water through ion exchange resins (collection of CO2). The melt water can be filtered for the collection of pollen, terrestrial and cosmic dust Uncontaminated CO2, Ar and Si samples can be obtained for radioisotopic dating. The results of the Si-32 samples allow us to establish an apparent half-life for Si-32 dating. The possible causes of the C-14 variations are discussed and ways to solve the problem suggested. (Auth.)

ECOLOGICAL INVESTIGATIONS OF THE TUNDRA BIOME IN THE PRUDHOE BAY RE-GION, ALASKA.

Brown, J., ed, Oct. 1975, No.2, 215p., For selected papers see 30-3305 through 30-3313. Numerous refs.

SOILS, TUNDRA VEGETATION, TUNDRA

TUNDRA SOILS, TUNDRA VEGETATION, SNOW COVER, ANIMALS, TUNDRA BIOME, UNITED STATES—ALASKA—PRUDHOE BAY. During the period 1970-1974, the U.S. Tundra Biome Program, which was statuoned primarily out of Barrow, performed a series of environmental and terrestrial ecological studies. which was stationed primarily out of Barrow, performed a series of environmental and terrestrial ecological studies at Prudhoe Bay This volume reports specifically on the Prudhoe results and is divided into three major subdivisions, (1) aboute and soil investigations, (2) plant investigations, and (3) animal investigations. The aboute section contains papers on the air and soil temperature regimes, the snow cover, particularly its properties adjacent to the roadnet, major soil and landform associations, and the chemical composition of soils, runoff, lakes, and rivers. The plant section contains reports on a general vegetation survey, a follow-up vegetation mapping project, and a study of the growth of arctic, boreal, and alpine biotypes in an experimental transplant garden. The animal section contains reports on the tundra invertebrates, the bird, lemming, and fox populations, and the behavioral and physiological investigations of caribou and several experimental reindeer. Appendices contain a checklist of the vascular, bryophyte, and lichen flors of the Prudhoe Bay area and selected date on vegetatior Severai of the papers draw comparisons with the Barrow tundra. The volume includes a considerable number of tables in its attempt to document for the first time tha abiotic, flora, and fauna of this relatively unknown arctic tra landscape.

MP 1054

SELECTED CLIMATIC AND SOIL THERMAL CHARACTERISTICS OF THE PRUDHOE BAY REGION.

Brown, J., et al, Oct. 1975, No 2, p 3-12, 7 refs. Haugen, R.K., Parrish, S

TUNDRA SOILS, CLIMATE, AIR TEMPERATURE, SOIL TEMPERATURE, UNITED STATES
--ALASKA-PRUDHOE BAY.

MP 1055

NEAR REAL TIME HYDROLOGIC DATA AC QUISITION UTILIZING THE LANDSAT SYS-

McKim, H.L., et al, Conference on soil-water problems in cold regions, Calgary, Alberta, Canada, N., 6-7, 1975, Proceedings, 1975, p.200-211, 4 refs. Anderson, D.M., Berg, R.L., Tuinstra, R.L.

30-3342 REMOTE SENSING, SPACECRAFT, DATA TRANSMISSION, MEASURING INSTPU-MENTS, LANDSAT.

MENTS, LANDSA^T.

The LANDSAT Parta Collection System (DCS) invides the capability of rapidly collecting hydrologic, meteofologic and environmental data at remote sites throughout the United States and Canada. The coded signals are transmitted via satellite to NASA ground receiving stations where the data are compiled and feletyped to the user. The number of transmissions per day varies considerably depending on the location of each data collection platform (DCP). During the part of the control the location of each data collection platform (OCF). During the past two years, many sensors have been interfaced to the DCP, one of the most important is a porous cup tensiometer.

constructed so that a transducer provides a continuous reading of pore water pressure. Field tests have shown that the transmissions from the DCP are accurate and reliable. This system appears to provide a reliable means of measuring pore water pressure at freeze-up and thaw, critical data needed for validation of current hydrologic models.

MP 1056 GLACIOLOGY'S GRAND UNSOLVED PROB-LEM.

Weertman, J., Mar. 25, 1976, 260(5549), p.284-286. 30-3369

ICE SHEETS, GLACIER OSCILLATION, ICE SHELVES, SEA LEVEL. ICE

Glaciology's grand unsolved problem, or set of interrelated problems, concerns the West Antarctic Ice Sheet, how it Giaciology's grand unsolved problem, or set of interrelated problems, concerns the West Antarctic Ice Sheet, how it formed, whether it it growing or disintegrating, why fast moving ice streams form at its periphery, etc. Geological evidence indicates that before 10,000 yr ago the West Antarctic Ice Sheet was much larger, covering the area, now below sea level, presently occupied by the Ross Ice Shelf and that a large scale retreat took place at its edge. The retreat was probably caused by the large rise in sea level that occurred when the ice sheets in the northern hemisphere melted at the end of the last ice age. It has been suggested that the West Antarctic Ice Sheet is still disintegrating, its edge retreating where it joins the Ross Ice Shelf on the order of 70 m/yr. This slowly occurring destruction could account for the present rate of rise of the mean sea level Recent data collected on the Ross Ice Shelf reaches the startling conclusion that the position of the edge of the ice sheet at least at one location is advancing at the very fast rate of 1 km/yr. Extensive field data will be required to determine whether the ice sheet is disintegrating or growing and at what rate.

MP 1057

MP 1057 MECHANICAL PROPERTIES OF SNOW USED AS CONSTRUCTION MATERIAL

Wuori, A.F., 1975, Vol.326, p.157-164, In Russian. 14 refs.

SNOW (CONSTRUCTION MATERIAL), SNOW ROADS, ICE ROADS, ICE RUNWAYS, SNOW MECHANICS, SNOW COMPACTION, SNOW BEARING STRENGTH, TESTS.

Various methods are feasible for processing snow into a construction material in polar areas where conventional materials are uneconomical or impractical state unconsiderable alteration of the rechanneal properties of snow, this study is concerned with these alterations. The problems of compacting snow for road, airstrip and building construction are examined.

MP 1058

METHODS OF MEASURING THE STRENGTH OF NATURAL AND PROCESSED SNOW. Abele, G, 1975, Vol.326, p.176-186, In Russian. 14

30-3629

SNOW (CONSTRUCTION MATERIAL), ICE RUNWAYS, SNOW COMPACTION, SNOW ROADS, AIRPORTS, SNOW BEARING BEARING STRENGTH.

MP 1059 TECHNIQUES FOR USING LANDSAT IMAGE-RY WITHOUT REFERENCES TO STUDY SEA ICE DRIFT AND DEFORMATION.
Hibler, W.D., III. et al, Mar. 1976, No.31, p.115-135.

Tucker, W.B., Weeks, W.F. 30-3888

SEA ICE, DRIFT, ICE DEFORMATION, POSITION (LOCATION), LANDSAT.

TION (LOCATION), LANDSAT.

A semi-automatic procedure is described for transferring ice coordinates rapidly and accurately from one LANDSAT image to another and for simultaneously estimating all linear inceasures of the ice deformation. The procedure takes into acci int the non-parallel nature of the longitude lines and the finite curvature of the latitude lines, factors which are particularly critical in the polar regions. Necessary inputs are the location coordinates (latitude and longitude) of the entire of each inceasured the location of the control o of the center of each image and the location of two arbitraty points on a line of longitude on the image. These equations, which are valid over distances of several hundred kilometers. by pass the complex and time-consuming procedure of projecting points on the spheroid. After the transfer of common ree feature locations (on successive days) is completed, a least squares program yields the average strain rate and vorticity, with the strain rate being independent of errors in the transfer of the coordinate system. Transfer, vorticity, and strain rate errors of the technique are described.

MP 1060 LABORATORY INVESTIGATION OF THE ME-CHANICS AND HYDRAULICS OF RIVER ICE JAMS.

Taunclaux, J.C., et al, Mar. 1975, No. 186, 97p., 7 refs. Lee, C.L., Wang, T.P., Nakato, T., Kennedy, J.F. 30-4136

ICE JAMS, RIVER ICE, ICE MECHANICS, HY-DRAULICS, COMPRESSIVE STRENGTH, ICE COVER THICKNESS, ICE FLOES, FLOW RATE, EXPERIMENTAL DATA

MP 1061

ROSS ICE SHELF PROJECT DRILLING, OCTO-BER-DECEMBER 1976.

Rand, J.H., Oct. 1977, 12(4), p.150-152, 4 refs. 32-2116

ICE SHELVES, ICE CORING DRILLS, DRILL-ING, ANTARCTICA—ROSS ICE SHELF.

ING, ANTARCTICA—ROSS ICE SHELF.

The wire line core drilling system used for the Ross lee Shell Project and the problems encountered in using the equipment are described. The proposed plans included drilling four holes: the water well hole. Bern hole, ecre hole, and access hole. The generally unsuccessful operations during the season indicated that it is not feasible to drill an open hole through the Ross lee Shelf due to closure of the drilled hole as a result of the flowing characteristics of see. of ice.

MP 1062

CONCENTRATED LOADS ON A FLOATING ICE

Nevel, D.E., 1977, 19(81), p.237-245, In English with French and German summaries. 8 refs.

FLOATING ICE, ICE BEARING CAPACITY, TENSILE STRESS, ICE ELASTICITY, LOADS (FORCES), ICE COVER THICKNESS, MATH-EMATICAL MODELS.

The safe bearing capacity of a floating ice sheet is usually determined by limiting the maximum tensile stress which occurs under the load at the bottom of the ice sheet. If the size of the load distribution is large compared to the ice thickness, the thin plate theory predicts these stresses correctly. However, if the size of the load distribution becomes small compared to the ice thickness, the plate becomes small compared to the ice thickness, the plate theory overestimates the stresses. In this case the ice sheet should be treated as a three-dimensional elastic layer. Previous investigators have solved the elastic-layer problem for loads distributed over a circular area, and have limited the results to the stress at the bottom of the ice sheet directly under the center of the load. In the present paper the stresses are evaluated at any radial position, and it is shown how these stresses approach those for the plate theory as the radial position becomes large. The solutions for the stresses are presented in integral form, as well as graphs from the numerical integration. These new results are significant for the superposition of stresses when two concentrated loads act near each other. Similarly for loads distributed over a rectangular area, the plate theory will overestimate the stresses if the dimensions of the load will overestimate the stresses if the dimensions of the load become small compared to the ice thickness For this case integral solutions are presented for the stresses, and are evaluated directly under the center of the load. (Auth)

MP 1063 FLEXURAL STRENGTH OF ICE ON TEMPER-ATE LAKES.

Gow, A.J., 1977, 19(81), p 247-256, In English with French and German summaries. 7 refs.

FLEXURAL STRENGTH, LAKE ICE, ICE CRYS-TAL STRUCTURE. TENSILE STRESS, ICE CRACKS, TESTS.

Large, simply supported beams of temperate lake ice generally yield significantly higher flexural strengths than the same beams tested in the cantilever mode. Data support the view that a significant stress concentration may exist at the fixed corners of the cantilever beams. Maximum effects are experienced with beams of cold, brittle ice substantially described by the control of the cantilever of the control of the contro are experienced with beams of cold, brittle ice substantially free of structural imperfections, the stress concentration factor may exceed 20 in this kind of ice. In ice that has undergone extensive thermal degradation the stress concentration effect may be eliminated entirely. Simply supported beams generally test stronger when the top surface is placed in tension. This behavior is attributed to differences in ice type, the fine-grained, crack-free top layer of snow-ice usually reacting more strongly in tension than the coarse-grained bottom lake ice which is prone to cracking. (Auth.)

DE-ICING OF RADOMES AND LOCK WALLS USING PNEUMATIC DEVICES.

Ackley, S F., et al. 1977, 19(81), p 467-478. In English with French and German summaries Itagaki, K. Frank, M.

ICE REMOVAL, PNEUMATIC EQUIPMENT, ICE DETECTION, ICE NAVIGATION.

A rough comparison between thermal and mechanical methods A rough comparison between thermal and mechanical methods of de-teng indicates that mechanical methods could potentially desice with an order-of-magnitude less energy than that required to melt an ice accretion. Two applications of mechanical desicing using pneumatically driven inflatable desicers are described in this report. The first of these was the descript of a small cylindrical radome used for air margational purposes. Two sersons of testing were conducted with a desicer consisting of an inflatable-defiatable flexible plattic covering. The desicer was driven by tanks with pressure and vacuum reservoirs that were recharged by an on-site air compressor in response to a pressure sensor on-site air compressor in response to a pressure sensor. The descring cycle was activated by an ice detector so the system responded to long events on a demand basis driven by the ice detector. The system proved successful in keeping the radome free of ice without manned operation. small energy consumption in a mountain teing ent. The second application was an attempt to

de-ice the walls of locks used in river navigational facilities. Ice usually formed at the high-water-mark by the freezing of the water exposed to low air temperatures or by the pressing of ice against the walls by thips using the locks. The de-icers consisted of air-driven hoses mounted on the wall covered by a thick flexible rubber mat and protected from ship damage by steel outer plates. This method was successful in removing ice accumulations up to 2 m long by 0.3 m thick over the area covered by the de-icer. Installation costs and the necessity for protection of the de-icer against abrasion by ships may make this de-icing method prohibitively expensive compared with methods which are not as susceptible to damage by ships (e.g., chemical coating and electrical heating cables buried in the walls).

MP 1065

ENGINEERING PROPERTIES OF SEA ICE. Schwarz, J., et al. 1977, 19(81), p.499-531, In English with French and German summaries. Refs. p.526-530. For this paper from another source see 31-2778. Weeks. W.F. 32-2470

ICE SHELVES, ICE STRUCTURE, ICE MECHANICS, ICE FRICTION, ICE THERMAL PROPERTIES, ICE ELECTRICAL PROPERTIES, ICE (CONSTRUCTION MATERIAL), ENGINEERING, SEA ICE, ICE STRENGTH.

(CONSTRUCTION MATERIAL), ENGINEER-ING, SEA ICE, ICE STRENGTH.

As the continental shelves of the Arctic become important as source areas for the oil and minerals required by human society, sea ice becomes an increasing challenge to engineers. The present paper starts with a consideration of the different fields of engineering which require information on sea ice with the tasks ranging from the design of ice-breaking ships to Arctic drilling platforms and man-made ice islands. Then the structure of sea ice is described as it influences the observed variations—physical properties. Next the status of our knowledgr—the physical properties important to engineering is reviewed. Properties discussed include mechanical properties (compressive, tensile, shear and flexural strengths; dynamic and static clastic moduli; Poisson's ratio), friction and adhesion, thermal properties (specific and latent heats, thermal conductivity and diffusivity, density) and finally electromagnetic properties (dielectric permittivity and loss, resistivity). Particular attention is given to parameters such as temperature, strain-rate, brine volume, and loading direction as they affect property variations. Gaps, contradictions in the data, and inadequacies in testing techniques are pointed out. Finally suggestions are made for future research, especially for more basic laboratory studies dasigned to provide the data base upon which further theoretical developments as well as field studies can be built. (Auth)

MP 1066 STUDIES OF THE MOVEMENT OF COASTAL SEA ICE NEAR PRUDHOE BAY, ALASKA, U.S-

Weeks, W.F., et al, 1977, 19(81), p.533-546, In English with French and German summaries. 5 For this paper from another source see 31-2777. Kovacs, A., Mock, S.J., Tucker, W.B., Hibler, W.D., III, Gow, A.J.

32-2471 FAST ICE, PACK ICE, ICE MECHANICS, THER MAL EXPANSION, RADAR TRACKING, LAS-ERS, SEA ICE, ICE CONDITIONS, UNITED STATES—ALASKA—PRUDHOE BAY.

STATES—ALASKA—PRUDHOE BAY.

During March-May 1976, a combination of laser and radar ranging systems was used to study the motion of both the fast ice and the pack ice near Narwahl and Cross Islands, two barrier islands located 16 and 21 km offshore in the vicinity of Prudhoe Bay, Alaska Laser measurements of targets on the fast ice near Narwahl Island indicate small net displacements of approximately 1 m over the period of study (71 d) with short-term displacements of up to 40 cm occurring over 3 d periods. The main motion was outward normal to the coast and was believed to be the result of thermal expansion of the ice. The radar records of fast-ice sites farther offshore show a systematic increase in the standard deviation of the displacements as measured parallel to the coast, reaching a value of 6 6 m increase in the standard deviation of the displacements as masured parallel to the coast, reaching a value of 66 m at 31 km. The farthest fast-ice sites show short-term displacements of up to 12 m. There are also trends in the records that are believed to be the result of the general warming of the fast ice with time. Radar targets located on the pack ice showed large short-term displacements (up to 2.7 km) but negligible net ice drift along the coast. There was no significant correlation between the movement of the pack and the local wind, suggesting that coastal ice prediction models can only succeed if handled as part of a regional model which incorporates stress transfer through the pack. The apparent fast-ice-pack-ice boundary in the study are was located in 30-35 m of water. (Auth)

MP 1067 SHORT-TERM FORECASTING OF WATER RUN-OFF FROM SNOW AND ICE.
Colbeck, S.C., 1977, 19(81), p.571-588, In English

with French and German summaries. Refs. p.585-587.

32-2474 RUNOFF FORECASTING, SNOW HYDROLOGY, ICE MELTING, SNOW MELTING, GLACIAL HYDROLOGY, MELTWATER, SNOW COVER EFFECTS. MODELS

Accurate forecasting of water run-off from snow covers and glaciers is increasingly important because of the increasing competition for scarce water resources. The trend toward conceptual computerized models of hydrologic systems requires extensive knowledge of the physical aspects of those systems. Unlake river and stream networks, the hydrological characteristics of snow covers and glaciers are highly variable with time and cannot be easily defined. After reviewing the physical aspects of water flow through snow covers and glaciers, it is concluded that snow covers and glaciers are predictable hydrological systems once the melt metamorphism of the snow is complete and the englacial conduits have been established. However, much additional information about snow and ice masses must be generated before general forecasting techniques can be established for all situations. (Auth.)

MP 1068

ROLE OF RESEARCH IN DEVELOPING SUR-PACE PROTECTION MEASURES FOR THE ARCTIC SLOPE OF ALASKA.

Johnson, P.R., Symposium on Surface Protection

through Prevention of Damage (Surface Management). Focus: the Arctic Slope, Anchorage, Alaska, May 17-20, 1977. Proceedings. Edited by M.N. Evans. Anchorage, Alaska, Bureau of Land Management, Mar. 1978, p.202-205.

32-2648
ENVIRONMENTAL PROTECTION, SNOW ACCUMULATION, SNOW (CONSTRUCTION MATERIAL), ICE (CONSTRUCTION MATERIAL), CIVIL ENGINEERING, U.S. ARMY CRREL, RESEARCH PROJECTS, UNITED STATES—ALASKA—NORTH SLOPE.

ALASKA—NORTH SLOPE.

The U.S. Army Cold Regions Research and Engineering Laboratory (USA CRREL) has long conducted research in snow, ice, and permafrost. It also translates foreign language engineering papers and publishes research reports, monographs, and bibliographies. Snow and ice roads and construction pads have been used, primarily on the Arctic Slope, during the last few winters. Some have been successful but problems exist which will require further experience and research to solve. One problem is that of snow supply. Snowfall on the Arctic Slope is limited, particularly early in the season when it is most desired. Few good data are available on total quantities and the time pattern of snowfall but Wyoming Snow Gages, now being installed by a number of government agencies and private organizations, are beginning to provide some data which can be used with some confidence. The snow which falls is often blown off by the strong winds which are common in the area so it is not available where it is needed. Research is under way on equipment and techniques for collecting snow and inducing drifting.

MP 1069

MP 1069

MP 1069
INTEGRATED APPROACH TO THE REMOTE SENSING OF FLOATING ICE.
Campbell, W.J., et al, International Astronautical Congress, 26th, Lisbon, September 21-27, 1975. Proceedings. Edited by L.G. Napolitano, Oxford, Pergamon Press, 1977, p.445-487, Refs. p.483-487.
Ramseier, R.O., Weeks, W.F., Gloersen, P. 22-3840. 32-2840

FLOATING ICE, REMOTE SENSING, SENSOR MAPPING, AERIAL RECONNAISSANCE, SEA-SONAL VARIATIONS.

SONAL VARIATIONS.

The current increase of scientific interest in all forms of fe.s.ing ice—sea ice, lake ice, river ice, ice shelves and icebergs—has occurred during a time of rapid evolution of both remote-sensing platforms and sensors. The application of these new research tools to ice studies in the Arctic and Antarctic has generally been both piecemeal and sporadic, partly because the community of ice scientists has not kept up with the rapid advances in remote sensing technology and partly because they have not made their needs known to the space community. This paper seeks to help remedy the latter shortcoming. The remote sensing requirements for floating ice studies are given, and the capabilities of various existing and future sensors and sensor combinations in meeting these requirements are discussed. The desirable future sensors are also discussed from both the research and operational points of view.

MP 1070

MP 1070 DYNAMICS OF SNOW AVALANCHES.

Mellor, M., Rockslides and avalanches, 1. Natural phenomena. Edited by B. Voight, New York, Elsevier, 1978, p.753-792, 22 refs.

AVALANCHE MECHANICS, SNOW COVER STABILITY, SHEAR STRAIN, AVALANCHE

WIND.

After a general introduction to snow avalanches and their consequences, type classification is discussed, and classification schemes are described briefly. The first technical section deals with deformation and displacement of snow slopes prior to avalanche release, with the failure process, and with the propagation of initial failure. The following section describes various types of avalanche motion after release. Representative values are suggested for slope angles, initial accelerations, flow density, driving stresses, and travel velocities. The third technical section considers idealized theoretical analyses of avalanche motion. The final technical tes The third technical section constitutes are analyses of avalanche motion. The final technical section covers the dynamic forces imposed by snow avalanches

and their associated "winds." Measured values of impact stresses are summarized, and direct impact stresses for "wide" avalanches are deduced from simple theory. Forces induced by interfacial shear and avalanche deflection are considered briefly, and forces created by avalenche winds, or "air blast," are discussed. In the conclusion there is a simplified tabulation of representative values for stress ranges, typical strain rates and typical velocities in the various avalanche

IN-SITU MEASUREMENTS ON THE CONDUCTIVITY AND SURFACE IMPEDANCE OF SEAICE AT VLF FREQUENCIES.

McNeill, D., et al, Dec. 1971, R105, 19p. plus dis-

grams, 9 refs. Also published in Radio science, Jan. 1973, 8(1):23-30. Hoekstra, P.

27-700

SEA ICE. ICE RESISTIVITY, ELECTRICAL RESISTIVITY.

RESISTIVITY.

An experimental program to measure in-situ values of the electrical conductivity and surface impedance of sea ice at VLF frequencies was carried out at Pt. Barrow, Alaska. Temperature, salinity, and resistivity were measured as a function of depth in the ice for both first year and multi-year sea ice by means of cored samples. All three quantities varied with the age of the ice and, in addition, the resistivity varied with age from 100 to 10,000 ohm-meters at the surface, and in general down to a few ohm-meters at the sea water interface. The wave tilt of a VLF plane wave propagating over sea ice is theoretically linearly dependent on the thickness. Measurements of the quadrature phase wave tilt at 18.6 KHz give values of the right order of magnitude but erratic in local behavior. Short-spacing Wenner array resistivity measurements and tellizic current measurements at VLF demonstrated that the erracic behavior was due to significant horizontal variations of the sea ice resistivity over distances of a few feet.

UV RADIATIONAL EFFECTS ON: MARTIAN REGOLITH WATER.
Nadeau, P.H., Hanover, New Hampshire, Dartmouth

College, Aug. 1977, 89p., M.A. thesis. Refs. p.66-89. 32-2972

MARS (PLANET), SOIL CHEMISTRY, CHEMI-CAL REACTIONS, ENVIRONMENTS, HYDRO-GEN PEROXIDE, SOLAR RADIATION, UL-TRAVIOLET RADIATION, ECOLOGY, ENVI-RONMENT SIMULATION.

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan continental shelf. Vol.XVI. Hazards. Prinrissian continental snell. Vol.AVI. Flazards. Pfincipal investigators' reports for the year ending March 1977. Boulder, Colorado, Environmental Research Laboratories, 1977, p.151-163. Weeks, W.F.

32-3067

SEA ICE, DRIFT, ICE DEFORMATION, LASERS.

MP 1074 DELINEATION AND ENGINEERING CHARAC-

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al, Environmental assessment of the Alaskan continental shelf. Vol.XVI. Hazards. Prin-cipal investigators' reports for the year ending March 1977. Boulder, Colorado, Environmental Research Laboratories, 1977, p.385-395.

Blouin, S.E. Brown, I. Chamberlain, F.I. Islandar.

Blouin, S.E., Brown, J., Chamberlain, E.J., Iskandar, I.K., Ueda, H.T.

SUBSEA PERMAFROST, PERMAFROST PHY-SICS, PERMAFROST DISTRIBUTION, ENGI-NEERING.

NEERING.

The overall objectives of the CRREL participation in the subsea permafrost program are to quantify the engineering characteristics and ascertain the distribution of permafrost beneath the Beaufort Sea and to determine their relationship to temperature, sediment type, ice content and chemical composition. Permafrost was pres;n' in the four holes drilled at Prudhoe Bay. Ice bonder, permafrost was absent in the upper 30 meters of sediment up to 17 k.lometers from shore. Based on negative temperature gradients and pore water chemistry, ice-bonded permafrost should be encountered at 30- and 43-meter depths at sites PB-2 and PB-3, respectively. It appears that the depth to the ice-bonded permafrost decreases with increasing distance from shore and depth of water. Highly over-consolidated marine clays were encountered seaward of keindeer Island. The overconsolidation probably resulted from the freeze-thaw history. The presence of these stiff, matrice clay deposits is an in portant consideration for siting structures associated with offshore developments.

MP 1075

ROSS ICE SHELF PROJECT ENVIRONMENTAL IMPACT STATEMENT JULY, 1974.

Parker, B.C., et al, Environmental impact in Antarctica, edited by B.C. Parker, Blacksburg, Virginia Polytechnic Institute and State University, 1978, p.7-36, 13

McWhinnie, M.A., Elliott, D., Reed, S.C., Rutford,

32-3113 ENVIRONMENTAL IMPACT, ICE SHELVES, DRILLING, RESEARCH PROJECTS, ANTARC-TICA-ROSS ICE SHELF.

TICA—ROSS ICE SHELF.

The scientific objectives of the Ross Ice Shelf Project (RISP) are to drill into the ice shelf to investigate the physical, chemical, biological, and geological conditions in 're ace shelf, the water mass beneath the ace, and the soft sediments and bedrock at the bottom of the sea, and to use the data obtained for interpretation of the present conditions and the history of this portion of Antarctica. This environmental impact assessment describes the proposed action, summarizes the scientific studies to be undertaken, and outlines remedial and protective measures, unavoidable adverse impacts, and alternatives to the proposed action. It is anticipated that the majority of the impacts will be short-term and extremely localized, such as those associated with the camp and laboratory facility on the Ross Ice Shelf during the period of drilling. These impacts will be monitored throughout the RISP operations. The pristine nature of the surface should be restored fully within one year. It is stressed that the likelihood of penetrating a hydrocarbon trap is remote, but should this occur rendering an uncontrollable release of hydrocarbons, the impact on the environment could be quite severe On a scale of 1 to 10 this possibility is assigned a value of 5. is assigned a value of 5.

MP 1076

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan continental shelf. Vol.II. Principal investigators' quarterly reports for the period April-June 1977. Boulder, Colorado, Environmental Research Laboratories, 1977, p.411-424. Weeks, W.F. 2, 2188

32-3188 SEA ICE. ICE MECHANICS, FAST ICE, ICE STRUCTURE.

DELINEATION AND ENGINEERING CHARAC-

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al, Environmental assessment of the Alaskan continental shelf. Vol.II. Principal investiga-tors' quarterly reports for the period April-June 1977. Boulder, Colorado, Environmental Research Laboratories, 1977, p. 432-440.

Brown, J., Blouin, S.E., Chamberlain, E.J., Iskandar, I.K., Ueda, H.T.

SUBSEA PERMAFROST, OFFSHORE DRILL-ING, ICE COVER THICKNESS, DRILL CORE ANALYSIS, CHEMICAL ANALYSIS.

GROUTING SILT AND SAND AT LOW TEM-PERATURES.

Johnson, R., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol 2, New York, American Society of Civil Engineers, 1979, p.937-950, 2 refs. 33-4452

GROUTING, VISCOSITY, SOIL STABILIZA-TION, FROZEN GROUND MECHANICS, SANDS, STRESS STRAIN DIAGRAMS, COM-PRESSIVE STRENGTH, TEMPERATURE EF-FECTS, COLD WEATHER OPERATION, RES-INS, TESTS.

MP 1079

INTERHEMISPHERIC COMPARISON OF CHANGES IN THE COMPOSITION OF ATMO-SPHERIC PRECIPITATION DURING THE LATE CENOZOIC ERA.

Cragin, J.H., et al, Polar oceans. Proceedings of the Polar Oceans Conference, Montreal, May 1974. Edited by MJ Dunbar, Montreal, Arctic Institute of North America, 1977, p 617-631, 26 refs Includes discussion

Herron, M. M., Langway, C.C., Jr., Klouda, G.A. 32-3432

GLACIER ICE. ICE SHEETS, ICE COMPOSITION, PRECIPITATION (METEOROLOGY). TION, PRECIPITA DUST, ICE CORES.

Concentrations of alkali and alkaline earth elements in north Greenland glacial ice deposited during the past 100,000 years show marked variations over that time span the Wisconsin Stage concentrations of Na, K. Mg and Ca average 26, 44, 63, and 18 microg 1 respectively Concentration levels rise gradually at the beginning of the Wisconsin

Stage and peak at averages of 51, 29, 25, and 162 microg/l during the last third. During the Holocene the concentration levels decrease to lows of 17, 3.3, 2.6, and 5.1 microg/l. Silicon concentrations increase by about a factur of 3 (over Sangamon levels of 100 microg/l) during the late Wisconsin Stage, indicating a significant influx of colian dust at that time. Although sulfate concentrations are high (280 microg/l) during the last third of the Wisconsin Stage, they remain relatively constant (100 microg/l) prior to an approximate that time; this might suggest that the Wisconsin Stage was not triggered by volcanism. Similar elemental concentrations measured in West Antarctic glacialite deposited essentialthat tane; this might suggest that the wisconsin Sage was not triggered by volcanism. Similar elemental concentra-tions measured in West Antarctic glacial ice deposited essential-ly over the same time period as the Orcenland material also increase during the late Wisconsin Stage, but to a much smaller extent than those in Greenland ice. (Auth)

EFFECT OF FREEZING AND THAWING ON THE PERMEABILITY AND STRUCTURE OF

Chamberlain, E.J., et al, International Symposium on Ground Freezing, 1st, Bochum, Germany, March 8-10, 1978. Proceedings. Edited by H.L. Jessberger, Bochum, Ruhr University, 1978, p.31-44, 11 refs. Gow, A.J. 32-3469

FREEZE THAW CYCLES, SOIL WATER MIGRA-TION, PERMEABILITY, SOIL STRUCTURE, SOIL PHYSICS, SOIL TEXTURE, FINES, PARTI-CLE SIZE DISTRIBUTION.

CLE SIZE DISTRIBUTION.

The permeability and structure of four fine-grained soils were observed to be changed by freezing and thawing. In all cases freezing and thawing caused a reduction in void ratio and an increase in vertical permeability. The increase in permeability is attributed to the formation of polygonal shrinkage cracks and/or to the reduction of the volume of fines in the porces depending on material type. No definite relationships are established; however, it appears that the largest increase in permeability occurs for the soil of highest plasticity. of highest plasticity.

MP 1081

SEGREGATION FREEZING AS THE CAUSE OF SUCTION FORCE FOR ICE LENS FORMA-TION.

Takagi, S. . International Symposium on Freezing, 1st, Bochum, Germany, March 8-10, 1978. Proceedings. Edited by H.L. Jessberger, Bochum, Ruhr University, 1978, p.45-51, 20 refs. 32-3470

SOIL FREEZING, GROUND ICE, ICE LENSES, SOIL WATER MIGRATION, FROST HEAVE, FROZEN GROUND THERMODYNAMICS, SOIL STRUCTURE, SOIL PRESSURE, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

A new freezing mechanism, called segregation freezing, is proposed to explain the generation of the suction force that draws pore water up to the freezing surface of a growing ice lens. The segregation freezing temperature is derived by applying thermodynamics to a soil mechanics concept that distinguishes the mechanically effective pressure from the mechanically neutral pressure. The frost-heaving pt cedure is formulated as part of the solution of the differential equations of the simultaneous flow of heat and water, of which the segregation freezing temperature is one of the boundary conditions. boundary conditions

EFFECT OF FREEZE-THAW CYCLES ON RESILIENT PROPERTIES OF FINE-GRAINED

Johnson, T.C., et al, U.S. Army Cold Regions Research and Engineering Laboratory, [1978], 19p. Prepared for International Symposium on Ground Freezing, Bochum, Germany, March 8-10, 1978. refs.

Cole, D.M., Chamberlain, E.J. 32-3502

FROZEN GROUND MECHANICS, FREEZE THAW CYCLES, PAVEMENT BASES, BEARING TESTS, SHEAR STRESS, SUBGRADE SOILS, LOADS (FORCES), SOIL MOISTURE CONTENT. SOIL TEMPERATURE, MODELS.

SOIL TEMPERATURE, MODELS.

Stress-deformation data for silt and clay subgrade soils were obtained from in-situ tests and laboratory tests, for use in mechanistic models for design of pavements that will experience frecang and thawing. Plate-bearing tests were use in mechanistic models for design of pavements that will experience frecang and thawing. Plate-bearing tests were use in structed directly on silt subgrade, and on an experimental ABC pavement constructed on clay subgrade, applying repeat ed loads to the pavement surfaces while the subgrade was forzen, thawing, thawed, and fully recovered. Analysis of deflection data from the in-situ tests showed resilient moduli of the subgrade soils up to more than 10 GPa when frozen, as low as 2 MPa during the thawing period, and up to more than 10 MPa when fully recovered. Analysis of the laboratory tests, which gave meduli comparable to the latter values, showed that resilient modulus and Poisson et alto in the thawed and recovering conditions can be expressed ratio in the thawed and recovering conditions can be expressed as a function of the stress rate, the moisture content, and the dry density

TEMPERATURE EFFECTS IN COMPACTING AN ASPHALT CONCRETE OVERLAY.

Eaton, R.A., et al, Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol.1, New York, American Society of Civil Engineers, 1978, p.146-158, 9 refs. Berg, R. 32-3608

BITUMINOUS CONCRETES, COMPACTING, DENSITY (MASS/VOLUME), TEMPERATURE EFFECTS, COOLING RATE.

An asphalt concrete overlay was constructed at the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), Hanover, New Hampshire, in November, 1976, to evaluate temperature and other environmental effects upon compaction. Four overlay sections each 100ft x 12 ft x 3 in. thick and two sections each 80 ft x 12 ft x 1/12 in thick were designed to be pisced on an existing CRREL test road. The asphalt cement and aggregate used were to have mix characteristics as close to the Thule mix as possible. This paper presents results of the test overlay using an AC 2.5 in a cold environment.

MP 1034
KOTZEBUE HOSPITAL—A CASE STUDY.
Crory, F.E., Conference on Applied Techniques for
Cold Environments, Anchorage, Alaska, May 17-19,
1978. Proceedings, Vol.1, New York, American Society of Civil Engineers, 1978, p.342-359, 10 refs.

BUILDINGS, SETTLEMENT (STRUCTURAL), PERMAFROST BENEATH STRUCTURES, FOUNDATIONS, SOIL TEMPERATURE. STRUCTURES,

FOUNDATIONS, SOIL TEMPERATURE.
Construction of the hospital was started in late 1959 and completed in September 1961. The hospital is a single-story structure, supported on insulated perimeter wall footings, with intermediate footings for the support of roof columns and grade beams. All floors are slab-on-grade concrete. Wall cracking was in evidence in the first year of occupancy. A void of more than a foot was found between the floor slab and the gravel fill in August, 1963. At the request of the U.S. Public Health Service, USA CREEL conducted soil explorations and installed ground temperature assemblies and vertical movement points within the building and around the perimeter of the foundation to ascertain the source and potential magnitude of the foundation distress. The performance of the hospital through 1976 clearly indicates the settlement associated with the thawing of the underlying permafrost with time. Soil and permafrost conditions in the village of Kotzebue are described in light of the conditions disclosed in the hospital area.

EFFECTS OF MOISTURE AND FREEZE-THAW ON RIGID THERMAL INSULATIONS: A LABORATORY INVESTIGATION.

Kaplar, C.W., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol.1, New York, American Society of Civil Engineers, 1978, p.403-417, 13 refs. 32-3628

THERMAL INSULATION, ABSOMOISTURE, FREEZE THAW TESTS. ABSORPTIVITY,

MOISTURE, FREEZE THAW TESTS.

Laboratory observations on the effects of moisture absorption and freeze-thaw on various thermal insulation boards commonly used in construction beneath slabs on grade, in toofs, and in perimeter insulation of foundations were made under wet conditions. Test specimens were submerged in water and buried in mosts soil for periods ranging up to 36 months. Selected soaked specimens submerged in water were subjected to 15 and 30 freeze-thaw cycles. The study showed that:

1) None of the materials was completely resistant to moisture absorption under all test conditions, 2) A number of extruded polystyrenes were highly resistant to moisture, 3) The beaded polystyrenes were highly resistant to moisture. 3) The beaded polystyrene boards were more absorbent than the extruded types, and 4) Alternate freezing and thawing of rigid insulation polyasyrene boards were more absorbent than the extruded types, and 4) Alternate freezing and thawing of rigid insulation in presence of free water was either destructive or increased moisture absorption in most of the tested materials, and 5) Cellular glass, normally highly moisture resistant in soaking tests, suffered extremely severe deterioration in freeze-thaw tests. This study clearly demonstrated that only highly moisture-resistant rigid thermal insulations should be used under conditions subject to free water and alternate freezing and thawing.

DESIGN CONSIDERATIONS FOR AIRFIELDS IN NPRA.

Crory, F.E., et al., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol. 1, New York, American Society of Civil Engineers, 1978, p.441-458, 6 refs. Berg, R.L., Burns, C.D., Kachadoorian, R. 32-3631

AIRCRAFT LANDING AREAS, FROZEN SAND, FROZEN GRAVEL, PETROLEUM INDUSTRY. Two exploratory wells, at lindgok and Tunalik, will be spudded in the spring of 1978. The well sites require airfields for Hercules aircraft during the entire drilling operation Design and construction problems for the two airfields are compounded by the constraint that they be built in winter and in accordance with environmental requirements which necessitate that all fill and gravel be transported over snow roads. Laboratory studies conducted at USACRREL showed that fills of frozen silty sand, the only locally available borrow at Inagok, have a greater potential for settlement upon thewing than the in-situ sands in cut sections. Several design options were considered for the airfields. deill nade seen thewing Can the in-situ sands in cut sections. Several design options were considered for the airfields, drill pads and short connecting roads which must be usable all year. These included (1) gravel over sand, (2) gravel over insulation as and, (3) landing mat with insulation, and (4) landing mat without insulation. Some of these concepts were evaluated at USAEWES, using large-scale test sections. In conjunction with the airfields, additional test sections are planned to evaluate different design concepts for runways, drill pads and roads to be built for the 1979 drilling program. This paper describes studies associated with the Inigok airfield. MP 1087

EFFECTS OF SUBGRADE PREPARATION UPON FULL DEPTH PAVEMENT PERFORMANCE IN COLD REGIONS.

Eaton, R.A., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol.1, New York, American Society of Civil Engineers, 1978, p.459-473, 8 refs. 32-3632

BITUMINOUS CONCRETES, COLD WEATHER PERFORMANCE, SUBGRADE PREPARATION, FROST HEAVE.

FROST HEAVE.

In September, 1973, a "full-depth" road test section was constructed at the U.S. Army Cold Regions Research and Engineering Laboratory (CREEL), Hanover, New Hampshire. Due to weather and time constraints, the subgrade beneath the asphalt concrete pavement was not properly prepared (blended, mixed, and made as uniform as possible) The road is in a cut area on an 87 slope and intersects horizontal layers of varved silts, silty sands, and sandy materials which are highly frost susceptible. The first winter, surface differential heaves of up to 5 inches in 5 feet occurred. The following summer, the subgrade was removed for 100 feet to a depth of 24 inches and 100 feet to a depth of 12 inches. The material was mixed, blended, and dried before placing back into the roadway in 6-inch compacted lifts. The succeeding two winters' performance has shown very marked improvement with relatively uniform heaving of the pavement surface. This shows, in conjunction with other CRREL highway pavement test sections, the importance of proper subgrade preparation for pavements in cold regions over frost-susceptible soils.

MP 1888

MP 1988 STORM DRAINAGE DESIGN CONSIDERA-TIONS IN COLD REGIONS.

Lobacz, E.F., et al, Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol.1, New York, American Society of Civil Engineers, 1978, p.474-489, 12 refs. 32-3633

DRAINAGE, AIRCRAFT LANDING AREAS, ICE

DRAINAGE, AIRCRAFT LANDING AREAS, ICE CONTROL, COLD WEATHER OPERATION.

This paper, based on the authory' recently revised design manual for drainage facilities at Army and Air Force airfields and heliports, adapts previously used U.S. hydraulic design criteria it. the special conditions prevailing in arctic and subarctic regions. Design runoff supply rates for surface drainage are derived from rainfall plus snowmelt minus infiltration, three factors for which typical values are given, for both permafrost and unfrozen ground situations. Guidelines are discussed for other drainage design requirements such as structural, durability, maintenance, and, of major significance in cold regions, environmental impact considerations and debtis and icing control Because of the importance of control and prevention of icings in and near drainage structures, applicable principles formulated by CRREL and other researchers are enunciated. While primarily intended for design of storm drain pipes, appurtenances and open drainage ditches serving airfields and heliports, the principles outlined are also generally suitable for culverts and drainage for facilities such as roadways, parking lots, and built-up areas in the Arctic and Subarctic.

MP 1069

TECHNIQUES FOR USING MESL (MEMBRANE ENCAPSULATED SOIL LAYERS) IN ROADS AND AIRFIELDS IN COLD REGIONS. Smith, N., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-9, 1978. Proceedings, Vol.1, New York, American Society of Civil Engineers, 1978, p 560-570, 15 cfs. 32-3640

SOIL TEXTURE, SOIL WATER, SOIL COMPAC-TION, WATERPROOFING, LAYERS

TION, WATERPROOFING, LAYERS
Membrane encapsulation of fine-grained soils to prevent soil
moisture intrusion can provide an option to the use of
more eapensive select granular soils as structural layers in
roads and airfields, even in cold regions. Silts and clays
compacted at, or slightly below, optimum moisture contents
can provide high bearing strengths and are not subject to
moisture migration or detimental firost heaving during closed
system (membrane encapsulated) freezing. Central Alaska
has an abundant supply of silts, and the semi-arid climate
is ideal for air-drying those that have an in-situ moisture
content above optimum. In other areas it might not be
economically or technically feasible to dry the soils to the
required moisture content for encapsulation unless granular
soils are extremely scarce.

MP 1090

WATER RESOURCES BY SATELLITE. McKim, H.L., May-June 1978, 70(455), p.164-169. 32-3654

REMOTE SENSING, SPACEBORNE PHOTOGRAPHY, WATER SUPPLY, SNOW COVER, ICE COVER, MAPPING.

MP 1091

MASS TRANSFER ALONG ICE SURFACES OB-SERVED BY A GROOVE RELAXATION TECH-NIQUE.

Tobin, T.M., et al, 1977, No.118, International Symposium on Isotopes and Impurities in Snow and Ice, Grenoble, Aug. 28-30, 1975, p.34-37, In English with French summary. 6 refs.

Itagaki, K. 32-3809

groove decay.

MASS TRANSFER, ARTIFICIAL ICE, DEUTERI-UM OXIDE ICE, RELAXATION (MECHANICS). The mass transfer coefficients were measured using a groove decay technique on the (0001) planes of naturally and artificially grown H2O see and artificially grown D2O see at 0.0C. In each case a viscous flow term contributed the most to groove decay in the longest wavelengths measured. initic an evaporation-condensation term predominated in the ortest wavelengths measured. All other terms were found be negligible. Large discrepancies between the decay to be negligible. Large discrepancies between the decay constants obtained from measurements and the constants calculated from theory indicate that other mer vanisms not considered in Mullins' theory may be responsible for the

MP 1092 VANADIUM AND OTHER ELEMENTS IN GREENLAND ICE CORES.

GREEN LAW ALE CORES.

Herron, M.M., et al., 1977, No. 118, International Symposium on Isotopes and Impurities in Snow and Ice, Grenoble, Aug. 28-30, 1975, p.98-102, In English with

French summary. 16 refs. Langway, C.C., Jr., Weiss, H.V., Hurley, J.P., Kerr, R., Cragin, J.H.

32-3817 ICE COMPOSITION, CHEMICAL ANALYSIS, ICE CORES, GREENLAND.

Chemical analysis for Na, Cl, Al, Mn and V of surface snows and deeper uce core samples from station Milcent, Greenland, indicates a terrestrial or marine origin for these constituents. Pre-1900 enrichment factors, based on average Greenland, indicates a terrestrial or marine origin for these constituents. Pre-1900 enrichment factors, based on average crustal composition, are high for Zn and Hg and appear to be related to the volatility of these elements. A comparison of pre-1900 and 1971-1973 concentrations of V and Hg shows no decided increase due to industrial production, yet the relative abundance of Zn increased from 12 to 32 over this time period. The chemical composition of ancient ice is extremely useful in interpreting modern aerosols.

TRACER MOVEMENT THROUGH SNOW.

Colbeck, S.C., 1977, No.118, International Symposium on Isotopes and Impurities in Snow and Icc, Grenoble, Aug. 28-30, 1975, p.255-262, In English with French summary. 19 refs.

32-3840 SNOW COMPOSITION, MOISTURE TRANSFER. IMPURITIES.

Impurities flowing with water through snow undergo hydrody-namic dispersion. Solutions describing the distribution of impurities are hard to obtain for realistic boundary conditions. The movement of impurities in snow is approximated here by neglecting second-order effects on their movement.

SEASONAL VARIATIONS OF CHEMICAL CONSTITUENTS IN ANNUAL LAYERS OF GREENLAND DEEP ICE DEPOSITS.

Langway, C.C., Jr., et al, 1977, No.118, International Symposium on Isotopes and Impurities in Snow and Icc, Grenoble, Aug. 28-30, 1975, p 302-306, In English with French summary. 13 refs. Klouda, G.A., Herron, M.M., Cragin, J.H.

32-3846

ICE CORES, CHEMICAL ANALYSIS, SEASON-AL VARIATIONS, ICE DATING.

Chemical analysis of century-old ice from continuous 5-year intervals of three ice cores obtained from south and central Greenland (Dye 3, Milcent and Créte) shows max-imum concentrations of Na, Mg. Ca. K and Al during early spring and minimum concentrations during late summer and early fall. Peak spring values are as much as 10 times greater than fall values. Because of the large seasonal chemical variations, samples used for depth-age or annual deposition rate stud-ies must represent exactly one (or multiple) year's accumulation. The seasonal chemical variations seem promising as a new method of defining annual layers and thus dating old ice

MP 1095

STABLE ISOTOPE PROFILE THROUGH THE ROSS ICE SHELF AT LITTLE AMERICA V, AN-TARCTICA.

Dansgaard, W., et al, 1977, No.118, International Symposium on Isotopes and Impurities in Snow and Ice, Grenoble, Aug. 28-30, 1975, p.322-325, In English with French summary. 9 refs.
Johnsen, S.J., Clausen, H.B., Hammer, C.U., Langway,

32-3849 ICE SHELVES, ICE DATING, ICE COMPOSITION, ISOTOPE ANALYSIS, ANTARCTICA—ROSS ICE SHELF.

The delta (O-18)-profile along the Little America V core ranges from -20 per mille near the surface to per mille at the bottom, i.e., lower than at any sus value hitherto measured in West Antarctica. (Aw

THERMAL PROPERTIES AND REGIME OF WET TUNDRA SOILS AT BARROW, ALASKA.

McGaw, R., et al, International Conference on Perma frost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.47-53, With Russian and French summaries. 12 refs. Outcalt, S.I., Ng. E.

TUNDRA SOILS, THERMAL CONDUCTIVITY, TUNDRA VEGETATION, SOIL TEMPERATURE, TEMPERATURE MEASUREMENT.

TURE, TEMPERATURE MEASUREMENT.

Measurements of temperature and of thermal conductivity for two summer periods were carried out on wet organic surface materials and underlying mineral soils at Barrow, Alaska. Precise temperatures were measured by means of calibrated thermistors placed at accurately known depths, from which temperature gradients to a depth of 1.0 m are calculated. Thermal conductivities were measured by the transient-heating probe method, both in-situ and in the laboratory. The observed conductivity of the organic layer was between that of moist air (0.1 W/mK) and that of water (0.6 W/mK); the conductivity of the silt soil depended on the state of freezing. The measured data are combined to calculate summer heat fluxes to a depth of 1.0 m, from which the thermal transition of the active layer from initial thaving to incipient freezing is described and analyzed. thawing to incipient freezing is described and analyzed.

DETERMINATION OF UNFROZEN WATER IN FROZEN SOIL BY PULSED NUCLEAR MAG-VETIC RESONANCE.

Trice, A.R., et al, International Conference on Perma-frost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Re-search Council of Canada, 1978, p. 149-155, With Rus-sian and French summaries. 12 refs.

Burrous, C.M., Anderson, D.M. 37.3685

FROZEN GROUND, GROUND ICE, UNFROZEN WATER CONTENT, MEASURING INSTRU-MENTS.

Pulsed nuclear magnetic resonance (NMR) techniques have Pulsed nuclear magnetic resonance (NMR) techniques have been developed and utilized to determine complete phase composition curves for three soils. This promising new technique offers a non-destructive method for measurements of unfrozen water contents in frozen soils from -0.2C through -25C. The results show that unfrozen water contents determined by this technique depend upon ice content (i.e. total water content). These results are contrary to earlier assumptions based on results which indicated that unfrozen water contents are a function of temperature only. These water contents are a function of temperature only These findings show great promise in the discrimination of unfrozen water associated with mineral grain boundaries and the icewater interfaces of the poly-crystalline ices present in soilwater syrtems

MP 1098 GEOECOLOGICAL MAPPING SCHEME FOR ALASKAN COASTAL TUNDRA.

Everett, K.R., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p. 359-365, With Russian and French summaries. 8 refs. 17.1717

TUNDRA, MAPPING, CHARTS, VEGETATION PATTERNS, TUNDRA SOILS, UNITED STATES -ALASKA.

A unified geoecological mapping system has been developed for northern Alaska which recognizes in a given area a suit of landforms whose geomorphic elements control the composition and distribution of vegetation and soil. Within composition and distribution of segetation and soil Within each landform boundary a fractional code is displayed in which the numerator consists of the geomorphic feature and its characteristic segetation stand presented as a series of alpha-numeric units. The denominator is comprised of three elements the soil(s), the landform type and its mean slope Each map contains an annotated list of code symbols and is accompanied by a text in which the characteristics of the code components are discussed. The advantages of such a mapping technique include: (1) integrating on a single base a large body of diverse data into a relatively few easily detected environment units, (2) the denvation of any number of special purpose maps by selecting components of the cod and/or related analytical data; (3) permitting an expansion of the code to include other kinds of geotechnical

CLIMATIC AND DENDROCLIMATIC INDICES IN THE DISCONTINUOUS PERMAPROST ZONE OF THE CENTRAL ALASKAN UPLANDS. Haugen, R.K., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.392-398, With Russian and French summaries. 17 refs.

37-3777

PERMAFROST DISTRIBUTION, DISCONTINU-OUS PERMAFROST, ALPINE TUNDRA, TUN-DRA VEGETATION, FOREST TUNDRA, PLANT ECOLOGY, CLIMATIC FACTORS, UNITED STATES—ALASKA—CENTRAL ALASKAN UP-LANDS.

Most climatic records from central Alaska represent lowland sites. Consequently, continuous climatic observations were initiated in 1970 at four sites (750-1150 m clevation) 160 km north of Fairbanks near Eagle Summit, at one site (1040 m) to km east of Livengood, and at one site (1040 m) on the northern flank of Mt. Fairplay. Mean annual temperatures at these upland sites range from -8.1 to -6.4C, as compared to -3 5C at Fairbanks for the same period of record. The site data characterize air temperatures and permafrost conditions for several different alpine tundra and forested settings. Based upon correlations of radial growth of timberline white spruce and June-July temperatures, dendroclimatic patterns of warm and cool growing seasons are documented over the past 300 years for the Yukon-Tanins Uplands. Similar timberline tree growth patterns are found south to the Alaska Range and at the white spruce timberline in the southern foothills of the Brooks Range, suggesting a relative uniformity of summer temperature patterns throughout central Alaska.

MP 1100 Most climatic records from central Alaska represent lowland

MP 1100

BIOLOGICAL RESTORATION STRATEGIES IN RELATION TO NUTRIENTS AT A SUBARCTIC SITE IN FAIRBANKS, ALASKA.

Johnson, L.A., International Conference on Perma Jonnson, L.A., International Conference on Perma-frost, 3rd, Edmenton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Re-search Council of Canada, 1978, p.460-466, With Rus-sian and French summaries. 9 refs. 32-3732

SUBARCTIC LANDSCAPES, ARCTIC LAND-SCAPES, ENVIRONMENTAL PROTECTION, REVEGETATION, UNITED STATES—ALASKA -FAIRBANKS.

Restoration needs in the far north have dramatically increased as the extent of surface disturbance has increased over the last decade. The urgency of arctic and subarctic revegetation and restoration has prompted the use of technology developed in the temperate zones, at least some of which may ultimately be suitable in these colder regions. A randomized block design was established in 1975 on the Chena Flood Control Project in order to test the effect of nutrient applications upon the competitive relationships between arctared fescue, bluepoint reedgrass, and annual rye. Data gathered over two growing seasons on biomass, cover, maximum height, nutrient content, and other pertinent parameters are used to predict the effects of nutrient manipulation upon long-term restoration goals. It is anticipated that this research will increase the options available for successful mitigation of impact from northern industrial development.

MP 1101 Restoration needs in the far north have dramatically increased

MP 1101

SHALLOW ELECTROMAGNETIC GEOPHYSI-CAL INVESTIGATIONS OF PERMAFROST.

Arcone, S.A., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.501-507, With Russian and French summaries. 6 refs. Sellmann, P.V., Delaney, A.J.

32-3738 PERMAFROST PHYSICS, ELECTRICAL PROP-ERTIES, ELECTRICAL PROSPECTING, PERMA-FROST DISTRIBUTION, MEASURING INSTRU-

MENTS.
Radionave surface impedance (SI) and LF (200-400 kHz) and VLF (10-30 kHz) and magnetic induction (MI) methods were used to investigate permaterist properties and distribution in the Fairbanks and Copper River Basin areas of Alaska Recently developed portable field instruments were used. The sites contained a range of materials and ground tec fo varying volume and type. Galsams resisting soundings and existing borehole data provided ground truth for data comparison. Local plane wave interpretations of the LF and VLF apparent resistivity and phase data correlated with subsurface conditions. Frequencies in the LF band were most sensitive to permafrost conditions at the sites studied while VLF frequencies were more affected by conductive materials underlying the permafrost. The MI technique

also correlated with subsurface control, but the coil spacing used limited the instrument's depth of penetration, making it more sensitive to variations in the active layer than the

THAW PENETRATION AND PERMAFROST CONDITIONS ASSOCIATED WITH THE LI-VENGOOD TO PRUDHOE BAY ROAD, ALAS-

Berg, R.L., et al. International Conference on Perma-Berg, R.L., et al. International Conterence on Ferma-frost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Re-search Council of Canada, 1978, p.615-621, With Rus-sian and French summaries. 16 refs.

Brown, J., Haugen, R.K.

ROADS, PERMAFROST BENEATH ROADS, AC-TIVE LAYER, HEAT TRANSFER, GROUND THAWING, CONTINUOUS PERMAFROST, DIS-CONTINUOUS PER!
REGIME. UNITED PERMAFROST. FROST, THERMAL STATES—ALASKA— PRUDHOE BAY.

PRUDHOE BAY.

An environmental engineering study including the \$8 kilometer TAPS Road and the \$80 kilometer Alyeska Pipeline Haul Road was initiated during the summer of 1976. Physiography along the route ranges from the rolling Yukon-Tanana Uplands, where the permafrost is warm (-1 C) and discontinuous, through the Brooks Range and the Arctic Foothills to the Arctic Coastal Plain, where permafrost is cold (-1 C) and continuous. Permanently frozen subgrade materials range from rock to externely ice-rich fine-grained sitis. Approximately 30 sites have been selected for measuring thaw subsidence and seasonal thaw penetration, instrumentation for measuring air temperatures were also measured at three of these sites. The 1976 thawing indexes varied from 350C degree-days at Prudhoe Bay to 1840C degree-days at Livengood. Measured thaw penetration in undisturbed areas adjacent to the road varied from 28 cm to 112 cm. The calculated gravel embankment thickners to prevent subgrade thawing during the 1976 thawing season ranged from 1.9 m near Prudhoe Bay to 5.2 m near Livengood.

DENSIFICATION BY FREEZING AND THAW-ING OF FINE MATERIAL DREDGED FROM

WALERWAYS. Chamberlain, E.J., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Re-search Council of Canada, 1978, p.622-628, With Rus-sian and French summaries. 11 refs.

32-3755

DREDGING, SOIL COMPACTION. FREEZE THAW CYCLES.

FREEZE THAW CYCLES.
Volume changes and permeabilities for fine material dredged from waterways were observed in the laboratory after full consolidation and freeze-thaw cycling for applied pressures in the range of 0.93 to 30.73 kN/sq m. Up to 20% volume reduction was observed when dredged materials with liquid limits in the range of 60 to 92% were subjected to freeze-thaw cycling. Vertical permeabilities were observed to increase by as much as two orders of magnitude. The technical and economic feasibility of using freeze-thaw overconsolidation procedures to increase the volume of material stored in disposal sites is considered.

ENGINEERING PROPERTIES OF SUBSEA PERMATROST IN THE PRUDHOE BAY RE-GION OF THE BEAUFORT SEA.

Chamberlain, E.J., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p 629-635, With Russian and French summaries. 14 refs.

Sellmann, P.V., Blouin, S.E. 32-3756

SUBSEA PERMAFROST, DRILLING, DRILL CORE ANALYSIS, FROZEN ROCK TEMPERA-TURE, BEAUFORT SEA.

TURE, BEAUFORT SEA.

Core samples, cone penetration resistance and temperature data obtained from subsea sediments near Prudhoe Bay. Alaska, provided the basis for this study. The sites were located 1 to 17 km from shore in 2 to 12 m of water Maximum hole depth was 50 m. The materials at the drill sites included sands and gravels overlain by 45 to 5 m of silts and clays. No ice-bonded materials were observed, although thermal data indicated that permafront was present. Index property, triaval compressive strength, consolidation and permeability data were obtained in the laboratory. Strengths ranged between 25 and 270 kPa for the fine material. Highly overconsolidated clays were encountered at the site farthest from shore. The preconsolidation pressure was estimated to be 15 MPa. Based on considerations of geologic and climatic history, it is proposed that the overconsolidation is a result of freezing and thawing

MP 1105 STRENGTH AND DEFORMATION OF FROZEN

Haynes, F.D., International Conference on Permariaynes, r.D., international Conference on Perma-frost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Re-search Council of Canada, 1978, p.655-661, With Rus-sian and French summaries. 20 refs. 37-3760

FROZEN FINES, TENSILE STRENGTH, COM-PRESSIVE STRENGTH, FROZEN GROUND TEMPERATURE, DEFORMATION.

TEMPERATURE, DEFORMATION.
Results are given for tests made in uniaxial tension and uniaxial compression on frozen Fairbanks silt. These constant displacement rate tests were made over a strain rate range from .00016/s to 2.9/s and a temperature range from OC to 57C. Over these ranges athe compressive strength increased about one order of magnitude, while the tensite strength doubled over the strain rate range and increased about one order of magnitude over the temperature range. For increasing strain rate and decreasing temperature, the specific energy for the compression tests and the modulus increased, but the specific energy for the tension tests decreased. Expressions were developed for the strength as a function of strain rate and temperature. The increase in strength with higher strain rates and lower temperatures is explained by the strength of the see matrix, changes in the unifozen water content, and intergranular friction.

MP 1104

INFLUENCE OF FREEZING AND THAWING ON THE RESILIENT PROPERTIES OF A SILT SOIL BENEATH AN ASPHALT PAVEMENT.

Johnson, T.C., et al, International Conference on Per mafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.662-668, With Rus-Cole, D.M., Chamberlain, E.J. 32-3761

PROZEN FINES, FREEZE THAW CYCLES, ROADS, PAVEMENTS, STRESS STRAIN DIAGRAMS, MODELS.

GRAMS, MODELS.

Stress-deformation data for silt subgrade soil were obtained from in-situ tests and laboratory tests, for use in mechanistic models for design of pavements affected by frost action. Plate-bearing tests were run on bituminous concrete pavements constructed directly on a silt subgrade, applying repeated loads to the pavement surface while the silt was frozen, thawing, thawed, and fully recovered. Repeated-load laboratory trainal tests were performed on the silt in the same conditions. Analysis of deflection data from the is-situ tests showed resiliant moduli of the silt as low as 2000 kPa for the critical thawing period, and 100,000 kPa or higher when fully recovered. Analysis of the laboratory tests, which gave moduli comparable to the latter values, showed that resilient modulus during recovery from the thaw-weakened condition can be modeled as a function. Sechanging mossture content. changing moisture content.

MP 1107 SOME EXPERIENCES WITH TUNNEL ENTRANCES IN PERMAFROST.

Linell, K.A., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.813-819, With Russian and French summaries. 9 refs.

Lobacz, E.F. 12-1781

TUNNELS, PERMAFROST CONTROL, COOL-ING SYSTEMS

Tunnels and shafts in permafrost encounter special portal problems because of instability of surface materials during than, tendency for see formation within the tunnel from annual than zone scepage, and necessity for control of air temperatures within the tunnel during summer. In constructing a tunnel in permafrost at Fox, Alaska, these problems were successfully solved. The unstable ground slope at the tunnel entrance was stabilized by use of a blanket of clean natural gravel. Refrigerant pipes imbedded in the backfull above the portals were used with a mechanical refrigeration system to insure a frozen zone around the tunnel where seepage would otherwise enter in summer. An insulated builkhead containing doors permitted exclusion of warm summer air. Entrance to a vertical shaft connecting to the rear of the tunnel was kept shaded in order to minimize seepage entrance in summer. Tunnels and shafts in permafrost encounter special portal seepage entrance in summer

MP 1108 CONSTRUCTION ON PERMAFROST AT LONG-

Tobiasson, W. International Conference on Perma-frost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978 Proceedings, Vol.1, Ottawa, National Re-search Council of Canada, 1978, p.884-890, With Russian and French summaties. 6 refs. 17, 1701

ROADS, FLOOD CONTROL, BUILDINGS, PER-MAFROST BENEATH ROADS, FOUNDATIONS, PAD FOUNDATIONS, PERMAFROST DEGRA-

Facilities at Longycarbyen were designed and are being operated with an appreciation for the importance of preserving permafrost. Portions of the network of gravel roads and paved runway were constructed on ice-rich permafrost. Ditches, culverts and bridges have been need to accommodate large peak flows since flash floods have occurred. Some difficulties have been experienced with progressive degradation large peak flows since flash floods have occurred. Some defficulties have been experienced with progressive degradation of permafrost by surface and groundwater. Damming a low area and pumping out brackish water has created a year-round water supply lake. The post and post foundation concept used extensively has proved quite successful. The hangar is an impressive use of an elevated floor above permafrost. Older buildings have been stabilized by adding slag insulation above supporting soils and installing open skirting below the first flowr. Water lines and other utilities are supported on timber bents anchored in permafrost.

MP 1109 DETAILS BEHIND A TYPICAL ALASKAN PILE FOUNDATION.

Tobiasson, W., et al. International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.891-897, With Russian and French summaries. 7 refs. Johnson, P.

32-3795

BUILDINGS. FOUNDATIONS, PERMAFROST BENEATH STRUCTURES.

When a sprehouse at Barter Islama burness used to the new foundation consists of forty-five steel pipe pulse, 25 m in dismeter, set in 4.6 to 5.8 m deep holes made with a 46 m dismeter sugger. The annotes was backfilled with a sand-water slurry. Starty manifested using thermocouples. As When a worehouse at Barter Island burned down, a replacement The samelus was backfilled with a sand-water slurry. Starry freezeback was closely monitored using thermocouples. As freezeback was rapid, the contractor was allowed to set steel beams on a pile five days after it was installed and post concrete ten days after the last pile was set. Groundwater problems during July required casing of suggered holes with 51 m diameter pipe to a depth of 1 m. Mechanol difficulties and lack of a crane slowed pile installation, but contractor resourcefulness got the job done clevation surveys and thermocouple measurements indicate that the foundation is solidly frozen and stable.

MP 1110 LAND APPLICATION OF WASTEWATER IN PERMAFROST AREAS.

Sletten, R.S., International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.911-917. With Russian and French summaries. 14 refs.

WASTES, WASTE TREATMENT, WATER TREATMENT, IRRIGATION.

TREATMENT, IRRIGATION.

Land application of wastewater can serve as a high performance treatment system, as a final disposal step for treated efficients, and as a polishing step for partially treated efficients. Experimental studies conducted near Farthanks, Alaska, during 1974-76 meetings both high (5.5 to 152 meters/year) and low rate (0.6 to 5.5 m/yr) systems for the purpose of polishing aerated lagoon efficient to meet secondary treatment enterns. Results from the slow rate system indicate that drusking water quality can be achieved. However, even though nitrogen remoral is not as great, the high rate (rapid infiltration) system is considered to be more feasible for cold climate conditions became the need for winter storage is less, the system does not rely on vegetative uptake, and the free-draining, consistential solis necessary for such systems can be found in alluvial valleys and coastal areas where many Arctic communities are located. For most wastewater constituents, high rate systems are capable of sustained, effective performance in extreme climates.

MP 1111 RADAR ANISOTROPY OF SEA ICE DUE TO PREFERRED AZIMUTHAL ORIENTATION OF THE HORIZONTAL C-AXES OF ICE CRYS-

Kovacs, A., et al. Mar. 1978, No.38, p.171-201, 32 refs.

32-3878

ICE CRYSTAL STRUCTURE, SEA ICE, OCEAN CURRENTS, RADAR ECHOES, ANISOTROPY.

CURRENTS, RADAR ECHOES, ANISOTROPY. Results of impedie radar, see crystal casis and sub-see current measurements on the fistisce near Narshal Island, Alaska, are presented. The crystal structure of the see was found to have a horprontal crystal casis with a preferred arimithal corentation. This orientation was found to algar with the direction of the current at the see water interface. Impulse radar reflection measurements revealed that the preferred orientation of the sea see crystal structure behaved as a microwave-polariter. It was observed that when the antenna E-field was oriented parallel with the c-axis of the crystal platelets a strong reflection of the radar signal from the bottom of the see was obtained. However, when the antenna E-field was oriented perpendicular to the c-axis, no bottom reflection was detected. The results of this study fully support earlier reports of sea see in-homogeneity and anisotropy in reference to both structure and electromagnetic energy transmission.

MP 1112 LAND TREATMENT MODULE OF THE CAP-DET PROGRAM.

Merry, C.J., et al. Symposium on Military Applications of Environmental Research and Engineering. 8th, Dec. 7-8, 1977. Edgewood, Maryland, 1977, 4p. Spaine, P.A. 32-3941

WASTE TREATMENT, WATER TREATMENT, COMPUTER PROGRAMS.

PRELIMINARY ANALYSIS OF WATER EQUIVALENT/SNOW CHARACTERISTICS USING LANDSAT DIGITAL PROCESSING TECHNIQUES.

Merry, C.J., et al, Eastern Snow Conference, Feb. 3-4, 1977, Beileville, Ontario, Canada. Proceedings. 1977, 16 leaves, 20 refs. McKim, H.L., Cooper, S., Ungar, S.G.

REMOTE SENSING, DATA PROCESSING, SNOW WATER EQUIVALENT, SNOW DEPTH. SNOW WATER EQUIVALENT, SNOW DEPTH. The primary emphases of this analysis were to evaluate the accuracy of mapping the accal extent of snow and to determine the relationship between the water equivalent of the snowpack and the radiance obtained from the LANDSAT digital data. The test area selected for this task was the Dickey-Lincoln School Lakes Project located above the confluence of the St. John and Allagash Rivers in northern Maine. The computer alsorithm utilized in this study uses two features—"color" and "albedo" of the LANDSAT digital data to classify the multispectral data into land and water categories. Three snow commes (Allagash B. Beech Ridge and Ninemine B) yielding snow depth and water equivalent data were located. This task was accomplished using computer-guerated gray scale printouss (scale I 24,000) and topographic maps. The preliminary results indicated that the snow radiance values females of 9.5 inches. Extrapolation of these radiance values for the entire watershed can be used to map the arcal extent of snow contrivegration with a water equivalent value of 9.5 inches which enables computation of potential water runoff.

USE OF THE LANDSAT DATA COLLECTION SYSTEM AND IMAGERY IN RESERVOIR MANAGEMENT AND OPERATION.

Cooper, S., et al, Waltham, Massachusetts, U.S. Army Corps of Engineers, 1977, c150p., Numerous refs. Buckelew, T.D., McKim, H.L., Merry, C.J. 32-3943

WATERSHEDS, REMOTE SENSING, SPACE-BORNE PHOTOGRAPHY, COMPUTER AP-PLICATIONS, SNOW WATER EQUIVALENT.

PLICATIONS, SNOW WATER EQUIVALENT.

The New England Division Coops of Engineers demonstrated the use of the data collection and imagery systems in watershed and interfaced with a computer to provide an amounting proud receiver station which operated nearly continuously for over 18 months. Adequate reliability for operational use was goosen, and daily procedures were conjected to one half hour of operation time per day. Comparisons of costs and operation constraints were drawn among Landson DCS, GOES DCS, and groud based radio. Comparer own pathle tapes of Landson imagery were analyzed to evaluate the marging accuracy of the area of shown to determine a relationship between the water equivalent of a stowpack and the radiance recorded in Landson digital data, and to defining writinals and flood areas in New England. Sense interfaces were developed and evaluated for the collection of real time environmental data was the Landson DCS.

MP 1115 ECOLOGICAL BASELINE INVESTIGATIONS ALONG THE YUKON RIVER-PRUDHOE BAY HAUL ROAD, ALASKA.
Brown, J., ed. Hanover, New Hampshire, U.S. Army

Cold Regions Research and Engineering Laboratory, 1978, 131p., Progress report to the Department of En-ergy. For individual reports see 32-3889 through 32-3896 32-3888

PLANTS (BOTANY), MAPPING

DISTRIBUTION AND PROPERTIES OF ROAD DISTRIBUTION AND PROPERTIES OF ROAD DUST AND ITS POTENTIAL IMPACT ON TUNDRA ALONG THE NORTHERN PORTION OF THE YUKON RIVER-PRUDHOE BAY HAUL ROAD. CHEMICAL COMPOSITION OF DUST AND VEGETATION.

Iskandar, I.K., et al. Ecological baseline investigations along the Yukon River-Prudhoe Bay Haul Road, Alasta, edited by J. Brown. MP 1115, Hanover, New Hampshire, U.S. Army Cold Regions Research and Engineering Laboratory, 1975, p.110-111, 2 refs. Quarry, S.T., Brown, J. 32-3896

ROADS, DUST, TUNDRA VEGETATION, CHEMICAL ANALYSIS, ION DENSITY (CONCENTRATION).

MP 1117 OBTAINING FRESH WATER FROM ICE-

Mellor, M., 1977, Vol.31, p.193, In Russian. 32-3932

SUPPLY, ICERERGS, ECONOMIC ANALYSIS.

Conclusions of two conferences on the forming and utilization of ichergs, one held in Paris, in June, 1977, the other at the University of Iown in Oct., 1977, are reviewed. There is here interest in water supply from ichergis, but technical problems remain. Rough estimates indicate that obtaining water from seebergs may be economically useful for rich countries with a fresh-water shortage.

SOME CHARACTERISTICS OF GROUNDED FLOEBERGS NEAR PRUDHOE BAY, ALASKA-Kovacs, A., et al, Sep. 1976, 29(3), p.169-172, 10 refs. For another version of this paper see 32-1083. Gow. A.J.

SEA ICE, SOUNDING, ICE BOTTOM SURFACE, ACOUSTIC MEASURING INSTRUMENTS, ICE STRUCTURE, PRESSURE RIDGES.

ARCTIC AND SUBARCTIC ENVIRONMENTAL ANALYSIS.

A.VALUSIS. Anderson, D.M., et al. Dec. 1972, 13(8), p.28-30, Haugen, R.K., Gatto, L.W., Slaughter, C.W., McKim, H.L., Marlar, T.L.

REMOTE SENSING, TERRAIN IDENTIFICA-TION, ERTS IMAGERY.

TION, ERIS IMAGERY.

The authors indicate that data from the Earth Resources Technology Satellite, ERTS-1, will people greater opportunity to study relationships between snow pack and mer technologies relationships between snow pack and permaferost-registron and coastal sedimentation processes, and permaferost-registrate relationships. An example of ERTS-1 imagery of a 115 square mile area 250 miles NW of Fairbanks, Aliska is shown with detailed identification of 55 cloud and terrain features.

MESOSCALE DEFORMATION OF SEA ICE FROM SATELLITE IMAGERY. Anderson, D.M., et al, Oct. 25, 1973, NASA-CR-135741, 2p., N73-3307. Crowder, W.K., McKim, H.L., Hibler, W.D., III.

SEAICE, ICE MECHANICS, REMOTE SENSING. ERTS IMAGERY.

MP 1121 ICE AND SNOW AT HIGH ALTITUDES.

Mellor, M., Symposium on High Altitude Geoecology, Denver, Colorado, Feb. 20-25, 1977 American Association for the Advancement of Science, 1977, 10p.

SNOW PHYSICS, SNOW MECHANICS, ICE PHY-

MP 1122 OPPORTUNITIES FOR PERMAFROST-RELATED RESEARCH ASSOCIATED WITH THE TRANS-ALASKA PIPELINE SYSTEM.

National Research Council. Polar Research Roard. Committee on Permafrosi, Washington, D.C., National Academy of Sciences, 1975, 37p., Report of Workshop, March 19-22, 1975, Scottsdale, Attrona

MEETINGS, RESEARCH PROJECTS, PERMA FROST, PIPELINES

MP 1123 EFFECTS OF HOVERCRAFT, WHEELED AND TRACKED VEHICLE TRAFFIC ON TUNDRA.
Abele, G., Mar. 1976, No. 116, Muskeg Research Conference, 16th, Oct. 7, 1976. Proceedings, p.186-215,

31-1510

AIR CUSHION VEHICLES, TRACKED VFHI-CLES, VEHICLE WHEELS, TUNDRA VEGETA-TION, DAMAGE.

TION, DAMAGE.
In support of the Advanced Research Projects Agency (ARPA) Arctic Surface Effects Vehicle (ASEV) Program, traffic tests were conducted during the summer of 1971 near Barrow, Alaska, on various types of tundra terrains using an SK-5 Air Cushion Vehicle. The main objectives of the study were to investigate the effects of air cushion vehicle operations and traffic on tundra, specifically, the extent and pattern of erosion, the degree of damage, initial and permanent, to the vegetation, the subsequent effect on the soil thermal regime due to any surface disturbance by the ACV, and to compare the general ecological impact of ACV traffic with that of other ground vehicles

MP 1124 DIFFICULTIES OF MEASURING THE WATER SATURATION AND POROSITY OF SNOW. Colbeck, S.C., 1978, 20(82), p.189-201, 26 refs.

WET SNOW, SNOW WATER CONTENT, POROSITY, SATURATION, MEASURING INSTRUMENTS, ACCURACY, REMOTE SENSING. STRUMENTS, ACCURACY, REMOTE SENSING.
Liquid saturation and porosity control most of the important material properties of wet snow, hence accurate measurements of these two parameters are of the utmost importance for both field research and glaciological applications. Nevertheless, most of the instruments in use are not capable of making accurate determinations of saturation. An error analysis shows that only direct measurements of the liquid volume can provide accurate values of water saturation, hence the melting calorimeter is inherently inaccurate While centrifuges extract some of the liquid for direct measurement, there is always some residual liquid left, depending on the grain size and structural parameters of the ice matrix. Therefore, some uncertainty exists over the interpretation of the data obtained from centralizer. grain size and structural parameters of the ice matrix. Therefore, some uncertainty exists over the interpretation of the data obtained from centrifuges. High-frequency capacitance probes can be used either in situ or on the surface and are very sensitive to the volume of hquid present. Capacitance probes are by far the best of the available devices

1977 TUNDRA FIRE IN THE KOKOLIK RIVER AREA OF ALASKA.

Hall, D.K., et al, Mar. 1978, 31(1), p.54-58, ADA-062 439, 10 refs.

Brown, J., Johnson, L.A.

TUNDRA VEGETATION, REMOTE SENSING, SPACEBORNE PHOTOGRAPHY, THAW DEPTH, FIRES.

The authors describe a lightning-set fire on the north coast of Alaska southwest of Barrow in July-August, 1977 Ground and satellite observations were rade to determine the effects of the fire on the tundra vegetation and the thaw depth of the permafrost. The study indicates that natural drainages form effective fire breaks in the region and that fire intensity is related to vegetation type and the moisture present in the soil.

MP 1126 RADAR PROFILE OF A MULTI-YEAR PRES-SURE RIDGE FRAGMENT.

Kovacs, A., Mar. 1978, 31(1), p.59-62, 9 refs.

SEA ICE, PRESSURE RIDGES, RADAR ECHOES,

ICE COVER THICKNESS.

The usefulness of radar profiling pressure ridges of multi-year ice is described. Radar echoes provide thickness measurements of ridge keels and sails and help to define the most difficult of all Arctic obstacles. The author warms, however, that the radar technique is still in its infancy and all but excludes profiling the thickness of first-year ice pressure ridges.

MP 1127 EFFECT OF TEMPERATURE AND STRAIN RATE ON THE STRENGTH OF POLYCRYSTAL LINE ICE.

Haynes, F.D., Oct. 1977, No.121, p.107-111, 8 refs.

ICE CRYSTALS, ICE STRENGTH, TEMPERA-TURE EFFECTS, STRAIN TESTS, SNOW ICE

The focus of this paper is on the results of laboratory tests on polycrystalline, isotropic snow ice. Test temperatures ranged from OC to -56C, and strain rates ranged from O01/sec to 0 1/sec. Tests in both uniaxial compression and uniaxial tension were made on dumbbell shaped specimens

MP 1128 ICEBERG THICKNESS AND CRACK DETEC-TION.

Kovacs, A., International Conference and Workshops on Iceberg Utilization for Fresh Water Production, Weather Modification, and Other Applications, 1st, lowa State University, Ames, October 2-6, 1977. Proceedings. Edited by A.A. Husseiny, New York, Pergamon Press, 1978, p.131-145, 18 refs.

ICEBERGS, ICE COVER THICKNESS, RADAR ECHOES, ICE ISLANDS, CREVASSES, ICE CRACKS, ANTARCTICA—MCMURDO SOUND. CRACKS, ANTARCTICA—MCMURDO SOUND. Results obtained with an impulse radar system used to profile the thickness of and detect cracks in a tabular iceberg in McMurdo Sound, Antarctica, and an nee island in the Beaufort Sea near Flaxman Island, Alaska, are presented. Graphic records are shown of the radar impulse travel time which clearly reveal, for the first time, the bottom relief of each cice formation. Also detected in the antarctic iceberg was an echo signature from an infiltration-brine layer. The impulse radar signature of a 3-m wide creviase in the McMurdo Ice Shelf is also shown. The time of flight of the radar impulse in the ice island is compared with a 24.05-m drill hole measurement of the ice thickness. The effective velocity of the radar impulse in the ice island was found hole measurement of the ice thickness. The effective velocity of the radar impulse in the ice island was found to be 0.16m/ns and the effective dielectric constant of the ice to be 3.5. The findings show that tabular icebergs are flawed by cracks or crevasses which could be expected to propagate through the ice when an iceberg reaches the edge of the pack where it is subject to stresses induced by sea swell and waves (Auth.)

MP 1129 CATALOG OF SNOW RESEARCH PROJECTS. Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, Oct. 1975, 103p Dumont, N., ed

SNOW SURVEYS, RESEARCH PROJECTS.

WHEELED VEHICLES.

Harrison, W.L., International Conference of the International Society for Terrain-Vehicle Systems, 5th, Detroit, Mich., June 2-6, 1975, Proceedings. Vol.2, Hoboken, N.J., (1976), p.589-614, 14 refs. 33-440

SNOW COMPRESSION, TRACTION, LOADS (FORCES), SNOW MECHANICS, RUBBER SNOW FRICTION, SNOW COMPACTION, ANALYSIS (MATHEMATICS), VEHICLES.

MP 1131 MATHEMATICAL MODEL TO PREDICT FROST HEAVE.

Berg, R.L., et al, International Symposium on Frost Action in Soils, Luleå, Sweden, Feb. 1977. Proceed-ings, Vol.2, University of Luleå, 1977, p.92-109, 14

Gritner, K.E., Guymon, G.L.

345

MATHEMATICAL MODELS, SOIL WATER MI-GRATION, HEAT TRANSFER, FROST HEAVE, FROST PENETRATION.

A mathematical model of coupled heat and moisture flow in gols has been developed. The model includes algorithms A mathematical model of coupled heat and moisture flow in soils has been developed. The model includes algorithms for phase change of soil moisture and frost heave, and several types of boundary and initial conditions are permitted. The finite element method of weighted residuals (Galerkin procedure) was chosen to simulate the spatial regime and the Crank-Nicolson method was used for the time domain portion of the model. Comparison of simulated and experimental data illustrates the importance of unsaturated hydraulic conductivity. It is one parameter which is difficult to measure and for which only a few laboratory test results are available. Therefore, unsaturated hydraulic conductivities calculated in the computer model may be a significant source of error in calculations of frost heave.

MP 1132 SEA ICE PRESSURE RIDGES IN THE BEAU-FORT SEA.

Wright, BD, et al, 1AHR Symposium on Ice Problems, Luleå, Sweden, Aug 7-9, 1978 Proceedings, Part 1, International Association for Hydraulic Research, 1978, p.249-271, 10 refs.

Hnatiuk, J., Kovacs, A.

SEA ICE, PRESSURE RIDGES, ICE MODELS.

The ice cover in the Beaufort Sea is characterized by extreme irregularities in thickness which are produced by the motion irregularities in thickness which are produced by the motion and resulting deformation of the sea ice. Pressure ridges, which are an integral part of this irregular and formidable ice cover, are recognized as the largest and most hazardous tee formations. Here, a number of cross-sectional profiles of first and multi-year pressure ridges in the Beaufort Sea are presented, which include both free-floating and grounded ice forms. The cross-sections of these multi-year ridges suggest that they can be adequately described by one ridge model with a constant sait to keel ratio and geometry. It is shown that the ice comprising multi-year ridges is

solid, with the interblock voids existing at the time of their formation being completely filled with ice. Several first-year pressure ridge profiles are also discussed, which indicate that there ridges cannot be represented by any one geometric model as their sail to keel ratios and geometries are quite variable.

MP 1133

ICE AND NAVIGATION RELATED SEDIMEN-TATION.

Wuebben, J.L., et al, IAHR Symposium on Ice Problems, Luleå, Sweden, Aug. 7-9, 1978. Proceedings, Part 1, International Association for Hydraulic Research, 1978, p.393-403, 5 refs.

Alger, G.R., Hodek, R.J.

33-383

ICE COVER EFFECT, ICE NAVIGATION, SEDI-MENT TRANSPORT.

MENT TRANSPORT.

This paper examines the hydrodynamics of vessel passage through a restricted channel and the resulting potential for sediment translocation

Examples of field measurements are presented which show a complex pattern of changes in water current magnitude and direction. The constriction of the channel by a ship creates a drop in the water surface that travels with the ship. The application of the concepts of effective stress and upward seepage forces to the riverbed material predicts that the potential for sediment translocation increases upon the passage of this moving trough. Three modes of granular bottom sediment transport were observed: bed load, saltation, and a process referred to as explosive liquefaction. liquefaction.

MP 1134 ARCHING OF MODEL ICE FLOES AT BRIDGE PIERS.

Calkins, D.J., IAHR Symposium on Ice Problems, Luleå, Sweden, Aug. 7-9, 1978. Proceedings, Part 1, International Association for Hydraulic Research, 1978, p.495-507, 7 refs.

RIVER ICE, ICE FLOES, BRIDGES, PIERS, ICE PRESSURE, ICE MODELS, ICE DEFORMATION. PRESSURE, ICE MODELS, ICE DEFORMATION.

A model study of the formation of ice arching at the upstream faces of rounded bridge piers was conducted in a hydraulic flume Polyethylene plastic was used to simulate square ice floes of two sizes, 37 mm and 74 mm A power function relaining the upstream surface ice concentration to a size ratio (characteristic block size over pier span opening) distinguishes between the arching and non-arching conditions at velocities below the critical value for underturning of individual ice floes.

MP 1135 FRAZIL ICE FORMATION IN TURBULENT FLOW.

Muller, A., et al, IAHR Symposium on Ice Problems, Lulea, Sweden, Aug. 7-9, 1978 Proceedings, Part 2, International Association for Hydraulic Research, 1978, p.219-234, 9 refs. Calkins, D.J.

33.400

FRAZIL ICE, ICE FORMATION, TURBULENT FLOW, SUPERCOOLED WATER, ICE NUCLEI. FLOW, SUPERCOOLED WATER, ICE NUCLEI.

To study ice nucleation and heat transfer, frazil ice was produced experimentally under controlled conditions. Turbulence was generated by a moving grid in a turbulence jar, where water could be cooled below the freezing point. Frazil was observed by means of a schileren system and the number of ice particles was counted on photographs. No frazil ice formed, regardless of turbulence and foreign material, unless the water was seeded with ice nuclei. The number of particles grew during the experiment, the growth rate increased with greater supercooling and higher velocity of the grid. This indicates a multiplication process induced by secondary nucleation. The heat transfer per particle normalized with supercooling, and the size of the particles was constant in all experiments within the accuracy of measurement. From these observations, it can be concluded that the total ice production is predictable if the heat transfer per particle can be estimated from turbulence data and if the number of particles can be calculated. A nucleation theory is, however, not available and is regarded as the crucial question.

MP 1136 RIGHTING MOMENT IN A RECTANGULAR ICE BOOM TIMBER OR PONTOON.

Perham, R.E., IAHR Symposium on Ice Problems, Lulea, Sweden, Aug. 7-9, 1978 Proceedings, Part 2, International Association for Hydraulic Research, 1978, p.273-289, 5 refs.

ICE BOOMS, FLOATING STRUCTURES.

ICE BOOMS, FLOATING STRUCTURES.

The ability of an ice boom timber to restrain ice floes is governed by its capacity to float and to resist being overturned

Six mathematical equations that describe this capacity for a rectangular-shaped timber have been worked out and are prevented here. The limits of each equation are also given them dimensionless values of righting moment equations, and from them dimensionless values of righting moment may be calculated. The equations have been evaluated for some general conditions, and for a few specific cases involving water and wood, and for one case concerned with deugning a steel pontoon booin. The calculations were done by a computer program which is not included.

data provided include three graphs and two tables of dimension-less values. All in all, the information should be very useful in evaluating new designs of ice boom timbers and

MP 1137

ENTRAINMENT OF ICE FLOES INTO A SUB-MERGED OUTLET.

Stewart, D.M., et al, IAHR Symposium on Ice Problems, Luleå, Sweden, Aug. 7-9, 1978. Proceedings, Part 2, International Association for Hydraulic Research, 1978, p.291-299, 2 refs.

Ashton, G.D.

FLOATING ICE. WATER INTAKES, WATER

FLOW.

Results of a series of laboratory experiments in a flume to determine the conditions under which floating ice floes are entrained into a submerged outlet are reported. Entrainment is found to occur when a Froude number based on outlet velocity and submergence depth is exceeded and that critical Froude number is a function of the ratio of outlet height to upstream flow depth. The critical Froude number is also shown to asymptotically approach the Froude number corresponding to equilibrium accumulation thicknesses of ice floes at a surface obstruction as the outlet height approaches the flow depth. Interpretation and application to design of submerged outlets is discussed.

MP 1138 ICE ARCHING AND THE DRIFT OF PACK ICE THROUGH CHANNELS.

Sodhi, D.S., et al, IAHR Symposium on Ice Problems, Luleå, Sweden, Aug. 7-9, 1978. Proceedings, Part 2, International Association for Hydraulic Research, 1978, p.415-432, 25 refs.

Weeks, W.F.

SEAICE, DRIFT, WIND VELOCITY, CHANNELS (WATERWAYS), ICE MODELS.

(WATERWAYS), ICE MODELS.

Models originally developed to describe the arching and the movement of granular materials through hoppers or chutes are applied to arching and drift of pack ice in straits and gulfs having lengths of 50 to 500 km. Verification of the usefulness of the models is attempted by making comparisons with ice deformation patterns as observed via satellite imagery in the Bering Strait region and in Amundsen Gulf The results are encouraging in that there is good correspondence between observed arching and lead patterns and those predicted by theory. In addition, values determined via the model for the angle of internal friction and the cohesive strength per unit thickness are similar to values obtained by other approaches It is estimated that if the wind velocity parallel to the Bering Strait exceeds 6 m/s, there will be ice flow through the strait. A one-dimensional formulation is presented, governing the ice pressure in a straight channel when the ice is stationary due to an ice arch or a boom.

MP 1139

RADAR ANISOTROPY OF SEA ICE DUE TO PREFERRED AZIMUTHAL ORIENTATION OF HORIZONTAL C AXES OF ICE CRYSTALS.

Kovacs, A., et al, Dec. 20, 1978, 83(C12), p.6037-6046, 36 refs.

Morey, R.M.

SEA ICE, RADAR ECHOES, ANISOTROPY, ICE CRYSTAL STRUCTURE, ELECTROMAGNETIC PROPERTIES, OCEAN CURRENTS

PROPERTIES, OCEAN CURRENTS
Results of impulse radar, nee crystal c axis, and subice current
measurements on the fast ice near Narwhal Island, Alaska,
are presented. The crystal c axis with a preferred azimuthal
onentation. This orientation was found to align with the
direction of the current at the ice-water interface. Impulse
radar reflection measurements revealed that the preferred
onestation of the securic crystal attrictive behaved as a radar reflection measurements revealed that the preferred onentation of the sea ice crystal structure behaved as a microwave polarizer— it was observed that when the antenna E field was oriented parallel with the c axis of the crystal platelets, a strong reflection of the radar signal from the bottom of the ice was obtained. However, when the antenna E field was oriented perpendicular to the c axis, no bottom reflection was detected— The results of this study fully support earlier reports of sea ice inhomogeneity and anisotropy in reference to both structure and electromagneitic energy transmission

Frankenstein, G.E., et al, International Tank Towing Conference, 15th, The Hague, September 1978. Proceedings—Part 1, M W C. Oosterveld, editor, Wageningen, Netherlands Ship Model Basin, 1978, p.157-179, 34 refs.
33-543

MEETINGS, ICE NAVIGATION, ICE CONDI-TIONS, ICE MECHANICS, IMPACT TESTS, ME-CHANICAL TESTS, PLASTICITY TESTS

MP 1141

ICE RELEASING BLOCK-COPOLYMER COAT-INGS.

Jellinek, H.H.G., et al, 1978, Vol.256, p.544-551, In English with German summary. 7 refs. Kachi, H., Kittaka, S., Lee, M., Yokota, R.

33.545

PROTECTIVE COATINGS, POLYMERS, ICE RE-MOVAL, CHEMICAL ICE PREVENTION. MP 1142

UPDATE ON SNOW LOAD RESEARCH AT CRREL.

Tobiasson, W., et al, 1977, 34th, p.9-13, 20 refs. Redfield, R. 33-624

SNOW LOADS, RESEARCH PROJECTS, SNOW DENSITY.

MP 1143

METHODOLOGY USED IN GENERATION OF SNOW LOAD CASE HISTORIES. McLaughlin, D., et al, 1977, 34th, p.163-174.

Duggan, G.

SNOW LOADS, ROOFS, DATA PROCESSING.

MP 1144
EFFECT OF WASTE WATER REUSE IN COLD REGIONS ON LAND TREATMENT SYSTEMS. Iskandar, I.K., July-Sep. 1978, 7(3), p.361-368, 26 refs.

WATER TREATMENT, WASTE DISPOSAL, COLD WEATHER TESTS, SOIL CHEMISTRY.

COLD WEATHER TESTS, SOIL CHEMISTRY. The effect on ground water quality and soils and vegetation of treatment and disposal of municipal/industrial waste water on land in cold regions was investigated using six outdoor test cells. Winter application of waste water was feasible even at very cold air temperatures (<00C) at the New Hampshire test site High NO3-N concentrations were observed in all treatments (5-15cm/week) in both soils in early summer. This was explained as leaching of NH4-H stored over the winter months after its oxidation to NO3 in early spring. The principal mechanism for nitrogen removal was found to be plant uptake, which was seasonally dependent Application of 15 cm of secondary effluent per week to a sandy loam soil was not feasible because of the presence of >10mg/liter NO3-N in the leachate for >9 molyear Application of salts for road deceing during winter resulted in relatively higher concentrations of salts and Cl in the ground for a short period of time MP 1145

MP 1145 STATE OF KNOWLEDGE ON LAND TREAT-MENT OF WASTEWATER.

International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, 2 vols., For selected papers see 33-651 through 33-661. 33-650

MEETINGS, WASTE TREATMENT, WATER TREATMENT, AGRICULTURE, FOREST LAND, MATHEMATICAL MODELS, LAND DEVELOP-

The objectives of this Symposium are to summarize the state of knowledge of the practical aspects of the treatment of wastewater by land application and to identify the suitable approaches for the design of such land treatment systems. The topics included are: site selection considerations, case studies of national and international concern, health effects of land treatment systems, pretreatment considerations, uses of wastewaters in agricultural and forest systems, monitoring, modeling and design criteria in two volumes. Volume 1 contains the invited papers presented and discussed at the conference Volume 2 contains shorter nanera about on-soine research that were contains the processory. The objectives of this Symposium are to summarize the contains shorter papers about on-going research that were selected from the responses received following a call for abstracts

MP 1146

USE OF REMOTE SENSING TECHNIQUES AND OTHER INFORMATION SOURCES IN REGIONAL SITE SELECTION OF POTENTIAL LAND TREATMENT AREAS.

Merry, C.J., International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Proceedings, Vol.1, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1973, p 107-119, 27 cef.

SITE SURVEYS, WATER TREATMENT, WASTE TREATMENT, REMOTE SENSING, SPACE-BORNE PHOTOGRAPHY

Landsat, Skylab S190A Multispectral Photographic Camera, and Skylab S190B Earth Terrain Camera satellite data products, enlarged to scales of 1:500,000 and 1:250,000, were used to prepare land use maps for regional site selection of potential land treatment areas Interpretation of tonal and textural characteristics on the photography corresponded to vegetation, urban and agricultural land use categories. Color and color infrared transparencies augmented the land use mapping,

which was accomplished on black and white photographic prints. The three systems are compared in terms of areal coverage, resolution, and time of product preparation.

MP 1147

EVALUATION OF THE MOVING BOUNDARY THEORY IN DARCY'S FLOW THROUGH POR-OUS MEDIA.

Nakano, Y., International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Proceedings, Vol.1, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.142-151, 22 refs.

BOUNDARY VALUE PROBLEMS, SOIL WATER MIGRATION, POROUS MATERIALS, ANALYSIS (MATHEMATICS), THEORIES.

YSIS (MATHEMATICS), THEORIES.
Traditionally in hydrology and soil physics, neither the water table nor the wetting front in Darcy's flow were believed to be singular surfaces. Recently, a new and conflicting theory has been advanced, using two different approaches. It has been shown, based upon continuum physics, that across both the water table and the wetting front local acceleration generally suffers a non-zero jump, and these two boundaries can be interpreted as acceleration waves This interpretation was found consistent with reported regularity results obtained from a purely mathematical viewpoint.

EVALUATION OF N MODELS FOR PREDICTION OF NO3-N IN PERCOLATE WATER IN LAND TREATMENT.

Iskandar, I.K., et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1979, Hanover, New Hampshire. Proceedings, Vol.1, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.163-160, 61-61.

Selim, H.M. 33-653

WATER TREATMENT, SOIL CHEMISTRY, SEEPAGE, MATHEMATICAL MODELS.

SEEPAGE, MATHEMATICAL MODELS.

Nitrogen simulation models developed to describe one or more processes in agricultural soils can be adopted for land treatment. The most important processes in the simulation of N transformations for prediction of N in percolate water in land treatment are intrification, dentification, plant uptake and exchange of NH4 with the soil. The N model must be incorporated into a moisture flow model. It was concluded that the Michaelis-Menten type model is the most appropriate, although the first order kinetic may be used to describe the intrification process. Modeling the denirification process in slow infiltration must include biodegradable carbon and dissolved oxygen as limiting factors. Although several large models are available to simulate and predict N in leachate in land treatment, a need for a simplified model that can be tested in the field is apparent.

NITROGEN BEHAVIOR IN LAND TREAT-MENT OF WASTEWATER: A SIMPLIFIED MODEL

Selim, H.M., et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire Proceedings, Vol.1, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.171-179, 15 refs.

Iskandar, I.K. 33-654

WASTE TREATMENT, WATER TREATMENT, SOIL CHEMISTRY, SEEPAGE, MATHEMATICAL MODELS.

A simplified mathematical model was developed to describe A simplified mathematical model was developed to describe transformations and transport of nitrogen under transient soil water flow conditions. Kinetic reactions were assumed to govern the nitrification and denitrification processes. A macroscopic approach was used to incorporate plant uptake of water as well as NO3-N and NH4-N from the soil solution. The sensitivity of the model to changes in rate of N transformation, N uptake by plants, and schedule and amounts of N application were also investigated. The model can be used as a tool to predict the fate of nitrogen in land treatment systems. The model is flexible and can be adapted to incorporate various nitrogen transformation mechanisms as well as laverings in the soil profile mechanisms as well as layerings in the soil profile

OVERVIEW OF EXISTING LAND TREATMENT SYSTEMS.

Iskandar, I.K., International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Proceedings, Vol 1, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p 193-200, 34 refs.

WASTE TREATMENT, WATER TREATMENT,

SOIL CHEMISTRY, HISTORY
This paper reviews existing systems of land application of Particular emphasis is placed upon the historical philosophy of the utilization of the natural soil-plant system for purifying wastewater, reasons for the success or failure of the older systems, and experience gained from their design, construction and operation.

UPTAKE OF NUTRIENTS BY PLANTS IRRI-GATED WITH MUNICIPAL WASTEWATER EF-RITIENT

Clapp, C.E., et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Pro-ceedings, Vol.1, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p 395-404, 21 refs.

Palazzo, A.J., Larson, W.E., Marten, G.C., Linden,

33.656

NUTRIENT CYCLE, IRRIGATION, WASTES, WATER TREATMENT, SOIL CHEMISTRY.

We present compansons of plant nutrient uptake by corn and forage grasses when these crops were irrigated with secondary municipal wastewater effluent or treated with inorganic fertilizer Characteristic analyses of effluent from secondary municipal wastewater effluent or treated with inor-ganic fertilizer Characteristic analyses of effluent from various locations are given for the macro plant nutrients as well as for quality indicators. The importance of the presence of varying amounts of N, P, and K in effluent studies is discussed. Micro elements in effluent are consid-ered for their use to meet nutrient requirements of these crops as well as for their potential for environmental contamina-tion.

MP 1152

PERFORMANCE OF OVERLAND FLOW LAND TREATMENT IN COLD CLIMATES.

Jenkins, T.F., et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Pro-ceedings, Vol.2, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.61-70,

Martel, C.J., Gaskin, D.A., Fisk, D.J., McKim, H.L.

WATER TREATMENT, WASTE TREATMENT, SOIL CHEMISTRY, COLD WEATHER PER-FORMANCE.

FORMANCE.

The objective of this study was to evaluate the performance of overland flow systems, especially during the winter months. Operation of the CRREL overland flow facility began in May 1977 and continued through the winter of 1977-78. The results of this study indicated that satisfactory BOD removal did not occur at soil temperatures below 4C

Based on this criterion, 105 days of storage would be needed at the CRREL site. This is 30 days less than the storage needs predicted by the EPA-1 computer program

GROWTH AND NUTRIENT UPTAKE OF FOR-AGE GRASSES WHEN RECEIVING VARIOUS APPLICATION RATES OF WASTEWATER.

Palazzo, A J, et al, Inter. Lional Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire Proceedings, Vol.2, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.157-162, 10-27. 163, 10 refs. McKim, H.L.

33-658

NUTRIENT CYCLE, SOIL CHEMISTRY, WASTE TREATMENT, GRASSES.

This study reports on the growth and nutrient removal of forage grasses receiving three years of wastewater applications. The forages received wastewater at various application rates and schedules and were grown in either a Windsor sandy loam or a Chariton silt loam soil. Plant and soil analyses were performed on representative samples during the study

MP 1154

MICROBIOLOGICAL AEROSOLS FROM A FIELD SOURCE DURING SPRINKLER IRRIGATION WITH WASTEWATER.

Bausum, H.T., et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Pro-ceedings, Vol.2, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.273-280. 14 rcfs.

Brockett, B.E., Schumacher, P.W., Schaub, S.A., McKim, H.L., Bates, R.E.

WASTE TREATMENT, WATER TREATMENT, IRRIGATION, AEROSOLS.

IRRIGATION, AEROSOLS.

Measurements were made of the strength and dispersion of bacterial aerosols resulting from land application of chlorinated, ponded wastewater by spray irrigation. An approximaterly square 2 i hectare area was covered by 96 impact sprinkles, thus creating a multi-point or field aerosol source type and large volume electrostatic precipitator air samplers were deployed upwind and on 3 m centers in each of three downwind transects. In four runs, water to be sprayed was seeded with fluorescent dye to characterize the aerosol cloud without the effect of biological decay. During aerosol

studies, continuous on-site meteorological measurements were made, and wastewater chemical parameters were monitored

COMPLITED PROCEDURE FOR COMPARISON OF LAND TREATMENT AND CONVENTIONAL TREATMENT: PRELIMINARY DESIGNS, COST ANALYSIS AND EFFLUENT QUALITY PRE-DICTIONS.

Spaine, P.A, et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Proceedings, Vol.2, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.335-340, 4 refs.

33-66Ó

WASTE TREATMENT, WATER TREATMENT, COMPUTER PROGRAMS.

COMPUTER PROGRAMS.

Dunng 1972 a manual for the design of wastewater treatment facilities was developed by the U S Army Engineer Waterways Experiment Station. To complement the design manual and assist the field design engineer, the computer model CAPDET (Computer Assisted Procedure for the Design and Evaluation of Wastewater Treatment Systems) was developed. In response to field users' request, a land treatment module was developed and implemented into CAPDET. The CAPDET program provides planning level design and cost evaluations for any wastewater treatment system

SIMULATION OF THE MOVEMENT OF CON-SERVATIVE CHEMICALS IN SOIL SOLUTION.

Nakano, Y, et al, International Symposium on the State of Knowledge in Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire. Proceedings, Vol 2, Hanover, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.371-

Iskandar, I.K. 33-661

SOIL WATER MIGRATION, SOIL CHEMISTRY,

MATHEMATICAL MODELS.
A numerical method is introduced to simulate the movement A numerical method is introduced to simulate the movement of conservative chemicals in soil by water. The method is essentially based upon a finite element aproximation to the equation of continuity, and each element constitutes a complete mixing cell. The number of cells represents a degree of mixing. The theoretical justification of the method is presented and the accuracy of the method is presented and the accuracy of the method is presented and that accuracy of the method is presented and that betained from a large lystimeter. It is found that the method can simulate the general trend of the movement of chemicals reasonably well, but fails to simulate the high frequency of variations that occur near the soil surface

TECHNIQUE FOR MEASURING RADIAL DEFORMATION DURING REPEATED LOAD

TRIAXIAL TESTING.
Cole, D.M., Aug. 1978, 15(3), p.426-429, In English with French summary.

3 refs. 33-638

ELECTRICAL MEASUREMENT, DYNAMIC LOADS, DEFORMATION.

A system of non-contacting displacement transducers has been used to record radial deformation in repeated load triaxial tests. Operating principle, system capabilities, and installation technique are discussed. Results of tests on clay and silt subgrade materials are presented and Poisson's ratio is calculated directly from test data.

MP 1158

REPETITIVE LOADING TESTS ON MEM-

REPETITIVE LOADING TESTS ON MEMBRANE ENVELOPED ROAD SECTIONS DURING FREEZE-THAW CYCLES. Smith, N, et al, Oct 1978, 104(GT10), p.1277-1288, 15 refs. For other versions of this paper see 32-562 (MP 962) and/or 32-4407 (CR 78-12, ADA-056 744). Eaton, R.A., Stubstad, J. 33-645

FREEZE THAW TESTS, ROADS, SUBGRADE PREPARATION, PROTECTIVE COATINGS, DY-NAMIC LOADS

NAMIC LOADS.
Road test sections of impermeable membrane-enveloped silt and clay soils overlain with asphalt cement concrete were subjected to repetitive dynamic plate-bearing loadings to determine strength variations of the pavement systems during freeze-thaw cycles. The modulus values of the asphalt cement concrete vary inversely with its temperature by an order of magnitude in the temperature range of 110F to 30F. The resilient stiffness of the pavement system varied in the same manner by nearly a factor of eight. Despite the wide strength variations of the sections during freeze-thaw cycles, membrane can loped fine-grained soils can be utilized instead of granular materials as base and subbase layers in flexible pavements in cold regions where moisture migration is a major concern. Without the membrane protection such fine-grained soils that experience frost heaving migration is a major concern Without the membrane protection such fine-grained soils that experience frost heaving suffer severe bearing strength loss during thawing

PHYSICAL MEASUREMENTS OF RIVER ICE JAMS.

Calkins, D.J., Aug. 1978, 14(4), p.693-695, 5 refs. 33-641

RIVER ICE, ICE JAMS, MEASUREMENT, ICE COVER THICKNESS.

COVER THICKNESS.
River ace jam measurements have always been relatively difficult to obtain because of the uncertain stability of the floating ace mass. But recently two ace jams resolidified for about 3 weeks, allowing the ace thickness to be measured at several cross sections along their longitudinal profiles. The size distribution of surface are floes in one of the jams was also evaluated from low-level aerial photography. The ice jams were found to be thickness at the downstream end, of the order of 4-5 times the thickness of the ice cover before breakup, and decreased almost linearly in thickness upstream. The largest surface ice floes measured no none (c jam ranged from 0.27 to 0.05 of the river's average width (45m) The largest floes were at the downstream end, and floe size decreased progressively with distance upstream.

MP 1160

COMPUTER SIMULATION OF BUBBLER-IN-DUCED MELTING OF ICE COVERS USING EX-PERIMENTAL HEAT TRANSFER RESULTS.

Keribar, R., et al, Sep. 1978, 5(3), p 362-366, In English with French summary. 9 refs.

Tankin, R.S., Ashton, G.D. 33-1243

33-1243
ICE MELTING, ARTIFICIAL MELTING, BUB-BLING, COMPUTERIZED SIMULATION
Results of laboratory experiments conducted to Jetermine bubbler-induced heat transfer coefficients are reported Implications and validity of results are discussed. As a second step, a procedure for computer-simulating the behavior of an ice sheet whose thickness is controlled by a bubbler system operating intermittently over a long period of time is developed. The simulation uses experimentally determined bubbler heat transfer coefficients, weather data, and a finite difference method to solve the equations governing the ice thickness and temperature profile. Through an example simulation, the usefulness of the procedure in predicting ice thickness and temperature profile. Through an example simulation, the usefulness of the procedure in predicting ice thickness and temperature profile. Through an example simulation, the usefulness of the procedure in predicting ice thickness and temperature profile histories, and the effectiveness or suitability of a given bubbler system are demonstrated.

MP 1161 DECAY PATTERNS OF LAND-FAST SEA ICE IN CANADA AND ALASKA.

Models, Sep. 6-9, 1977. Proceedings, Vol 2, Seattle, University of Washington, 1977, p.1-10, 11 refs. 33-1392

SEA ICE, FAST ICE, ICE COVER THICKNESS, ICE DETERIORATION, METEOROLOGICAL FACTORS.

FACTORS.

Weekly measurements of the thickness of land-fast sea ace made over a period of 10 to 15 years at a number of coastal locations in Canada and Alaska were analyzed. That portion of the data relating to maximum ice thickness and decay (i.e., the decrease in ice thickness) are presented and examined. Many meteorological and marine factors affect the decay process. This study investigates the effects of two important weather elements air temperature and solar radiation. Complete and reliable air temperature data for each station made it possible to analyze the relationship between accumulated thawing degree-days (ATDD) and sea ice ablation. The relationship between ice decrease and daily accumulated solar radiation was investigated, the results were comparable to those derived when ATDD was used were comparable to those derived when ATDD was used as the dependent variable. Other factors affecting ice ablation and breakup, such as snow-ice formation, snow cover depth, and wind, are also discussed in the study.

MP 1162 NEARSHORE ICE MOTION NEAR PRUDHOE BAY, ALASKA.

Tucker, W.B., et al, Symposium on Sea Ice Processes and Models, Sep. 6-9, 1977. Proceedings, Vol 2, Seattle, University of Washington, 1977, p 23-31, 7

Weeks, W.F., Kovacs, A., Gow, A.J.

33-1394

SEA ICE, DRIFT, ICE TEMPERATURE, THER-MAL EXPANSION.

MAL EXPANSION.

Shorefast and nearshore pack ice motions in the vicinity of Prudhoc Bay, Alaska, have been monitored for the spring seasons (March-June) of 1976 and 1977. From the base camp on Narwhal Island, a barrier island 25 km northeast of Prudhoe Bay, a ranging laser was used to measure distances to targets located on the fast ice within a 7 km radius of the island. To assess packice motions, a radar transponder system with tracking stations located on Narwhal and Cross Islands was used to monitor the positions of transponders placed on the pack ice as far as 37 km northeast of the islands. These results suggest that gyre movement of slippage of the nearshore pack ice in this area apparently does not begin until early to mid-summer. The pack ice in this area responds slowly, and only weakly to local winds. The mesoscale displacements that occurred took place only after several days of consistent offshore winds

This indicates that a significant shoreward stress originating in the more distant pack heavily influences the dynamics of this nearshore area.

MP 1163 CHARACTERIZATION OF THE SURFACE ROUGHNESS AND FLOE GEOMETRY OF THE SEA ICE OVER THE CONTINENTAL SHELVES OF THE BEAUFORT AND CHUKCHI SEAS.

Weeks, W.F., et al, Symposium on Sea Ice Processes and Models, Sep. 6-9, 1977 Proceedings, Vol.2, Seattle, University of Washington, 1977, p.32-41, 9

Tucker, W.B., Frank, M., Fungcharoen, S. 33-1395

SEA ICE DISTRIBUTION, SURFACE ROUGHNESS, SIDE LOOKING RADAR, PRESSURE NESS

RIDGES.

This paper reports on observations primarily made during the late winter and early spring of 1976 when the ice cover was at its maximum extent, and very few leads were observed. The primary sensors used were a laser profilometer and an X-band side-looking authorie radar (SLAR) system. The heaviest ridging was found at Barter Island and there was a general decrease in the number of ridges as one moved west into the Chukchi Sea. There was no strong variation in the mean ridge height along the coast. There was no systematic areal variation in mean ridge height normal to the coast. There was also no correlation between mean ridge height and the number of ndges per km as has been reported by previous investigators. An analysis was also made of the probability of encountering very large ridges SLAR imagery gives the size distribution of multiyear ice floes within the nearshore ice pack, and the variation in the areal percentage of deformed ice as a function of distance from the coast. This latter parameter showed a steady decrease as the distance north of the coast increases.

MP 1164

MODELING PACK ICE AS A VISCOUS-PLAS-TIC CONTINUUM: SOME PRELIMINARY RE-

SULTS.
Hibler, W.D., III, Symposium on Sea Ice Processes and Models, Sep. 6-9, 1977. Proceedings, Vol.2, Seattle, University of Washington, 1977, p.46-55, 21

PACK ICE, VISCOUS FLOW, PLASTIC FLOW, ICE DEFORMATION, ICE MODELS, MATH-EMATICAL MODELS.

EMATICAL MODELS.

A dynamic-thermodynamic model of pack ice is presented, which treats the ice as a nonlinear viscous continuum characterized by both bulk and shear viscosities and a pressure term with the viscosities being functions of the deformation rate and the pressure. The pressure is parameterized as a function of the compactness and mean thickness of the ice. This formulation allows the viscous continuum approach to be retained while allowing the system to deform in a plastic manner. The model is formulated in a fixed Eulerian and and the dynamical equations are counted to continuity. plastic manner The model is formulated in a fixed Eulerian grid, and the dynamical equations are coupled to continuity equations for compactness and mean ice thickness which include thermodynamic source and sink terms In the numerical scheme the dynamical equations of motion, in finite difference form, are integrated implicitly and the ice thickness equations are integrated explicitly. The model is applied to the Arctic Basin and integrated at one-day steps for up to eight years in order to obtain steady state results for both ice thickness and drift. Two cases are examined.

FINITE ELEMENT FORMULATION OF A SEA ICE DRIFT MODEL.

Sodhi, D.S., et al, Symposium on Sea Ice Processes and Models, Sep. 6-9, 1977. Proceedings, Vol 2, Seattle, University of Washington, 1977, p.67-76, 10 refs. Hibler, W.D., III.

33-1399

SEA ICE, DRIFT, MATHEMATICAL MODFLS

SEA ICE, DRIFT, MATHEMATICAL MODELS The complete boundary value problem of a linear viscous sea are drift model is presented, using the finite element method, and the formulation includes the inertial force term in the governing equation of motion. The results of the computations of the steady-state ice velocities in the Arctic Ocean are presented, using mean seasonal geostrophic wind data and available current information. The effect of varying handless conditions and the viscosity parameters is examined. data and available current information. The effect of varying boundary conditions and the viscosity parameters is examined On a much smaller scele, this model has been applied to the study of non-steady drift of pack ice through the Strait of Belle list (between Newfoundland and Labrador) where strong tidal streams and ocean currents move the pack ice back and forth. Using idealized sinusoidal variations of the tidal streams, it is found that the time lag between the water and the ice viscoties is related to the viscosity parameters, which indicates that the ice is not drifting freely, and the boundaries affect the time constant of the simplified first order model of the ice drift through the Strait first order model of the ice drift through the Strait

MP 1166 INVESTIGATION OF A VLF AIRBORNE RESIS-TIVITY SURVEY CONDUCTED IN NORTHERN MAINE.

Arcone, S.A., Dec. 1978, 43(7), p.1399-1417, 26 refs.

ELECTRICAL RESISTIVITY, AERIAL SURVEYS, VERY LOW FREQUENCIES, TOPOGRAPHIC EFFECTS, ELECTRIC FIELDS.

EFFECTS, ELECTRIC FIELDS.

Authorne wavetilt resistivity surveys and profiles at VLF have been analyzed for the effects of topography, altitude, and wavetilt phase and amplitude.

Topographic relief is known to affect at least one electric field component, flight altitude often varies over relief, and phase depends on the earth's resistivity stratification and the relative strength of displacement to conduction current.

A mountainous area in northern Maine of predominantly slate, but containing an igneous stock, was surveyed at 150 m mean flight altitude The 150-m survey was repeated at 300 m and two of the 150-m flight lines were repeated at a total of three other altitudes.

A comparison of the 150-m survey with the topography and with the 300-m survey revealed that although most of the resistivity information of the 150-m survey was retained at 300 m, serious differences arose due to topographic influences.

Profiles of the individual electric field components at the various altitudes then revealed that thopography was distorting resistivity values through its effect tield components at the various antitudes their revealed that topography was distorting resistivity values through its effect upon only the vertical component of the electric field. The separate influences of phase and amplitude were analyzed using the results of a ground survey of the total, complex surface impedance. The phase of the tilt proved to be important in the airborne differentiation of the rock types.

MP 1167
USE OF REMOTE SENSING TO QUANTIFY
CONSTRUCTION MATERIAL AND TO DEFINE
GEOLOGIC LINEAMENTS, DICKEY-LINCOLN
SCHOOL LAKES PROJECT, MAINE.

McKim, H.L., et al, International Symposium on Remote Sensing of Environment, 12th, Manila. Pro-ceedings, 1978, 9 leaves, 7 refs. Merry, C.J., Blackey, E.A.

Merry, 0 33-1584

REMOTE SENSING, CONSTRUCTION MATERIALS, GEOLOGIC STRUCTURES.

MATERIALS, GEOLOGIC STRUCTURES.

Fourteen surficial geology units were delineated in a 2850 sq km area in northern Maine These units included alluvial fan, alluvial terrace, esker, floodplain, glacial moraine, kame, kame terrace, outwash, outwash terrace, bedrock, till, till over bedrock, wet outwash and wet till. The surficial geology units were field checked and then updated from the field reconsissance. The depths of the surficial geology units were estimated utilizing borchole data, field measurements and seismometer data. The areal extent of each surficial geology unit was quantified, using a planimetric color densitometer. The volumes of construction material were computed based upon these areal determinations and estimated depths. The volume estimates, compared with the estimates of required construction material, showed that more material could be found within the prescribed area around the dam and dike sites than was required for construction. It is believed that the east- and northeast-trending lineaments in this area are thrust faults dipping 45 deg to the northeast. The north-trending and N60W lineaments are probably strike-slip normal and reverse faults dipping 80 deg to nearly vertical faults should be negligible.

MP 1168

MP 1168

CREEP RUPTURE AT DEPTH IN A COLD ICE SHEET. Colbeck, S C., et al, Oct 26, 1978, 275(5682), p 733,

13 refs.

St. Lawrence, W.F., Gow, A.J. 33-1616

ICE SHEETS, ICE CREEP, FRACTURING, SEIS-MIC SURVEYS.

Experimental evidence has not supported the hypothesis that tectonic processes operating within glaciers and ice sheets are analogous to those in the Earth However, evidence of the existence of discrete shear planes within the antarctic ice sheet (31-1071 or F-17742) and evidence described here relating to the Greenland ice sheet indicate that faulting takes place at depth in cold ice sheets. The evidence suggests reconsideration of the concept of correspondence between flow and rupture at depth in the Earth and in cold ice sheets, as suggested earlier. Direct investigations at depth in ice sheets are made with relative case as compared to the nearly impossible task of direct measurements in the Earth's mantle. Experimental evidence has not supported the hypothesis that

EFFECT OF INUNDATION ON VEGETATION AT SELECTED NEW ENGLAND FLOOD CONTROL RESERVOIRS.

McKim, H.L., et al, Symposium on Remote Sensing for Vegetation Damage Assessment, Februar, 1978 Proceedings, 1978, 13p., 13 refs. Gatto, L.W., Merry, C.J., Cooper, S.

33-1519

REMOTE SENSING. INFRARED PHOTOGRA-PHY, VEGETATION PATTERNS, DAMAGE, FLOODING.

The effect of inundation on vegetation caused by the regulation and impoundment of water at six New England flood control reservoirs during a June-July 1973 flood was assessed from color infrared photography and corroborative ground surveys. Percent of damaged trees was assessed on a pattern recognition and coloration basis. Correlative ground truth data showed that the deciduous trees, particularly silver maple and red oak, were least affected and that coniferous trees, especially white pine, were most affected by siltation and inundation Much of the understory vegetation, i.e., American and Eastern hop hornbeam, lost all leaves after inundation, but new buds and shoots appeared by late September 1973. A critical relationship, determined from ground transect profiles showing the relationship between species susceptibility and inundation time was that trees completely covered by flood waters for more than 90 hours showed the most apparent damage

MP 1170

INVESTIGATION OF ICE CLOGGED CHANNELS IN THE ST. MARYS RIVER.

Mellor, M., et al, Mar. 1978, USCG-D-22-78, 73p., ADA-058 015. Vance, G.P., Wuebben, J.L., Frankenstein, G.E

ICE BREAKING, ICE JAMS, CHANNELS (WATERWAYS), COST ANALYSIS.

TERWAYS), COST ANALYSIS.
This study addresses itself to the problem of removing brash ice from Frechette Point to Six-Mile Point of the Little Rapids Cut of the St. Marys River system and river system are described and estimates are made for partially clearing a channel 250 ft wide Rough costs, based on dollars per horsepower, indicate that it would cost between 1 and 2 million dollars per clear channel mile per year

MP 1171 DIELECTRIC PROPERTIES OF DISLOCA-TION-FREE ICE.

Itagakı, K., 1978, 21(85), p.207-217, In English with French and German summaries. 20 refs. 33-1867

ICE CRYSTALS, HOARFROST, DISLOCATIONS (MATERIALS), ICE ELECTRICAL PROPERTIES. Dielectric properties of dislocation-free hoar-frost ice crystals were measured in the audio-frequency range Anomalously small relaxation strength was found in the dislocation-free area of the crystal samples, while dislocations deliberately area of the crystal samples, while dislocations deliberately introduced by scratching the samples drastically modified the relaxation strength. Since measurements made in the area of high dislocation density indicated normal behavior, electrically charged dislocations are considered to be the source of the normally observed dielectric relaxation.

MP 1172 REGELATION AND THE DEFORMATION OF WET SNOW.

Colbeck, S.C., et al, 1978, 21(85), p.639-650, In English with French and German summaries 17 refs. Parssinen, N. 33-1901

WET SNOW, REGELATION, SNOW DEFORMA-TION, MODELS.

TION, MODELS.

The thermodynamics of phase equilibrium control the temperature distribution around the ice particles in wet snow. When the snow is stressed, pressure melting occurs at the interparticle contacts and the snow densifies. Densification is described by a physical model which simulates the heat flow, meltwater flow, and particle geometry. The effects of ionic impurities, liquid saturation, and particle size are demonstrated. Typical values of the temperature difference, inter-particle film size, and density are calculated as functions of time. The calculated rates of compaction are too large, hence, at some later time, the effects of simultaneous grain growth must be added to the model.

MP 1173

Takagi, S., 1978, 74(174), p 235-242, 27 refs. See also 32-3470 and 32-4368. 33-2083

ICE LENSES, ICE FORMATION, SOIL WATER, SOIL FREEZING, HEAT TRANSFER, FROST HEAVE, ANALYSIS (MATHEMATICS).

HEAVE, ANALYSIS (MATHEMATICS).

A new concept of the freezing of water, called segregation freezing, is proposed to explain the creation of the suction force that draws pore water up to the interface of a growing ice lens. The temperature of segregation freezing is shown to be lower than that of normal freezing (in situ freezing). This difference determines the pressure that the ice lens exerts while growing and carrying the overlying weight. On the assumption that the soil structure is rigid, equations governing the simultaneous flow of heat and water are formulated and solved for the limit of time t to 0 with the combination of analytical and numerical methods. Numerical computation of the solution yields a result that is reasonable, compared with experience in laboratory and nature.

449 1174

ISUA, GREENLAND: GLACIER FREEZING STUDY.

Ashton, G D., 1978, 74(174), p.256-264, 9 rcfs.

33-2086

GLACIER FLOW, CREEP, ICE REFRIGERA-TION, MINING, DRILLING, ANALYSIS (MATH-EMATICS), ICE TEMPERATURE.

A scheme for cooling the lower portion of the edge of the Greenland ice sheet, which abuts a potential mining operation is examined. At the mine site, the ore body is overlain with ice. Once the overburden is removed, however, the adjacent ice is expected to flow toward the pit. One possible means of slowing this movement is to cool the ice below its present temperature to achieve a reduction in the creep rate and a retardiation of basal silp. The present study examines analytically the magnitude of cooling which may be accomplished by glilling a series of vertical holes about the periphery of the mine site. Refrigeration is accomplished by pumping a coolant downhole in a central pipe, then uphole in an annulus between the pipe and hole wall, and then through a thin walled pipe exposed to the cold surface climate above the ice sheet. Results of example calculations for various particular combinations of the free parameters are examined and include cooling requirements, hold spacing, pump requirements, and other parameters. Over a period of operation on the order of a year of more, it appears possible to cool a substantial part of the lower area of the glacier on the order of 1 to -2C, using a hole spacing that is considered reasonable. The results of the study are to be used as input to a detailed glacier flow study.

MP 1175

MP 1175 REMOTE DETECTION OF MASSIVE ICE IN PERMAPROST ALONG THE ALYESKA PIPE-LINE AND THE PUMP STATION FEEDER GAS

PIPELINE.

Kovacs, A., et al, ASCE Pipeline Division Specialty Conference, New Orleans, Louisiana, Jan. 15-17, 1979. Proceedings. Pipelines in adverse environments; a state of the art, Vol.1, New York, N.Y., American Society of Civil Engineers, 1979, p.268-279, 10 as fe 10 refs.

Morey, R.M. 33-2077

PERMAFROST STRUCTURE, PERMAFROST PHYSICS, ICE DETECTION, SUBSURFACE INVESTIGATIONS, REMOTE SENSING, RADAR ECHOES, GROUND ICE, ICE FORMA-TION, LINES. SOUNDING, REFLECTIVITY, PIPE-

LINES.
Field soundings using an impulse radar system were carried out during May 1976 along a section of the Alyeska Pipeline near Pump Station 3 and the pump station feeder gas pipeline trench near the Happy Valley Camp, Alaska. The radar system, operating on the ground, provided a continuous profile of the near-surface geological structure of the permarfost. A unique dual antenna configuration produced two profiles, a vertical profile and an offset profile, from which the velocity of the radar signal at any point along the traverse could be calculated and from which a representative depth scale for the subsurface profile was determined. The profile results proved useful in identifying regions of massive ce in the permarfost. Logs from holes dililed for the oil pipeline's Vertical Support Members are compared with the radar profile data. This compansion shows that the radar detected the top and bottom of massive ice to a reader detected the top and bottom of massive ice to a depth of approximately 30 ft.

RESILIENT RESPONSE OF TWO FROZEN AND THAWED SOILS.

Chamberlain, E.J., et al, Feb. 1979, 5(GT2), p.257-

271, 13 refs. Cole, D.M., Johnson, T.C.

SUBGRADE SOILS, SEASONAL FREEZE THAW, SOIL MECHANICS, STRESSES, LOW TEMPERA-

Values of resilient modulus and Poisson's ratio were determined for silt and clay subgrade materials subjected to seasonal freezing and thawing. A new technique employing noncontacting variable impendance transducers was employed to obtain radial strain data for calculation of Poisson's ratio. The data were analyzed using multiple linear regression and analysis of variance techniques to obtain empirical relationships between the resilient moduli and Poisson's ratio parameters and stress and material property variables Resilient modulus data ranged from over 6,000,000 psi for the frozen condition to less than 600 psi for the thawed condition. Poisson's ratio ranged from 0.07 to 0.61, the majority of the values falling between 0.03 and 0.50.

MP 1177

OXYGEN ISOTOPE INVESTIGATION OF THE ORIGIN OF THE BASAL ZONE OF THE MATA-NUSKA GLACIER, ALASKA.

awson, D.E., et al, 1978, Vol.86, p.673-685, 34 refs. Kulla, J.B.

33-2287

GLACIER ICE, ICE STRUCTURE, OXYGEN ISO-TOPES, THERMODYNAMIC PROPERTIES.

An analysis of the oxygen isotope content of ice of the englacial and basal zones of the Matanuska Glacier at its terminus reveals the origin of the ice and entrained debris. The decrease with depth in the change of Ol8 values of ice of the diffused facies of the englacial zone and the dispersed facies of the basal zone is consistent with previous studies and indicates this ice originates in the accumulation area. Characteristics of the ice and debris of the dispersed facies indicate a subglacial source for most of the debris. The sharp increase of more than 4 per mill in the change

of O18 values of ice of the lower, stratified facies of the basal zone and its young radiocarbon age indicate this facies formed by subglacial freezing of isotopically enriched meltwater, probably surface-derived, to the glacier sole. The bubble-poor, fine-grained ice, thickness, stratification, rounded pebbles, and undisturbed sedimentary structures in this facies support this conclusion. The location, extent, and rate of subglacial ice formation and sediment entrainment vary. The Matanuska Glacier is therefore thermally complex, with zones of ice at the glacier sole that are at or below the pressure-melting point.

MP 1178 RIVER ICE.

Ashton, G.D., Jan./Feb. 1979, 67(1), p.38-45, 21 refs. 33-2288

RIVER ICE, ICE FORMATION, ICE JAMS, ICE GROWTH, THERMAL POLLUTION, TEMPERA-TURE EFFECTS.

MP 1179

MF 1179
MEASUREMENT OF MESOSCALE DEFORMATION OF BEAUFORT SEA ICE (AIDJEX-1971).
Hibler, W.D., III, et al, 1978, Vol.43-44, p.148-172,
TT-75-52082, For Russian version see 29-2023. 21

Weeks, W.F., Ackley, S.F., Kovacs, A., Campbell, 33-2376

PACK ICE. ICE DEFORMATION, DRIFT, AERI-AL SURVEYS, ICE REPORTING.

MP 1180

ORIGIN AND PALEOCLIMATIC SIGNIFICANCE OF LARGE-SCALE PATTERNED GROUND IN THE DONNELLY DOME AREA, ALASKA.

Péwé, T.L., et al, 1969, No.103, 87p., Bibliography p.79-84. In English with French, German, and Russian summaries.

Church, R.E., Andresen, M.J. 25-3645

PATTERNED GROUND, SEDIMENTS, PERI-GLACIAL PROCESSES, ICE WEDGES, PERMA-FROST, UNITED STATES—ALASKA—DON-NELLY DOME.

HYDRAULIC TRANSIENTS: A SEISMIC SOURCE IN VOLCANOES AND GLACIERS. St. Lawrence, W.F., et al, Feb. 16, 1979, 203(4381), p.654-656, 10 refs. Qamar, A. 33-2797

33-2727 WAVE PROPAGATION, CANOES, EARTHQUAKES.
A source for comparation

CANOES, EARTHQUARES.

A source for certain low-frequency seismic waves is postulated in terms of the water hammer effect. The time-dependent displacement of a water-filled subglacial conduit is analyzed to demonstrate the nature of the source. Preliminary energy calculations and the observation of hydraulically generated seismic radiation from a dam indicate the plausibility of the proposed source.

MP 1182

TERMINAL BALLISTICS IN COLD REGIONS

Aitken, G.W., International Symposium on Ballistics, 4th. Proceedings, Monterey, California, U.S. Naval Postgraduate School, 1978, 6p., 11 refs.

PROJECTILE PENETRATION, PENETRATION TESTS, FROZEN GROUND, SNOW COVER.

TESTS, FROZEN GROUND, SNOW COVER.

In a winter environment, snow and frozen soil may be the most readily available materials for use in field fortifications. Design of effective fortifications requires detailed knowledge of the response of these materials to impact from projectiles and projectile fragments. Data for small arms projectile and simulated projectile fragment penetration into snow and frozen soil are presented. Results of penetration predictions made using both closed form and empirical solutions are compared with test results, and the prediction techniques themselves are discussed. Basic agreement between predicted and measured penetrations was obtained for the simulated projectile fragments, which tended to remain stable in the target materials. Penetration of 7.62 mm small arms projectiles into frozen soil targets is also predictable at velocities below about 600 m/s, above which they tend to become unstable and tumble in the target. In the case of the empirical solution, the results presented serve to extend its range of applicability to projectiles weighing less than 0.9 kg.

MP 1183

INTRODUCTION TO THE WORKSHOP ON ECOLOGICAL EFFECTS OF HYDROCARBON SPILLS IN ALASKA.

Atlas, R.M., et al, Sep. 1978, 31(3), p.155-157.

MEETINGS, OIL SPILLS, RESEARCH PRO-

MP 1184

EFFECTS OF CRUDE AND DIESEL OIL SPILL ON PLANT COMMUNITIES AT PRUDEHOE BAY, ALASKA, AND THE DERIVATION OF OIL SPILL SENSITIVITY MAPS.

Walker, D.A., et al, Sep. 1978, 31(3), p.242-259, In English with French summary. 29 refs. Webber, P.J., Everett, K.R., Brown, J.

33-2793

OIL SPILLS, ENVIRONMENTAL IMPACT, TUN-VEGETATION, INDEXES (RATIOS), MAPS

MAPS.

Crude oil was spilled on six of the major Prudhoe Bay plant communities at an intensity of 12 liters/sq m. The communities occurred along a topographic-monsture gradient. The reaction of the major species of the various communities was recorded one year following the spills. Sedges and willows showed substantial recovery from crude oil spills. Mosses, lichens, and most dicotyledons showed little or no recovery. On a very wet plot with standing water, the vegetation showed very poor recovery. Dryss integrifolis M. Vahl, the most important vascular species on dry sites, was killed. Identical experiments using diesel oil rather than crude oil showed all species except an aquatic most obe killed. A sensitivity index for the communities was calculated on the basis of the percentage cover of the resistant species divided by the original total plant cover of the community. With this information an oil spill sensitivity map for an area of Prudhoe Bay was constructed for an accidental crude oil spill at nearby Franklin Bluffs. In this example all the community types are considered to have moderate to excellent recovery potential.

PHYSICAL, CHEMICAL AND BIOLOGICAL EF-FECTS OF CRUDE OIL SPILLS ON BLACK SPRUCE FOREST, INTERIOR ALASKA

Jenkins, T.F., et al, Sep. 1978, 31(3), p.305-323, 36

Johnson, L.A., Collins, C.M., McFadden, T. 33-2797

OIL SPILLS, ENVIRONMENTAL IMPACT, FOR-EST TUNDRA, VEGETATION, DAMAGE.

MP 1186

FATE OF CRUDE AND REFINED OILS IN

NORTH SLOPE SOILS.
Sexstone, A., et al, Sep. 1978, 31(3), p.339-347, In English with French summary. 6 refs.
Everett, K.R., Jenkins, T.F., Atlas, R.M. 33-2799

OIL SPILLS, TUNDRA SOILS, HYDROCARBONS, MICROBIOLOGY.

Prudhoe Bay crude oil and refined diesel fuel were applied to five topographically distinct tundra soils at Prudhoe Bay. Alaska. The penetration of hydrocarbons into the soil column depended on soil moisture and drainage characteristics. Biodegradation, shown by changes in the pristane to heptadecane and resolvable to total gas chromatographic area ratios, appeared to be greatly restricted in drier tundra soils during one year exposure. Some light hydrocarbons were recovered from soils one year after spillages Hydrocarbons were still present in soils at Fish Creek, Alaska, contaminated by refined oil spillages 28 years earlier, attesting to the persistence of hydrocarbons in North Slope soils. Prudhoe Bay crude oil and refined diesel fuel were applied

STUDY OF SEVERAL PRESSURE RIDGES AND ICE ISLANDS IN THE CANADIAN BEAUFORT

Hnatiuk, J., et al, 1978, 20(84), p.519-532, In English with French and German summaries 3 refs.

Kovacs, A., Mellor, M. 33-2885

PRESSURE RIDGES, ICE ISLANDS, ICE COVER THICKNESS, PROFILES.

THICKNESS, PROFILES.

The environmental conditions in the southern Beaufort Sea are described, with special emphasis on pressure ridges and rec islands. Techniques for determining the geometric configurations and the physical and mechanical properties of sea-ice structures and ice islands are described. Profiles of pressure ridges were determined by surface surveys, drill-hole probes and side-looking sonar scanning. Multi-year pressure ridges with thicknesses up to 20 m and widths up to 120 m were examined in detail. The first-year ridge of 22 m thickness and 100 m width was studied. Results are given for several multi-year and the first-year ridges. Information obtained from dives under the ice and sea bed. A 20 m thick ice-island fragment grounded in 15 m of water was one of several investigated. Measurements of temperature, salimity, tensile strength, and compressive strength are given for ice taken from old pressure ridges, and factors influencing the interpretation of test data are discussed

MP 1188 FULL-DEPTH PAVEMENT CONSIDERATIONS IN SEASONAL FROST AREAS.

Eaton, R.A., et al, Feb. 1979, 24p., 8 refs. Paper presented at the annual meeting of the Association of Asphalt Paving Technologists, Denver, Colorado, Feb. 15-17, 1979.

Joubert, R.H. 33-2904

BITUMINOUS CONCRETES, SEASONAL FREEZE THAW, FROST RESISTANCE, FROST PENETRATION, SUBGRADE PREPARATION, FROST HEAVE.

FROST HEAVE.

Two full-depth pavement sections were built on highly frostsusceptible subgrades that had been properly prepared. Suitable structural and service performances were achieved in
apite of substantial, though uniform, frost heaves. A fulldepth pavement built on a local municipal street has not
approached structural failure. However, poor service performance caused by differential heaves and severe differences
at surface castings has resulted. This paper reports on
these studies and attempts to underscore the importance
of proper design and construction of pavements on highly
flost-susceptible soils. Particular emphasis is placed on fiost-susceptible soils Particular emphasis is placed on the quality of subgrade preparation. Finally, the incorpora-tion of transition sections at surface castings is considered necessary to diminish differential heave at the castings

DESIGN OF AIRFIELD PAVEMENTS FOR SEA-SONAL FROST AND PERMAPROST CONDI-

Berg, R.L., et al, Oct. 1978, 18p., Presented at the U.S. Air Force Worldwide Pavements Conference, Panama City Beach, Florida, Oct. 24-26, 1978.

Johnson, T.C.
33-2905

AIRPORTS, BITUMINOUS CONCRETES, SUB-GRADE PREPARATION, SEASONAL FREEZE THAW, FROST PENETRATION, FROST HEAVI.

SINTERING AND COMPACTION OF SNOW CONTAINING LIQUID WATER.

Colbeck, S.C., et al, Jan. 1978, 39(1), p.13-32, Refs. p.31-32. 33-2982

SNOW COMPACTION, SNOW MECHANICS, FIRNIFICATION, ICE DENSITY, SALINITY, MELTWATER, WET SNOW.

ELEMENTAL ANALYSES OF ICE CRYSTAL NUCLEI AND AEROSOLS.

Kumai, M., International Conference on Atmospheric Aerosols, Condensation and Ice Nuclei, 9th, Galway, Ireland, Sep. 21-27, 1977. Proceedings, Galway, Ire-land, University College, 1977, 5p., 11 refs.

ICE NUCLEI, AEROSOLS, ELECTRON MICROS-COPY, X RAY ANALYSIS.

Ice crystal nuclei and aerosols in Fairbanks, Alaska were studied using a scanning electron microscope and energy-dispersive X-ray analyzer. It is thought that the origins of the ice nuclei and aerosols zer mainly solid combustion by products from local electric power plants and other combus-

MP 1192 ICE FOG SUPPRESSION USING THIN CHEMI-CAL FILMS.

McFadden, T, et al, Jan. 1979, EPA-600/3-79-007, 44p., 20 refs.

Collins, C.M. 33-2959

ICE FOG, FOG DISPERSAL, CHEMICAL REAC-TIONS.

TIONS.

Ice fog suppression experiments on the Fort Wainwright Power Plant cooling pond were conducted during the winter of 1974-76 Hexadecanol was added to the pond and dramatically improved visibility by reducing fog generated from water vapor released by the pond at 1-4C Although this temperature was not low enough to create ice fog, the cold vapor fog created was equally as devastating to visibility in the vicinity of the pond During the winter of 1975-76, suppression tests were continued using films of hexadecanol, mixes of hexadecanol and octadecanol, and ethylene glycol monobutyl either (EGME) Suppression effectiveness at colder temperatures was studied and limits to the techniques were probed. A reinforcing grid was constructed that prevented breakup of the film by wind and water currents. Lifetime tests indicated that EGME degrades much more slowly than either hexadecanol or the hexadecanol-octadecanol mix. All the films were found to be very effective fog reducers at warmer temperatures but still allowed 20% to 40% of normal evaporation to occur. The vapor thus produced was sufficient to create some ice fog at lower temperatures, but this ice fog occurred less frequently and was more quickly dispersed than the thick fog that was present before application of the films

MP 1193 PROCEEDINGS.

Colloquium on Planetary Water and Polar Processes, 2nd, Hanover, N.H., Oct. 16-18, 1978, Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, 1978, 209p., For selected papers see 33-3058 through 33-3080. 33-3057

MEETINGS, MARS (PLANET), PLANETARY ENVIRONMENTS, PERMAFROST HYDROLO-GY, GEOLOGIC STRUCTURES, WATER.

MP 1194 DEVELOPMENT OF A SIMPLIFIED METHOD FOR FIELD MONITORING OF SOIL MOIS-TURE.

Walsh, J.E., et al, Colloquium on Planetary Water and Polar Processes, 2nd, Oct. 1978. Proceedings, Hanover, N.H, U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.40-44, includes comments. 3 refs.

McQueeney, D., Layman, R.W., McKim, H.L.

SOIL WATER, MEASURING INSTRUMENTS, ELECTRIC EQUIPMENT.

MP 1195 VIKING GCMS ANALYSIS OF WATER IN THE MARTIAN REGOLITH.

Anderson, D.M., et al, Colloquium on Planetary Water and Polar Processes, 2nd, Oct. 1978. Proceedings, Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, 1978, p.55-61, Includes comments. 7 refs.

Tice, A.R. 33-3060

GROUND WATER, MARS (PLANET), SOIL TESTS, GAS INCLUSIONS.

ICE BLOCKAGE OF WATER INTAKES.

Carey, K.L., Mar. 1979, NUREG/CR-0548, 27p., 19 refe

WATER INTAKES, FRAZIL ICE, BOTTOM ICE, ICE COVER.

ICE COVER.

ice blockage of water intake structures can pose serious threats to the availability of cooling water at thermal power plants. Ice blockage difficulties are described as they may occur in invers, lakes, reservoirs, and estuaries, and as they may affect intakes either at the surface or submerged. Characteristics of both surface sheet ice and frazil ice are examined formational processes, sizes, thicknesses, movement or mobility, and modes of blockage or adhesion. Case histories of incidents of ice blockage of intakes are given. Solving ice blockage problems, either through original design, post-construction modification, or revised operational techniques is discussed.

EFFECT OF THE OCEANIC BOUNDARY LAYER ON THE MEAN DRIFT OF PACK ICE: APPLICATION OF A SIMPLE MODEL.
McPhee, M.G., Mar 1979, 9(2), p.388-400, 14 refs.

For this paper from another source, see 32-4551.

PACK ICE, DRIFT, BOUNDARY VALUE PROB-LEMS, MATHEMATICAL MODELS, ICE WATER INTERFACE.

WATER INTERFACE.
Smoothed records of tee drift, surface wind and upper ocean currents at four manned stations of the 1975-76 AIDJEX experiment in the central Arctic have been analyzed to provide a statistical relationship between stress at the iccoccan interface and ice-drift velocity during a 60-day period when the ice was too weak to support internal forces. Essen tail features of the model are dynamic scaling for velocity, kinematic stress and length, with exponential attenuation of a linear dimensionsless eddy viscosity. Currents measured 2 m below the ice confirmed the shape of the stress vs ice speed curve and provided an estimate of the angle between surface stress and velocity. The model was used to qualitatively estimate the effect of a pycnocline at 25 m on surface characteristics.

The observed behavior when stratification at that level was most pronounced tended toward slightly at that level was most pronounced tended toward slightly higher drag at higher speeds, which is qualitatively consistent with the model results

MP 1199 CURRENT RESEARCH ON SNOW AND ICE RE-MOVAL IN THE UNITED STATES. Minsk, L.D., Sep. 1978, 20(3), p.21-22.

SNOW REMOVAL, ICE REMOVAL, ICE CON-TROL, CHEMICAL ICE PREVENTION, ICE PRE-VENTION.

MP 1200 DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan continental shelf, Vol.3. Principal investigators' quarterly reports for the period July-September 1977, Boulder, Colorado, Environmental Research Laboratories, 1977, p.503-510, PB-279 913 Weeks, W.F. 33-3323

PACK ICE, DRIFT, RADAR ECHOES, ICE COVER THICKNESS, ICE DEFORMATION, DATA PROCESSING.

MP 1201 DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.
Sellmann, P.V., et a), Environmental assessment of the

seumann, P. V., et al., Environmental assessment of the Alaskan continental shelf, Vol 3. Principal investigators' quarterly reports for the penod July-September 1977, Boulder, Colorado, Environmental Research Laboratories, 1977, p.518-521, PB-279 913. Brown, J., Blouir, S.E., Chamberlain, E J., Iskandar, I.K., Ueda, H.T. 33-3324

SUBSEA PERMAFROST, DRILL CORE ANAL-YSIS.

MP 1202 ULTRASONIC MEASUREMENTS ON DEEP

ICE CORES FROM ANTARCTICA.
Gow, A.J., et al, Oct. 1978, 13(4), p.48-50, 3 refs. Kohnen, H.

ICE CORES, ULTRASONIC TESTS, ICE CRYSTAL STRUCTURE, ANTARCTICA—BYRD STA-TION.

TION.

This report discusses some results of recent measurements of ultrasonic velocities performed on ice cores collected in 1968 at Byrd Station The analytical technique is described it is concluded that measurement of ultrasonic velocities of cores from deep drill holes enables monitoring of the relation characteristics of the cores and determination of the gross trends of c-axis orientation in the ice sheet. Supplemented by optical thin section, studies can verify the exact nature of the fabric at any given depth and any inclination of the fabric symmetry axis with respect to the direction of propagation of P-wave velocity.

MP 1203 SEA ICE AND ICE ALGAE RELATIONSHIPS IN THE WEDDELL SEA.

Ackley, S.F., et al, Oct. 1978, 13(4), p.70-71, 7 refs. Taguchi, S., Buck, K.R.

SFA ICE, PACK ICE, ALGAE, CRYOBIOLOGY, ICE BREAKUP, CHEMICAL COMPOSITION, WEDDELL SEA.

Analysis of data obtained during a 1977 cruise in the Weddell Sea indicates that the ice algal community found during that cruise is distinct from others that have been described that cruise is distinct from others that have been described (for example, the bottom epontic community in the land-sist ice in McMurdo Sound, the surface communities off 15:: Antarctica, and the bottom communities in Arctic Pack (acc) Unlike these other communities, the Weddell pack algae is dominantly n interior one, existing not at the surface or bottom but at mid-depth (65 to 215 m) within the ice. The form, ion of this community is dependent on the unique thermal and physical setting for Weddell sea pack ice. Brine drainage processes are initiated by summer warming, but are not carried through to completion as in the Arctic. This process causes a redistribution of salinity, maximizing in the mid-depth regions of the ice and apparently leading to algae production because of the ice and apparently leading to algae production because of the ice and apparently higher nutrient levels at these mid-depths. A qualitative model indicating the relationship between the thermally induced brine migration and subsequent algae growth is given.

MP 1204 ENVIRONMENTAL ATLAS OF ALASKA

Hartman, C.W, et al, Fairbanks, University of Alaska, 1978, 95p., 2nd ed. For 1st ed see 24 4007 44 refs. 33-3460

SEA WATER, RIVERS, CLIMATE, INDEXES (RATIOS), PHYSICAL PROPERTIES, UNITED STATES—ALASKA.

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan continental shell, Vol. 11, Hazards. Principal investigators' annual reports for the year ending March 1978. Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, 1978,

p.11-22. Weeks, W.F.

15 given.

MP 1205

33-3591 SEA ICE, DRIFT, ICE COVER THICKNESS, RADAR ECHOES, ICE STRUCTURE, PRESSURE RIDGES.

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENE \TH THE BEAUFORT SEA.
Sellmann, P.V., et al, Environmental assessment of the

Alaskan continental shelf, Vol.11, Hazards. Principal investigators' annual reports for the year ending March 1978. Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, 1978, p.50-74.

Chamberlain, E.J.

SUBSEA PERMAFROST, BOTTOM SEDIMENT, BOREHOLES, TEMPERATURE MEASURE-MENT.

MENT.

Observations include determinations of subsea sediment temperature, type, ice content, and chemical composition. These data, coupled with geophysical studies and results from other Beaufort Sea geological studies, are being used jointly to accertain subsea permairost distribution. This report includes a summary of the spring 1977 field program and a general summartion of the results from two years of field study in the Prudhoe Bay area. The 1977 field study produced six additional drilled and sampled holes plus 27 probe sites which yielded both material property and temperature data. The field observations and the results of laboratory analyses of the samples help to demonstrate the complex nature of subsea permafrost.

MP 1207 MECHANICAL PROPERTIES OF POLYCRYS-TALLINE ICE: AN ASSESSMENT OF CURRENT KNOWLEDGE AND PRIORITIES FOR RE-SEARCH.

Hooke, R.L., et al, [1979], 16p, Report of the International Commission on Snow and Ice/National Science Foundation working group on ice mechanics.
Mellor, M., Jones, S.J., Martin, R.T., Meier, M.F., Weertman, J.

JS-343 ICE MECHANICS, ICE CRYSTALS, ICE CREEP, ICE DEFORMATION, STRAIN TESTS, STRESS STRAIN DIAGRAMS, ICE STRENGTH

MP 1209 PROJECTED THERMAL AND LOAD-AS-SOCIATED DISTRESS IN PAVEMENTS IN-CORPORATING DIFFERENT GRADES OF AS-

PHALT CEMENT.

Johnson, T.C., et al, 1979, Vol.48, p.403-437, 35 refs.

Shahin, M.Y., Demosey, B.J. Ingersoll, J.

SOILS.

BITUMINOUS CONCRETES, BITUMENS, LOW TEMPERATURE TESTS, FROST HEAVE, CRACKING (FRACTURING), THERMAL STRESSES, TEMPERATURE EFFECTS.

MP 1210 PHASE COMPOSITION MEASUREMENTS ON SOILS AT VERY HIGH WATER CONTENTS BY PULSED NUCLEAR MAGNETIC RESONANCE

TECHNIQUE. Tice, A.R., et al, 1978, No.675, p.11-14, 22 refs Burrous, C.M., Anderson, D.M.

FROZEN GROUND PHYSICS, UNFROZEN WATER CONTENT, NUCLEAR MAGNETIC RESONANCE, SOIL CHEMISTRY, SALINE

A simple, rapid method of determining the unfrozen water content of frozen soils is described in detail. The method content of frozen soils is described in detail. The method uses the first pulse amplitude of a pulsed nuclear magnetic resonance analyzer. Phase composition curves were obtained for four soils at very high total water contents. Three of the soils (Manchester fine sand, Fairbanks silt, and Goodrich clay) had been previously examined by another method (isothermal calorimeter). The fourth (Kotzebus silt) is a naturally saline soil found in low-lying coastal regions of Alaska. This soil was tested both in its natural state and with the soluble salts removed. The phase composition curves obtained by the nuclear magnetic resonance method are consistent with those obtained by using the isothermal calorimeter. tained by the nuclear magnetic resonance method are consistent with those obtained by using the isothermal calorimeter, but the nuclear magnetic resonance method saved time, requiring only 48h. It also provides a high degree of reproducibility and can be used over a wide range of temperatures. As expected, the unfrozen water content of the value soil was much higher in its natural state than after removal of the soluble salts. In addition, the unfrozen water content of all four soils appears to increase omewhat as the total water content of the sample is increased.

MP 1211
PERMAFROST BENLATH THE BEAUFORT
SEA, NEAR PRUDHOE BAY, ALASKA.
Sellmann, P.V., et al, Offshore Technology Conference, 11th Proceedings, Houston, Texas, 1979, p.1481-1493, 34 refs.

Chamberlain, E.J.

33-3864 SUBSEA PERMAFROST, DRILL CORE ANALYSIS, PENETRATION TESTS, PERMAFROST YSIS, P. DEPTH.

The occurrence and properties of subsea permafrost near Prudhoe Bay, Alaska, were investigated by drilling and probing Nine noles were drilled and 27 sites were probed with a cone penetrometer. The deepest drill hole was 65 Imbelow the seabed, while a depth of 14.1 m was reached with the cone penetrometer. Engineering and chemical properties were determined from core samples and point penetration resistance data were obtained with the penetrometer. Thermal profiles were acquired at both the drill and orobe sites.

COMPARATIVE TESTING SYSTEM OF THE APPLICABILITY FOR VARIOUS THERMAL SCANNING SYSTEMS FOR DETECTING HEAT LOSSES IN BUILDINGS.

Grot, R.A, et al, Infrared Information Exchange, 4th. Proceedings, St. Louis, Missouri, 1978, p.B71-B90, 18

Munis, R.H., Marshall, S.J., G: .orex, A. 33-3735

BUILDINGS. HEAT LOSS, TEMPERATURE MEASUREMENT, TESTS.

MEASUREMENT, TESTS.

A two-stage program for determining the applicability of various remote thermal scanning systems for detecting heat losses in buildings is desembed. The types of instruments tested are high resolution thermal imaging systems, low resolution thermal imaging systems, thermal line scanners and point radiometers. The first phase of this project consisted of inserting known building defects into a specially designed from at the USA Cold Regions Research and Engineering Laboratory and naving a representative of the manufacturer differences across the room envelope. The second phase of this project will consist of a field evaluation of these same instruments in approximately 10 cities, in cooperation with a weatherization program for low-income housing sponsored by the Community Services Administration and directed by the National Bureau of Standards. The goal of the second phase is to determine the cost effectiveness of various remote thermal scanning services. remote thermal scanning services

DETECTING WET ROOF INSULATIO WITH A HAND-HELD INFRARED CAMERA.

Korhonen, C., et al, Infrared Information Exchange,

Proceedings, St. Louis, Missouri, 978, p.A9-A15, 5 refs

Tobiasson, W. 33,3736

INFRARED PHOTOGRAPHY, ROOL, MOIS-TURE, DETECTION.

Since 1975, CRREL has used hand-held infra.ed scanners for detecting wet insulation under built-up roof membranes.
Thermocouples installed on roofs have shown that temperature differences between areas of wet and dry insulation may exist during both the day and night. The optimum time to detect these differences with an infrared camera is at night when solar interference is eliminated "urveys have night when solar interference is eliminated during based conducted successfully in many locations from Alabama to Alaska during both warm and cold weather. Three inch diameter core samples of the roof membrane and insulation have been obtained to verify infrared finding. This paper briefly overviews the technique used to survey roofs for moisture and then prevents results of a controlled experiment at Pease AFB, New Hampshire, to show the correlation between thermal images and temperature differences observed thermoelectrically in wet and dry portions of a roof. Measurem its of the thermal resistance of the wet and dry are commisted the physical picture. complete the physical picture

REMOTE DETECTION OF WATER UNDER ICE-COVERED LAKES ON THE DETH SLOPE

Kovacs, A., Dec 1978, 31(4), p 448-458, 9 res 33-3773

REMOTE SENSING, LAKE WATER, LAKE ICE, RADAR ECHOES, ICE COVER THICKNESS, WATER SUPPLY.

WATER SUPPLY.

Results from using an impulse radar sound—stem on the North Slope of Alaska to detect the existence of water under lake ice—see presented—It was found that both lake ice thice ess and depth of water under the ice could be determined when the radar antenna was either on the ce surface or airbone in a he, opter—The findings also revealed that the impulse radar sounding system could detect where lake ice was bottom-fast and where water existed under the ice zoer.

MP 1215
GEOBO ANICAL STUDIES ON THE TAKU

GLACIEI ANOMALY.
Heusser, C.J., et al., Apr. 1954. 44(2), p.224-239, AD030.651, 21 refs. Same as SIP-10697. Also issued as Report No. 7, Contract n. 900183001.

Schuster, R.L., Gilkey, A.K. 33-3769

GLACIER FLOW, VEG. TATION PATTERNS, GEOBOTANICAL INTER*RETATION, UNITED STATES—ALASKA--TAFU GLACIER.

MP 1216 RIVER ICE.

Ashton, G.D., Annual review of fluid mechanics. Vol.10, edited by M. Van Dyke, J.V Wehausen, and J.L. Lumley, Palo Alto, California, Annual Reviews, 1978, p.369-392, 85 refs. 33-3953

RIVER ICE, ICE MECHANICS, ICE PRESSURE, FLUID MECHANICS.

FLUID MECHANICS.

The emphasis is on the fluid mechanical aspects of river ice inclinding the areas of formation, evolution, and breakup of ice covers, hydraulies associated with the presence of ice, thermal effects and interactions with ice, and forces due to ice. River ice processes may be summarized as a series of steady states that exist between short periods of intense activity £.3 change.

MP 1217
DETERMINING SUBSEA PERMAFROST
CHARACTERISATICS WITH A CONE PENETROMETER—PRUDHOE BAY, ALASKA.
Bloun, S.E., et al June 1979, 1(1), p.3-16, 10 refs.
Chamberlain, E.J., Sellmann, P.V., Garfield. D.E.

SUBSEA PERMAFROST, PENETRATION TESTS, PERMAFROST DISTRIBUTION, PENETROME-TERS, UNITED STATES—ALASKA—PRUDHOE

RELATIONSHIPS BETWEEN JANUARY TEM-PERATURES AND THE WINTER REGIME IN GERMANY.

Bilello, M.A., et al, June 1979, 1(1,. p.17-27, 12 refs. Appel, G.C.

WEATHER FORECASTING, FROST FORECAST-ING, SNOW ACCUMULATION, SEASONAL FREEZE THAW, METEOROLOGICAL DATA, METEOROLOGICAL CHARTS

WATER FLOW THROUGH HETEROGENEOUS

Coll ck, S.C. June 1979, 1(1), p.37-45, 19 refs.

MELTWATER, SNOW COVER STRUCTURE, WATER FLOW, SNOW STRATIGRAPHY, CAPILLARITY, SURFACE WATERS

An ealier gravity flow theory (Colbeck 1971) treated snow as a homogeneous and uniform medium. The theory is expanded here to include the effects of ice layers and flow chan iels. Two examples are constructed and compared with observed runoff. In this particular situation, the results suggest that most of the water moves down flow channels

MP 1220

FREEZING AND THAWING TESTS OF LIQUID DEICING CHEMICALS ON SELECTED PAVE-MENT MATERIALS

Minsk, L.D., June 1979, 1(1), p.51-58, 8 refs.

CONCRETE PAVEMENTS, ICE REMOVAL, AN-

TIFREEZES, TESTS
The extent of deterioration of portland cement concer-The extent of deterioration of portland cement contract and several types of asphaltic concrete subjected in gaine decing chemicals was determined over 60 free gathawing cycles. Proprietary solutions containing urea, Mayfen, glycol, and formamide affected the surface of old extensional concrete only slightly (rating of 1 on a scale of 0 to 5 for increasing degradation). Asphaltic confricte specimens were not significantly affected. Abrasion tests were made on the increasing degradation affected. Abrasion tests were made on the increasing degradation during freezing and thawing, material loss was very low. Aprily the same as with distilled water control.

MP 1221

ELECTRICAL GROUND IMPEDANCE MEAS-UREMENTS IN THE UNITED STATES BE-TWEEN 200 AND 415 KHZ.

Arcone, S.A., et al, Dec. 1978, FAA-RD-78-103, 92p., ADA-068 088.

Delancy, A.J. 33-4413

RADIO WAVES, ELECTRICAL RESISTIVITY, MAPPING.

MAPPING.

The objectives of the work described in this report were to use and evaluate new radiowave methods of measuring earth resistivity in the LF and VLI bands and to develop estimated effective ground resistivity maps in this same band for the United States, including Alaska. Both airborne and ground methods were investigated by using the wascill and surface impedance techniques. It is concluded from the VLF study that over much of the central United States VLF airborne resistivity might well approximate LF ground methods discussion concerns the surface impedance method in the LF band. It is concluded from the LF studies that the present conductivity map is fairly accurate for BCB purposes but inapplicable to LF-purposes.

:MP 1222

CASE STUDY: FRESH WATER SUPPLY FOR POINT HOPE, ALASKA.

McFadden, T., et al, Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol 2, New York, American Society of Civil Engineers, 1979, p.1029-1040, 10 refs.

Collins, C.M. 33-4458

WATER SUPPLY, PERMAFROST HYDROLOGY, SNOWMELT, ICE MELTING, LAKE WATER, UNITED STATES—ALASKA—POINT HOPE.

MP 1223

SNOW AND ICE ROADS IN THE ARCTIC Johnson, P.R., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978. Proceedings, Vol.2, New York, American Society of Civil Engineers, 1979, p.1063-1071, 6 refs.

SNOW ROADS, ICE ROADS, AIRPORTS, COLD WEATHER CONSTRUCTION, ENVIRONMENTAL PROTECTION, ARCTIC VEGETATION, CONSTRUCTION MATERIALS.

REMOTE DETECTION OF A FRESHWATER POOL OPP THE SAGAVANIRKTOK RIVER DELTA, ALASKA.

Kovacs, A., et al, June 1979, 32(2), p.161-164, 4 refs. Morey, R.M.

RADAR ECHOES, GROUND ICE, GROUND WATER

MP 1225

EFFECT OF FREEZING AND THAWING ON THE PERMEABILITY AND STRUCTURE OF SOIL

Chrimberlain, E.J., et al, 1979, Vol.13, p 73-92, For unother version and abstract see 32-3469. 11 refs.

GOW, A.J.
33-4515
FREEZE THAW CYCLES, SOIL WATER MIGRATION, PERMEABILITY, SOIL STRUCTURE, SOIL PHYSICS, SOII TEXTURE, PARTICLE SIZE DISTRIBUTION, FINES.

MP 1226 EFFECT OF FREEZE-THAW CYCLES ON RESILIENT PROPERTIES OF FINE-GRAINED SOILS.

Johnson, T.C., et al, 1979, Vol.1., 247-276, For another version and abstract see 32-3502 20 refs. Cole, D.M., Chamberlain, E.J

33-4349 FROZEN GROUND MECHANICS, FREFZE THAW CYCLES, PAVEMENT BASES, BEARING TESTS, SHEAR STRESS, SUBGRADF SOILS, LOADS (FORCES), SOIL TEMPERATURE, MOD-

MP 1227

THERMAL AND RHEOLOGICAL COMPUTA-TIONS FOR ARTIPICIALLY FROZEN GROUND CONSTRUCTION. TIONS

Sanger, T.J., et al, 1979, Vol.13, p.311-337, 32 refs. For another version and abstract see 33-4283. Sayles, F.H.

SOIL FREEZING, ARTIFICIAL FREEZING, FROZEN GROUND MECHANICS, FROZEN GROUND THERMODYNAMICS, CREEP PROPERTIES, RHEOLOGY, THERMAL PROPERTIES, FROST HEAVE, ANALYSIS (MATHEMATICS), CONSTRUCTION.

M¹² 1228

M. 1226
LAND APPLICATION OF WASTEWATER: EF-FECT ON SOIL AND PLANT POTASSIUM.
Palazzo, A.J., et al, July-Sep. 1979, 8(3), p 309-312, 19

refs.

33.45RÁ

WASTE TREATMENT, WASTE DISPOSAL GRASSES, SOIL CHEMISTRY, IRRIGATION.

MP 1229 MULTI YEAR PRESSURE RIDGES IN THE CANADIAN BEAUFORT SEA.

Wright, B., et al, International Conference on Port and Ocean Engineering Under Arctic Conditions, 5th, Trondheim, Norway, Aug. 13-18, 1979. Proceedings, Vol.1, Trondheim, University, 1979, p.107-126. 17 sefe

Hnatiuk, J., Kovacs, A.

33-4609

SEA ICE, PRESSURF RIDGES, ICE STRUCTURE. MODELS.

The findings of a field at 10's designed to generate fundamental data on multi-year pressure ridges in the near shore zone of the Caradian Beaufort Sea are presented. The study investigated the geomety of eleven floating multi- it ridges or ridge fragments and the sail height and keet depth of four additional multi-year ridge fragments. The cross-sections of multi-year ridges with total thicknesses varying between 9.6 and 41.8 m were examined, and the results suggest that they can be adequately represented by one ridge model with a constant sail to keel ratio and geometry. It is also shown that the ice conditions at the standard standard from the study are bear in the standard from this study are bear in the shallow waters of the standard from the study are bear in the shallow waters of the standard from attrictal islant has be, and the standard from the study are bear in the shallow waters of the standard from attrictal islant has be.

MP 1230
ICE PILE-UP AND RIDE-UP IN ARCTIC AND SUBARCTIC BEACHES.

Kovacs, A., et al, Internations' onference on Port 22 refs.

Sodhi, D.S. 33-4610

SEA ICE, SHORES, PRESSU E RIDGES, ICE PUSH

PUSH.
Information on shore ice pile-up and ride-up in arctic and subarctic waters is pr. 2d. Cross-sectional profiles of several ice pile-ups and inde-ups are presented, from which models and theoretical analyses were made. The expressions derived pive the force required to overcome gravitational potential and friction occurring during ice-piling and ride-up. It was estimated that the distribut 5 force required during ice-piling or ride-up was of the order of 10 to 350 kPa (about 15 to 50 psi). Field obstructions revealed that shore i.e. p.i-cup or ride-up appears to recur within a period of less than 30 minutes at any time of year, but most often in the spring and fall. Pile-up seldom occurs more than 10 m inland from the s., but ride-up frequently extends 50 m or more inland, regardless of ice thickness. While steeply sloping shores do not favor ice ride-up, sea ice has mounted the steep, 9-m-high bluff at Batrow. Alaska, destroying structures and taking lives.

MP 1231

TEMPERATURE EFFECT ON THE UNIAXIAL STRENGTH OF ICE.

Hayne F.D, International Conference on Port and Ocean ineering Under Arctic Conditions, 5th, Trondn. ..., Norway, Aug. 13-18, 1979. Proceedings, Vo. 1, Trondheim, University, 1979, p 667-681,

33-4632

ICE STRENGTH, COMPRESSIVE STRENGTH, TENSILE PROPERTIES.

TENSILE PROPERTIES.

The effect of temperature on the uniaxial strength of fine-grained, polycrystalline ice was investigated Dumbbell-shaped specimens were loaded in uniaxial compress on and uniaxial tension. Two machine speeds, 0.847 mm/s and 84.7 mm/s, were used for the tests, and the test temperatures ranged from -0.1 to -54C. The uniaxial compressive strength is very sensitive to temperature, generally increasing as the temperature decreased from -0.1C to -54C. The tensile strength is not very sensitive to temperature, but did continue to increase with decreasing temperature. Tensile strength also increased the most between -0.1C and -3C. An initial tangent modulus and a 5° stress modulus were found for each compression test. The initial tangent modulus increased about two times as the temperature decreased from -0.1C to -54C. The 50° stress modulus also increased with decreasing temperature. A secant modulus was found for the tensile tests and it tended to decrease with decreasing temperature. The specific energy required to cause failure was also found for the tensile tests and it tended to decrease with decreasing temperature. temperature. The specific energy required to cause failure was also found for the compression and tension tests.

MP 1232

BUCKLING ANALYSIS OF WEDGE-SHAPED FLOATING WE SHEETS.

Sodhi, D.S., International Conference on Port and Ocean Engineering Under Arctic Conditions, 5th, Tro:/dheim, Norway, Aug 13-18, 1979. Proceed-ings, Vol.1, Trondheim, Ur. versity, 1979, p. 797-810, 7

33-4641

SEA ICE, FLOATING ICE, ICE LOADS, ICE PRESSURE.

A buckling analysis for semi-infinite wedge-shaped floating considering analysis for semi-infinite wedge-staged floating to the in-plane stresses | lessure are computed undary conditions | The but aling load and buckling for varying ice sheet geometry and the results of this analysis are close to those of earlier analyses for semi-infinite ice sheets and research the same of the results of this analysis are close to those of earlier analyses for semi-infinite ice sheets and

MP 1233
SNOW ACCUMULATION, DISTRIBUTION, MELT, AND RUNOFF.

Colbeck, S.C., et al, May 22, 1979, 60(21), p.465-468, 33-4547

SNOW ACCUMULATION, SNOW COVER DISTRIBUTION, SNOWMELT, RUNOFF, HEAT TRANSFER, SNOW SURVEYS, REMOTE SENS-ING, HYDROLOGY.

MP 1234

COMPACTION OF WET SNOW ON HIGH-

Colbeck, S.C., 1979, No 185, International Symposi-um on Snow Removal and Ice Control Research, 2nd, Hanover, N.H., May 15-19, 1978. Proceedings, p.14-17 7 refs.

WET SNOW, SNOW COMPACTION, SNOW RE-MOVAL, SALINITY.

MOVAL SALINITY.

The compressibility of we' snow decreases with decreasing fund water content but increases with decreasing saminity. Also, the tendency for snow splashing on highways increases with decreasing salinity. These opposite effects are complicined by the fact that liquid water content and salinity are not necessarily incompandent. The amount of liquid present can be controlled somewhat by the road fading and salinity is generally determined by how much salt is applied to the road surface. For different situations in a property of the salinity of compaction of wet snow into ice. Here we provide a qualitative review of wet snow and suggest how an understrading of wet snow's behavior on a road surface might increase our ability to deal with snow removal problems.

MY 1235 NUMERICAL SIMULATION OF ATMOSPHER-

IC ICE ACCRETION.

Actley, S.F., et al. 1979, No.185, international Symposium on Snow Removal and Ice Control Research, 2nd, Hanover, N.H., May 15-19, 1978. Proceedings, p 44-52, 7 refs. Templeton, M.K.

ICE ACCRETION, MATHEMATICAL MODELS, ENVIRONMENT SIMULATION, DROPS (LIQUIDS), PARTICLE SIZE DISTRIBUTION, TIME FACTOR.

FACTOR.

Time up-indence enters into calculations of ice accretion on objects primarily through terms dependent on the initial conditions and size and geometry of the object. A numerical technique to include the time-dependence is described here as well as simulation of complex situations where the conditions ry, for example, along a helicopter rotor blade. Some results of varying droplet sizes, velocity, and drepted distributions are presented. These indicate the general dependence of ice accretion on these paraneters as well as illustrate the utility of numerical techniques in sceing how these effects can influence the rates of ice accretion for particular initial. influence the rates of ice accretion for particular initial

LABORATORY EXPERIMENTS ON ICING OF ROTATING BLADES.

Ackley, S.F., et al, 1979, No.185, International Symposium on Snow Removal and Ice Control Research, 2nd, Hanover, N. H., May 15-19, 1978 Proceedings, p.85-92, 7 r.fs

Lemieux, G., Itagaki, K., O'Keefe, J.

LABORATORY TECHNIQUES, ICE ACCRETION, HELICOPTERS, ICE COVER THICKNESS, TEMPERATURE EFFECTS

TEMPERATURE EFFECTS

Experiments have been i.e. ducted to provide a basis for a computer model that simulates atmospheric ice accretion on a rotating blade. A comparison of the computer model simulation and experimental results reveals that general agreement exists within the temperature range 0 C to -25 C and the velocity range 0 to 60 m/s. Beyond 60 m/s the computer simulation over-predicts the thickness of the ice accretion at the leading edge. Below -25 C the simulation and experimental results disagree in that the simulation significantly overpredicts the thickness of the accretion at the leading edge.

MP 1237

SYSTEMS STUDY OF SNOW REMOVAL

Minsk, L.D., 1979, 180, 182 International Symposium on Snow Removal and Ice Control Research, 2nd, Hanover, N.H., May 15-19, 1978. Proceedings, p 220-225, 4 refs 34-84

SNOW REMOVAL, SYSTEMS ANALYSIS

The framework for a systems analysis of snow removal and recontrol on roads is presented perfittion of the operating conditions, the principal ones of which are climate and traffic, as well as the system itself, the road net, is required fragingment factors involved in performing the basic functions of clearing, spreading, loading, and hailing are analyzed

MP 1238 COMPUTER SIMULATION OF URBAN SNOW

Tucker, W.B., et al, 1779, No.185, International Symposium on Snow Removal and Ice Control Research, 2nd, Hanover, N. H., May 15-19, 1978. Proceedings p.293-302, 11 refs. Clohan, G.M.

34-95

SNOW REMOVAL, COMPUTERIZED SIMULA-TION, ENVIRONMENT SIMULATION.

TION, ENVIRONMENT SIMULATION.

A s-neral computer model to simulate urban snow reineval has been developed. One hart of the package includes seve integrams which assist in the routing of snow removal vehicles using computer graphics. The primary element, however, is a program which, once specific vehicle routes are input, allows the simulation of any particular snow removal scenario. Parameters that can be varied include both truck and snowstorm characteristics. This simulation program is tested using truck routes and storm data from Newington, Connecticut. Results indicate that the simulation predicts plowing times quite reasonably.

MP 1239

ULTRASONIC VELOCITY INVESTIGATIONS
OF CRYSTAL ANISOTROPY IN DEEP ICE
CORES FROM ANTARCTICA.

Kohnen, H., et al, Aug. 20, 1979, 84(C8), p.4865-4874. 22 refs.

Gow, A.J. 34-410

34-410
ICE CORES, ICE CRYSTAL STRUCTURE, ICE
ACOUSTICS, ICE SHEETS, ANISOTROPY,
WAVE PROPAGATION, ULTRASONIC TESTS,
GI ACIER FLOW, ICE CRYSTAL SIZE, SHEAR
PROPERTIES, ANTARCTICA—BYLD STATION,
ANTARCTICA—LITTLE AMERICA STATION. For the same paper from another source and abstract see 33-4204 or F-21944.

MP 1240

SEA ICE RIDGING OVER THE ALASKAN CON-

TINENTAL SHELF.
Tucker, W.B., et al, Aug. 20, 1979, 84(C8), p.4885-4897, 24 refs. For the same paper from another source and abstract see 33-4223. Weeks, W.F., Frank, M.

SEA ICE DISTRIBUTION, PRESSURE RIDGES, JEA ILE DISTRIBUTION, PRESSURE RIDGES, ICE DEFORMATION, SURFACE ROUGHNESS, PROFILES, LASERS, MATHEMATICAL MODELS, STATISTICAL ANALYSIS, REMOTE SENS ING, FORECASTING.

MP 1241

SOME RESULTS FROM A L'NEAR-VISCOUS MODEL OF THE ARCTIC ICE COVER. Hibler, W.D., III, et al, 1979, 22(87), p.293-304, 12

refs. Tucker, W.B.

34-544

ICE PHYSICS, DRIFT STATIONS, ICE MODELS, SEA ICE, VISCOSITY, GCEAN CURRENTS,

MP 1242 STANDING CROP OF ALGAE IN THE SEA ICE OF THE WEDDELL SEA REGION.
Ackley, S.F., et al, Mar. 1979, 26(3A), p.269-281, 19

refs.

Buck, K.R., Taguchi, S.

33.4674

SEA ICE, ALGAE, CRYOBIOLOGY, WEDDELL

Physical and biological measurements were made of ser-ice cores taken from 69 to 78 S in the Weddell Sea cence measurements indicated an algal community that was cence measurements indicated an algal community that was strongly associated with salinity maxima within the ice Maximum concentrations of chlorophyll a ranged from 0.31 to 4.54 mg cu.m. Comparisons with standing crops in the water column indicate that the standing crops within the ice can represent a minor but significant fraction of ne total anding crop for the legion. The sea ice algal community is applicably distinct from others that have been described for land-fast ice in McMurdo Sound, sea ice in the Artici, and pack ice off East Antarctics. The highest concentrations of biological material are found in the bottom or top sariples from those regions, whereas the Weddell Sea maxima are concentrated at intermediate depths (0.65 o. 2.15m) within the ice. A qualitative model indicating the relationship between thermally induced brine migration and subsequent algel growth is presented. (Auth mod.)

MP 1243

FORMATION OF ICE RIPPLES ON THE UN-DERSIDE OF RIVER ICE COVERS.

Ashton, G.D., Iowa City, University of Iowa, 1971, 157p., University Microfilms order No.71-30,392, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, Nov. 1971, p.2762.

RIVER ICE, ICE BOTTOM SURFACE, ICE WATER INTERFACE, TURBULENT FLOW, HEAT TRANSFFR, THERMAL CONDUCTIVITY, WATER FLOW, VELOCITY.

MP 1244

RUSEARCH ACTIVITIES OF U.S. ARMY COLD REGIONS RESEARCH AND ENGINEERING LABORATORY.

Buzzell, T.D., Mar. 1975, IWR-62, Environmental Standards for Northern Regions: a symposium, June 1974, Anc. orage, Alaska. p.9-12.

LABORATORIES, RESEARCH PROJECTS.

MP 1245

20-YR CYCLE TO GREENLAND ICE CORE RE-

CURDS. Hibler, W.D., III, et al, Aug. 9, 1979, 280(5722), p.481-483, 26 refs. Johnsen, S.J.

34.737

ICE CORES, D.J. L CORE ANALYSIS, ISOTOPE ANALYSIS, PERIODIC VARIATIONS.

Oxygen isotope analysis of G.eenland ice cores is made and the methods of analysis are described. Cyclic variations of about 20 yr seem to coincide with climatic oscillations and the Sun's motion about the center of mass of the Solar System. These periodic variations are compared with the exigen isotope record in the ice cores.

MP 1246 PHENOMENOLOGICAL DESCRIPTION OF THE ACOUSTIC EMISSION RESPONSE IN SEVERAL POLYCRYSTALLINE MATERIALS. St. Lawrence, W.F., July 1979, 7(4), p.223-228, 11

refs.

SNOW DEFORMATION, SNOW COVER STRUC-TURE, SNOW ACOUSTICS, ACOUSTIC MEAS-UREMENT, MODELS.

UREMENT, MODELS.

The pattern of acoustic emission response in snow subjected to constant deformation rates is examined. The structural character of snow is discussed, and an equation that describes the pattern of the coustic emission response is derived Comparison betw. he predicted acoustic response and experimental data is made and the agreement is shown to be excellent. The acoustic emission response for 7075-T6 alumnum and iron-3% silicon subjected to constant rates of deformation is also considered. The acoustic emission equation derived for snow represents the response in these materials. It is suggested that the internal fracture concept used to develop the model for snow may also apply to other densely packed polycrystalline n aterials. used to develop the model for snow may also apply other densely packed polycrystalline materials.

MP 1247

DYNAMIC THERMODYNAMIC SEA ICE MOD-

Hibler, W.D., III, July 1979, 9(4), p.815 846, 51 refs.

SEA ICE, THERMODYNAMICS, HEAT TRANSFER, ICE COVER THICKNESS, MATHEMATI-CAL MODELS.

CAL MODELS.

A numerical model for the rimulation of sea ice circulation and thickness over a seasonal cycle is presented. This model is used to investigate the effects of ice dynamics on arctic ice thickness and air-sea heat flux characteristics by carrying out several numerical simulations over the entire Arctic Ocean featon is a second in the model is to couple the dynamics. In the chickness characteristics by allowing the ice interaction to become stronger as the ce-becomes thicker and/or contains a lower areal percentage of thin ice. The dynamics, in turn, causes high oceanic heat losses in regions of ice divergence and reduced heat losses in regions of convergence. To model these effects consistently, the ice is considered to interact in a plastic manner with the plastic, strength chosen to depend on the ice thickness and concentration. The thickness and concentration. The thickness and concentration with the plastic properties of the plastic manner with the plastic, strength chosen to depend on the ice thickness and concentration. The thickness and concentration in turn, evolve according to continuity equations which include changes in ice mass and percent of open water due to advection, ice deformation and thermodynamic effects.

STEADY IN-PLANE DEFORMATION OF NON-COAXIAL PLASTIC SOIL.

Takagı, S., 1979, Vol.17, p.1049-1072, 27 refs

34-860
SOIL CREEP, PLASTIC PROPERTIES, THEORIES, BOUNDARY VALUE PROBLEMS, ANALYSIS (MATHEMATICS).
Presented in this paper is the theory of the steady inplante deformation, obeying the Coulomb yield criterion, of
plastic soils whose strain rate and stress principal directions
are noncoasial. The constitutive equations including an

unknown noncoaxial angle are derived by use of the geometry of the Mohr circle and the theory of characteristic lines. A boundary value problem is solved by assigning to the non coaxial angle a set of such values that enable us to accommodate the presupposed type of flow satisfying the given be undary conditions in a given domain. The plastic material regulated by the Colomb yield enterion in implane deformation is, therefore, a singular material whose constitutive equations are not constant with material but are variable with flow conditions.

SAFE ICE LOADS COMPUTED WITH A POCK-ET CALCULATO.

Nevel, D.E., May 1979, Nv.123, p.205-223, 3 refs.

ICE STRENGTH, LOADS (FORCES), COMPUT-ER APPLICATIONS.

This report provides a program for alculating the deflection and stresses of a floating ice sheet sing a pocket calculator. The program user must select serveropriate values for the ice mechanical properties in order to compute reliable deflection. tion and stresses. Engineering judgement must be used to select the allowable ice strength and when dealing with non-ideal situations

MP 1250

PROBLEMS C : OFFSH-)RE OIL DRILLING IN THE BEAUFO (7 SEA.
Weller, G., et Winter 1978, 10(4), p.4-11, 5 refs.

Weller, G., et Weeks, W.F.

ICE STRUCTURE, OFFSHORE DRILLING, FLOATING ICE, GROUND DICE, SEA ICE DIS-TRIBUTION, SUBSEA PERMAFROST.

COLD REGIONS RESEARCH AND ENGINEER-ING LABORATORY.

Freitag, D.R., Fall 1977, 10(3), p.4-6. 34-869

LABORATORIES, U.S. ARMY CRREL.

MP 1252

RECENT ICE OBSERVATIONS IN THE ALAS-AN BEAUFORT SEA FEDERAL-STATE LEASE AREA.

Kovacs, A, Fall 1978, 10(3), p.7-12.

SEA ICE, FAST ICE, RADAR ECHOES, PRES-SURE RIDGES, SEISMIC SURVEYS.

MP 1253

DESIGN AND CONSTRUCTION OF TEMPORARY AIRFIELDS IN THE NATIONAL PETROLEUM RESERVE. ALASKA.

Crory, F E., Fall 1978, 10(3), p 13-15, 1 ref.

AIRCRAFT LANDING AR. 5 SUBGRADE PREPARATION, INSULATION.

HUMAN-INDUCED THERMCKARST AT OLD DRILL SITES IN NORTHERN ALASKA. Lawson, D.E., et al, Fall 1978, 10(3), p.16-23, 16 refs.

TUNDRA, SOIL EROSION, THERMOKARST, HUMAN FACTORS, ACTIVE LAYER, SUBSI-DENCE.

OVERCONSOLIDATED SEDIMENTS IN THE BEAUFORT SEA. Chamberlain, E.J., Fall 1978, 10(3), p 24-29, 15 refs.

34-873

BOTTOM SEDIMENT, THAW CONSOLIDATION, CLAY SOILS, FREEZE THAW CYCLES.

WASTE HEAT RECOVERY FOR HEATING PUR-POSES.

Phetteplace, G, Fall 1978, 10(3), p.30-33. HEAT RECOVERY, HEATING, PUMPS.

MP 1257

MIZEX 84 MESOSCALE SEA ICE DYNAMICS:

POST OPERATIONS REPORT.
Hibler, W.D., III, et al., Oct. 1984, SR 84-29, MIZEX.
a program for mesoscale air-ice-ocean interaction experiments in Arctic marginal ice zones. 5. MIZEX 84 summer experiment FI preliminary reports. Edited by O.M. Johannessen and D.A. Horn, p.66-69, ADA-Edited 148 986

Leppäranta, M., Decato, S., Alverson, K.

40-4695 ICE MECHANICS, SEA ICE, ICE CONDITIONS, DRIFT STATIONS, ICE EDGE, MEASURING IN-STRUMENTS

ANISOTROPIC PROPERTIES OF SEA ICE IN THE 50- TO 150-MHZ RANGE

Kovacs, A., et al, Sep. 20, 1979, 84(C9), p.5749-5759,

Morey, R.M. 34-963

SEA ICE, RADAR ECHOES, ICE CRYSTAL STRUCTURE, OCEAN CURRENTS, DIELECTRIC PROPERTIES, ANISOTROPY.

TRIC PROPERTIES, ANISOTROPY.
Results of impulse radar studies of sea ice near Prudhoe Ray, Alaska, show that where there is a preferred current direction under the ice cover, the crystal structure of the ice becomes highly ordered. This includes a crystal structure with a preferred horizontal c axis that is onented parallel with the local current. The radar studies show that this structure behaves as an anisotropic dielectric. The result is that when electromagnetic energy is radiated from a dipole antenna in which the E field is onented perpendicular to the c axis azimuth, no bottom reflection is detected. It was also found that the frequency dispersion of anisotropic sea ice varies in the horizontal plane. This is demonstrated by the center frequency of the reflected signal spectrum, which is maximum in the preferred c axis direction and minimum perpendicular to it. In addition, it was found that the frequency dispersion is related to the average bulk brine volume of the ice but that the bulk dielectric constant of the ice, as determined from impulse travel time, shows little correlation with the coefficient of anisotropy.

ANALYSIS OF COUPLED HEAT AND MOISTURE FLOW IN AN UNSATURATED SOIL.
O'Neill, K., Jan. 1979, SR 79-36, Meeting on Model-

ing of Snow Cover Runoff, 26-28 September 1978, Hanover, New Hampshire. Proceedings, edited by S.C. Colbeck and M. Ray, p.364-309, ADA-167 767, 25 refs.

34-1027

SOIL WATER MIGRATION, HEAT TRANSFER. This paper presents a set of partial differential equations that describes the concurrent one-dimensional flow of liquid and heat in unfrozen unsaturated soils. A Galerkin finite element method based on hermite polynomials was used to solve the equations numerically. To verify both the theory and the solution method, laboratory measurements were made on a horizontal soil column. The res. _s furnished essential transport coefficient values, as well as data records over space and time for infiltrations of cold water that produced steep, interacting temperature and moisture content gradients. Comparison of measured and predicted values showed very good agreement in both the moisture and temperature domains. Contrary to the usual assumption in soil studies, liquid convection played a large role in the heat transfer. A simple geometric mean formula represented the soil the small conductivity quite adequately. SOIL WATER MIGRATION, HEAT TRANSFER.

SURFACE-BASED SCATTEROMETER RE-SULTS OF ARCTIC SEA ICE.
Onstott, R.G., et al, July 1979, GE-17(3), p.78-85, 16

Moore, R.K., Weeks, W.F.

SEA ICE, RADAR ECHOES, BACKSCATTER-ING, PRESSURE RIDGES, ICE COVER THICK-NESS

NESS.
Radar zekscatter measurements were made of shorefast sea ice nes. Point Barrow, AK, in May 1977, with a surface-based FM-CW scatterometer that swept from 1-2 GHz and from 8.5-17.5 GHz. The 1-2 GHz measurements showed that thick tirst-year and multiyear ice cannot be distinguished at 10-70 deg ir idence angles, but that undeformed sea ice can be discriminated from pressure ridges and lake ice Results also indicate that frequencies between 8-18 GHz have the ability to discriminate between thick first-year, multiye-r, and lake ice Cross polarization was found to be a bet-r discriminator than like polarization I addition, at these latter frequencies the differential scattering was found to have an approximately linearly increasing frequency resp-1se. CY fest a isc.

FOCUS ON U.S. SINDW RESEARCH. Colbeck, F.C., Aug. 1979, GD-6, p.41-52, 34 .efs

SNCY SURVEYS, RESEARCH PROJECTS, IM-PAC1, AGRICULTURE, WATER RESERVES.

MP 1262 SNOW AND THE ORGANIZATION OF SNOW RESEARCH IN THE UNITED STATES. Colbeck, S.C., Aug. 1979, GD-6, p.55-58, 1 ref SNOW SURVEYS, RESEARCH PROJECTS.

MP 1263 VISUAL OBSERVATIONS OF FLOATING ICE

PROM SKYLAB.
Campbell, W.J., et al, 1977, NASA-SP-380, Skylab explores the earth, prepared by NASA Lyndon B. Johnson Space Center, p.353-379, N77-28548, 2 refs. Ramseier, R.O., Weeks, W.F., Wayneberg, J.A.

SPACEBORNE PHOTOGRAPHY, LAKE ICE, SEA ICE. RIVER ICE.

MP 1264

ANALYSIS OF FLEXIBLE PAVEMENT RESILI-ENT SURFACE DEFORMATIONS USING THE CHEVRON LAYERED ELASTIC ANALYSIS COMPUTER PROGRAM.

Smith, N., et al, 1975, 3 leaves, Presented at the Symposium on Nondestruc ve Test and Evaluation of Airport Pavement, U.S. Army Vaterways Experiment Station, Wicksburg, Mississippi, November 18-20, 1975. 9 refs.

Groves, J.A.

34-1501 PAVEMENTS, ELASTIC PROPERTIES, COM-PUTER APPLICATIONS.

MP 1265

NONCORROSIVE METHODS OF ICE CON-TROL.

Minsk, L.D., Public works and public utilities: report from a workshop considering problem a identified by the Intergovernmental Science, Engineering, and Technology Advi.ory Panel, September 5-7, 1979, College Park, Mr. yland, Washington, D.C., American Association for the Advancement of Science, 1979, p.133-162, 33 ruis.

34-1586

ROADS, ICE CONTROL, CHEMICAL ICE PRE-VENTION, ENV. CONMENTAL IMPACT, SALT-ING.

MP 1266

GEOPHYSICS IN THE STUDY OF PERMA-

Scott, W J., et al, International Conference on Perma-frost, 3rd, Edmonton, Alberta, July 10-13, 1978. Proceedings, Vol.2, Ottawa, National Research Council of Canada, 1979, p.93-115, Refs. p.110-115. Sellmann, P.V., Hunter, J.A.

34-1682
PERMAFROST PHYSICS, GEOPHYSICAL SUR-VEYS, SEISMIC SURVEYS, SOIL TEMPERA-TURE, ELECTRICAL RESISTIVITY, ACTIVE LAYER, ELECTROMAGNETIC PROSPECTING

GRAIN CLUSTERS IN WET SNOW.

Colbeck, S.C., Dec. 1979, 72(3), p.371-384, 19 refs 34-1698

WET SNOW, SNOW CRYSTAL STRUCTURE, GRAIN SIZE, BOUNDARY VALUE PROBLEMS, SNOW PHYSICS.

SNOW PHYSICS.

The grain boundaries in snow are generally unstable when the pote space is filled with liquid water (i.e., liquid-saturated snow). Thus, when unstressed snow is saturated with melt, the tice particles in snow are cohesionless spheres. This leads to very low strengths and to rapid grain growth due to heat flow among particles of different sizes. The grain boundaries in highly unsaturated snow (up to about 7% liquid by volume) with small applied loads are stable, and the grains must be arranged in clusters to achieve local force equilibrium. Two grains bond together with geometrical constraints on the radii of the phase boundaries. Three grains join at a liquid vein whose size is determined by grain size and capillary pressure (i.e., liquid "tension"). Sow grain growth occurs by sublimation, vapor diffusion, and condensation, and intergrain strength is relatively high. Once grain clusters are formed, equilibrium imposes constraints on the curvature of the phase boundaries which limit change in the capillary pressure

FEASIBILITY STUDY OF LAND TREATMENT OF WASTEWATER AT A SUBARCTIC ALASKAN

LOCATION.

Sletten, R.S., et al, Cornell Agricultural Waste Management Conference, 8th, Rochester, N.Y., 1976.

Proceedings Land as a waste management alternative, edited by R.C. Loehr, Ann Arbor, Mich., Ann Arbor Science, 1977, p.533-547, For another version sen 31-1949. 10 refs.

Uiga, A. 34-1749

WASTE TREATMENT. WATER POLLUTION, LAND RECLAMATION, SUBPOLAR REG!')NS. SUBARCTIC LANDSCAPES, TESTS, UNITED STATES-ALASKA.

MP 1269

APPLICATION OF RECENT RESULTS IN FUNCTIONAL ANALYSIS TO THE PROBLEM OF WATER TABLES.

Nakano, Y., Dec. 1979, Vol.2, p.185-190, 7 refs. 34-1845

WATER TABLE, BOUNDARY VALUE PROB-LEMS, ANALYSIS (MATHEMATICS).

LEMS, ANALYSIS (MATHEMATICS).

The traditional viewpoint in hydrology and soil physics purports that water tables appearing in porous media described by Darcy's law and the extended Darcy's law are not singular surfaces. Several particular solutions in which singulanties occur are presented as counter-examples to the traditional viewpoint and as evidence supporting the new theory that water tables are generally singular surfaces.

MP 1270

INCREASED MERCURY CONTAMINATION OF DISTILLED AND NATURAL WATER SAM-PLES CAUSED BY OXIDIZING PRESERVA-TIVES.

Cragin, J.H., 1979, Vol.110, p.313-319, 18 refs. 34-2004

WATER CHEMISTRY, GASES, VAPOR TRANSFER, POLLUTION, LABORATORIES.

FER, POLLUTION, LABORATOKIES.

The passage of mercury vapor from ambient air through the wa'b of conventional polyethylene (CPE), linear polyethylene (LPL), and Teflon (FEP) containers can seriously contaminate solutions of distilled and natural water stored in these containers. The rate of mercury contamination is dramatically increased when the sample solution contains oxidizing agents such as nitric acid or potassium permanganate, which are commonly used as preservatives to prevent loss of mercury (II) ion. The rate of contamination also depends on container material and decreases in the order CPE> LPE> FEP> see lass. Freezing the samples in plastic containers is an glass. Freezing the samples in plastic containers is an effective way to prevent mercury contamination. When freezing is not practical, storage in glass containination manufactures manufactures manufactures manufactures manufactures manufactures ample contamination from ambient mercury vapor.

CORRELATION AND QUANTIFICATION OF AIRBORNE SPECTROMETER DATA TO TUR-BIDITY MEASUREMENTS AT LAKE POWELL, UTAH.

Merry, C.J., International Symposium on Remote Sensing of Environment, 13th, Ann Arbor, Michigan, April 23-27, 1979. Proceedings, Environmental Research Institute of Michigan, 1979, p.1309-1316, 7 refs. 34 2043

L. KE WATER, TURBIDITY, SUSPENDED SEDI-MENTS, LIGHT TRANSMISSION, AERIAL SUR-VEYS, SPECTROSCOPY.

VEYS, SPECTROSCOPY.

A water sampling program was accomplished at Lake Powell, Utah, duning June 1975 for correlation to multispectral data obtained with a 500-channel airborne spectroradiometer. Field measurements were taken of percentage of light transmittance, surface temperature, PH and Secchi dak depth. Percentage of light transmittance was also measured in the laboratory for the water samples Analyses of electron in crystephs and suspended sediment concentration data for four water samples located at Hite Bridge, Mile 168, Mile 168 Mile 150 and Bullfrog Bay indicated differences in the composition and concentration of the particulate matter. Authorne spectroradiometer multispectral data were analyzed for the four sampling locations. The results showed that: (a) as the percentage of light transmittance of the water samples decreased, the reflected radiance increased, and (b) as the suspended sediment concentration (rig/1) increased, the reflected radiance increased in the 1-50 mg/1 range. In concis on, valuable qualitative information was obtained on surface turbidity for the Lake Powell water spectra. Also, the reflected radiance measured at a wavelength of 0.58 micron was directly correlated to the suspended sediment concentration.

MP 1272 ON THE ORIGIN OF STRATIFIED DEBRIS IN ICE CORES FROM THE BOTTOM OF THE AN-TARCTIC ICE SHEET.

Gow, A.J., ct al, 1979, 23(89), p.185-192, In English with French and German summaries. 11 refs Epstein, S., Sheehy, W.

ICE CORES, DRILL CORE ANALYSIS, SEDI-MENTATION, STRATIFICATION, FREEZE THAW CYCLES.

THAW CYCLES.

Cores from the bottom 483 m of the antarctic ice sheet at Byrd Station contain abundant stratified debris ranging from alli-sized particles to cobbles. The nature and disposition of 'e debris, together with measurements of the physical properties of the inclosing ice, indicate that this zone of dirti-laden ice originated by "freezing-in" at the base of the ice sheet. The transition from air-rich glacial ice to ice practically devoid of air coincided precisely with the first appearance of debris in the ice at 483 m above the bed. Stable-isotope studies made in conjunction with gas-content measurements also confirm the idea of incorporation of basia ice may well constitute the most diagnostic test for discriminating between debris incorporated in a melti-refreeze process and debris entraped by purely mechanical means, e.g. shearing. We conclude from our observations en bottom cores from Byrd Station that "freezing-in" of

basal debris is the major mechanism by which sediment is incorporated into polar ice sheets. (Auth)

MP 1273

SUBARCTIC WATERSHED RESEARCH IN THE SOVIET UNION.

Slaughter, C.W., et al, 1978, 2(13), p.305-313, For another version of this report see 32-1318 (CRREL SR 77-15). 6 re Bilello, M.A. 6 refs.

34-2390

WATER BALANCE, STATIONS, RESEARCH PROJECTS, INTERNATIONAL COOPERATION, USSR-MAGADAN.

MP 1274 DRAINAGE NETWORK ANALYSIS OF A SU-BARCTIC WATERSHED.

Bredthauer, S.R., et al, Aug. 1979, 79-6, Alaska Science Conference, 29th, Fairbanks, Aug. 15-17, 1979. Proceedings (Alaska fisheries: 200 years and 200 miles of change), edited by B.R. Melteff, p.349-359. 8 refs.

Hoch, D.

WATERSHEDS, DRAINAGE, STREAM FLOW.

WATERSHEDS, DRAINAGE, STREAM FLOW. A drainage network map of the Caribou-Poker Creek Research Watershed, near Fairbanks, Alaska, has been used to conduct a Strahler stream order analysis and an analysis of length distributions of source and tributary-source links in a subarctic watershed. The basins have very low drainage densities, ranging from 1.35 km/sq km to 5.34 km/sq km. Bifurcation ratios were higher than those found in watersheds in the continental U.S. Statistical analysis indicates that source and tributary-source links in a subarctic watershed belong to different length populations, the same as found in other regions of the world. Additional analysis indicates that exterior links originating on permafrost slopes tend to be shorter than those originating on non-permafrost (well-drained) slopes.

MP 1275

HIGH-FORCE TOWING.

Mellor, M., Feb. 1980, 1(3/4), p.231-240, 5 refs. 34-2445

ICEBERG TOWING, LOADS (FORCES)

ICEBERG TOWING, LOADS (FORCES).

Required force levels for iceberg towing at 1 knot could be at least 50 tons for protection of structures and drillships in northern waters, and around 1000 tons for iceberg exports from the Antarctic. Corresponding values of effective ("towrope") power are only 307 hp and 6140 hp, respectively. A conventional-hull supertrug capable of 1000 tons thrust would probably have T/P=10 lbf/hp, p=200,000 hp, and a propulsive efficiency of about 3%. The most practical expedient for antarctic towing seems to be use of multiple conventional tugs, with fewer tugs or higher speeds as the iceberg reduces its size and streamlines itself. The practical difficulty of towing antarctic icebergs may have been underestidifficulty of towing antarctic icebergs may have been underestimated, and it might be worth reconsidering preliminary shaping of the iceberg to reduce the drag. (Auth.)

MP 1276

COMPARISON OF THE PEBBLE ORIENTA-TION IN ICE AND DEPOSITS OF THE MATA-NUSKA GLACIER, ALASKA.

awson, D.E., Nov. 1979, 87(6), p.629-645, 21 refs.

GLACIAL DEPOSITS, ICE STRUCTURE, SEDI-

MENT TRANSPORT. Depositional processes and their sediment source determine the orientation of pebbles in the deposits of the Matanuska Glacier and the relationship of this orientation to the direction of ice flow. Pebble fabrics in ice-derived deposits differ of ice flow. Pebble fabrics in ice-derived deposits differ from those in resedimented deposits: fabric in deposits from sediment flow, ablation of exposed basal zone ice, and the slumping and spalling of ice-cored slopes does not correspond to the ice flow direction, but is developed by these depositional processes. Pebbles in basal ice and melt-out till show a unimodal distribution of orientations, with individual observaà unimodal distribution of orientations, with individual observations only slightly dispersed about the mean axis. Pebble fabrics in other deposits are polymodal, with a significantly larger amount of dispersion about the mean axis. The regional pattern of mean axes of basal zone ice and meltiout till pebble fabrics approximates the local and regional trends of ice flow, but pebble imbreation in ice and sediment does not necessarily indicate the direction from which the glacier flowed. A small number of measurements of pebble orientations at many sites and the analysis of these data by the eigenvalue method appear to be suitable techniques for examining the pebble fabric of glacial deposits, but addition-

MP 1277

CRYSTAL ALIGNMENTS IN THE FAST ICE OF

or examining the pebble fabric of glacial deposits, but additional sedimentological data are needed to define the origins of these deposits.

ARCTIC ALASKA.
Weeks, W.F., et al, Feb 20, 1980, 85(C2), p.11371146, For this paper in another form see 34-1379 (CR 79-22, ADA-077 188). 8 refs.

Gow, A.J. 34-2671

SEA ICE, ICE PHYSICS, ICE CRYSTAL STRUC-TURE, OCEAN CURRENTS.

Field observations at 60 sites located in the fast or near-fast ice along a 1200-km stretch of the north coast of

Alaska between the Bering Strait and Barter Island have shown that 95% of the ice samples exhibit striking c axis ments within the horizontal plane. In all cases the ne of preferred orientation increased with depth in the Representative standard deviations around a mean ice. Representative standard deviations around a mean direction in the horizontal plane are commonly less than 10 deg for samples collected near the bottom of the ice. The general patterns of the alignments support the correlation at the ice/water interface suggested by Weeks and Gow (1978) A comparison between c axis alignments and instantaneous current measurements made at 42 locations shows that the most frequent current direction coincides with mean c axis direction. The c axis alignments are believed to be the result of geometric selection, with the most favored orientation being that in which the current flows normal to the (0001) plates of ice that comprise the dendritic sea ice/seawater interface.

TRAVELING WAVE SOLUTIONS OF SATURAT-ED-UNSATURATED FLOW THROUGH POR-OUS MEDIA.

Nakano, Y., Feb. 16, 1980, 16(1), p.117-122, 9 refs.

WAVE PROPAGATION, WATER FLOW.

Traveling wave solutions to the problem of saturated-unsaturated flow of water through a uniform porous medium are derived, and the regularity properties of the solutions are studied. It is found that a singularity occurs in the higher-order derivatives of flux with respect to the space coordinate in the solutions at water tables and that the water tables be generally interpreted as propagating acceleration waves of the nth order, where n is a positive integer

PILOT SCALE STUDY OF OVERLAND FLOW LAND TREATMENT IN COLD CLIMATES.

Jenkins, T.F., et al, 1979, 11(4/5), p.207-214, 11 refs. Martel, C.J.

WASTE TREATMENT, WATER CHEMISTRY, IRRIGATION, COLD WEATHER TESTS

IRRIGATION, COLD WEATHER TESTS.

Primary and secondary wastewaters were applied to separate sections of an overland flow site. The dimensions of each section were 3 m in width by 30 m in length and the system was graded to a five percent slope. The site was planted with orchard grass and tall fescue A one-year acclimation period was allowed to obtain a good cover. Wastewater was applied to the site for one month before onset of the study to establish a high level of microbial activity. Applied wastewater as well as surface and subsurface flows were monitored for NO-3, NH+4, TKN, BOD, suspended solids, Ph. conductivity and total phosphorius face flows were monitored for NO-3, NH+4, TKN, BOD, suspended solids, pH, conductivity, and total phosphorus The results indicate excellent warm weather performance for removal of oxygen demanding substances, suspended matter and nitrogen. Treatment efficiency of suspended solids remained high throughout the winter while treatment of BOD declined to unacceptable levels at soil temperatures below 4C. Nitrogen treatment declined rapidly below 14C. The form of nitrogen applied to overland flow was found to affect performance with nitrate being the less desirable form Phosphorus treatment by overland flow was found to be about 80% in the summer months, declining to nil during the winter.

MP 1280

LOW-FREQUENCY SURFACE IMPEDANCE MEASUREMENTS AT SOME GLACIAL AREAS IN THE UNITED STATES.
Arcone, S.A., et al, Jan.-Feb 1980, 15(1), p.1-9, 14

Delaney, A.J.

34-2674

RADIO WAVES, WAVE RADIO COMMUNICATION. WAVE PROPAGATION.

RADIO COMMUNICATION.

Measurements of apparent resistivity and phase derived from the complex surface impedance of radio waves propagating in the ground wave mode at frequencies in the radio navigation, and and band (between 157 and 382 kHz) are presented Areas encompassing between 400 and 800 sq km that covered a vaniety of glacial sediments, land forms, and some crystalline bedrock types were surveyed. The degree of dispersion found in resistivity values reflects the dispersion in grain size, while the average resistivity increases with mean grain size. Dielectric properties are suggested as one cause of the low phases observed over crystalline bedrock. The combination of apparent resistivity and phase data implies that the resistivity measurements are consistent in about 50% of the areas with previous measurements of field strength attenuation performed in the AM broadcast band

MARGIN OF THE GREENLAND ICE SHEET AT

Colbeck, S.C., et al, 1979, 24(90), p.155-165, In English with French and German summaries. 7 refs AJ.

34-2824

ICE SHEETS, ICE EDGE, DRILL CORE ANAL-YSIS, ICE STRUCTURE.

Field studies at a particular place at the margin of the Greenland ice sheet have provided information about the ice sheet. Lee temperatures were measured in five drill holes, two of which reached the unfrozen area of basal

melting Surface water entered these two bore holes, reacting the base in one, but remaining 59 m above the base in the other. The existence of this water conduit or in the other. The existence of this water conduit or fracture at 240 m depth, the calculated temperature profiles, and the local bedrock configuration suggest an area of stationary ice overridden by the ice sheet. This situation suggests made above 240 m depth shows patterns similar to fabrics elsewhere near the margin in zones of low deviations stress. Unfortunately, no cores were obtained below that depth where stationary ice may exist.

MP 1282

RELATIONSHIP OF ULTRASONIC VELOCIT-RELATIONSHIP OF ULTRASONIC VELOCITIES TO C-AXIS FABRICS AND RELAXATION CHARACTERISTICS OF ICE CORES FROM BYRD STATION, ANTARCTICA.

Gow, A.J., et al, 1979, 24(90), p.147-153, in English with French and German summaries. 12 refs.

Kohnen, H. 34-2823

ICE SHEETS, ICE MECHANICS, DRILL CORE ANALYSIS, RELAXATION (MECHANICS), ULTRASONIC TESTS. ANTARCTICA—BYRD STA-

TION.

Deep cores from Byrd Station were used to calibrate an ultrasonic technique of evaluating crystal anisotropy in the antarctic resishest. Velocities measured parallel and perpendicular to the vertical axis of the cores yielded data in excellent agreement with the observed e-axis fabric profile and with the in-situ P-wave velocity profile measured parallel to the bore-hole axis by Bentley Velocity differences in excess of 140 m/s for cores from below 1,300 m attest to the tight clustering of c axes of crystals about the vertical, especially in the zone 1,300-1,800 m. A small but significant decline in vertical velocity with ageing of the core, as deduced from Bentley's down-hole data, is attributed to the formation of oriented cracks that occur in the ice cores as they relax from environmental stresses. This investigation of cores from the 2,164 m thick ice sheet at Byrd Station establishes the ultrasonic technique as a viable method of monitoring relaxation characteristics of drilled cores and for determining the gross trends of c axis orientation in ice sheets. The retaxation characteristics of chiled cores and for determining the gross trends of c axis orientation in ice sheets. The Byrd Station data, in conjunction with Barkov's investigation of deep cores from Vostok, East Antarctica, also indicate that crystal anisotropy in the antarctic ice sheet is dominated by a clustering of c-axis about a vertical symmetry axis.

ANALYSIS OF CIRCULATION PATTERNS IN GRAYS HARBOR, WASHINGTON, USING REMOTE SENSING TECHNIQUES. Gatto, L.W., 1980, Vol.3, p 289-323, 45 refs. 34-2675

REMOTE SENSING, TIDAL CURRENTS. WATER FLOW.

WATER FLOW.

The objective of this investigation was to analyze surface circulation patterns in Grays Harbor, Washington, during flood and ebb tide, using National Aeronautics and Space Administration (NASA) aerial photographs and thermal-IR imagery and low altitude aerial photographs of uranine dye drogues. The application of LANDSAT-1 and passive microwave imagery was evaluated but did not prove useful. Water temperature, salinity, and suspended sediment data and the results of hydraulic model studies were used to venify and supplement interpretations from the photographs and imagery. The use of remote sensing techniques in conjunction with ground truth data and hydraulic model results, when available, provides a more complete perspective of estuarine processes than is available by using conventional shipboard surveys alone. shipboard surveys alone.

MP 1284 IMAGING RADAR OBSERVATIONS OF FROZ-EN ARCTIC LAKES.

Elachi, C., et al. 1976, 5(3), p 169-175, 14 refs. Bryan, M.L., Wecks, W.F.

RADAR ECHOES, FROZEN LAKES, BACK-SCATTERING, REMOTE SENSING, BUBBLES, ICE WATER INTERFACE, ICE SOLID INTER-FACE

L-band radar images of a number of ice-covered lakes located approx 48 km northwest of Bethel. Alaska, show large differences in radar backscatter with lakes showing homogeneous low-returns, homogeneous high-returns another low-returns around the lake borders and high-returns from the central areas. The patterns of the returns suggest that a low-return indicates that the lake is frozen completely to its bottom, while a high-return indicates the presence of freshwater between the ice cover and the lake bed. This interpretation is in good agreement with the limited information available on lake depths in the study area and recent X-band radar observations of North Slope lakes by Sellman, Weeks and Campbell, who suggested such an interpretation. These effects are, however, more striking in the L-band than in the X-band imagery. This can be explained by the fact that volume inhomogeneities, such as air bubbles, will cause more scattering and conductivity losses and thus more attenuation at the shorter wavelengths (X-band, 3 cm) I hand radar images of a number of rescovered lakes located

WATER MOVEMENT IN A LAND TREATMENT SYSTEM OF WASTEWATER BY OVERLAND FLOW.

Nakano, Y., et al, 1979, 11(4/5), p.185-206, 15 refs. Khalid, R.A., Patrick, W.H., Jr. 34-3949

WATER FLOW, WASTE TREATMENT, WATER TREATMENT, SOIL WATER, SATURATION, SEEPAGE, SLOPE ORIENTATION, EX-PERIMENTATION.

Water movement in an overland-flow land treatment system Water movement in an overland-flow land treatment system was studied experimentally and theoretically. A small-scale physical model was used to obtain experimental data. The theoretical analysis was based upon the shallow water equation for overland flow and the Darcy-Richards law for soil water flow. It was found that the water movement in the system was primarily controlled by the application rate, the friction slope, the slope angle, the hydraulic characteristics of soils, and the evapotranspiration. An approximate capabilities obtained to steady flow up the system was obtained to steady flow up the system was obtained. issues of soils, and the evapotranspiration. An approximate analytical solution to steady flow in the system was obtained it was found that the rate of soil water flow was mainly determined by the saturated conductivity of soils and in less extent by the friction slope and the slope angle in the steady condition. A finite difference solution to non-steady flow was found satisfactory in simulating the experimental data.

MP 1286 MASS-BALANCE ASPECTS OF WEDDELL SEA PACK-ICE.

Ackley, S.F., 1979, 24(90), p.391-405, In English with French and German summaries. 20 refs. 34-2840

SEA ICE DISTRIBUTION, MASS BALANCE, ICE DEFORMATION, SALINITY, WEDDELL SEA.

SEA ICE DISTRIBUTION, MASS BALANCE, ICE
DEFORMATION, SALINITY, WEDDELL SEA.

The Weddell Sea pack ice undergoes several unique advanceretreat characteristics related to the clockwise transport in
the Weddell Gyre, the physical setting for the pack ice,
and the free boundary with the oceans to the north. From
satellite-derived ice charts, the annual cycle of the pack
ice advance and retreat is depicted. The Weddell pack
advance is characterized by a strong cast-moving component
as well as the north advance seen in other regions such
as East Antarctica. Physical characteristics of the pack
ice at the summer minimum ice edge are presented. Indications are that deformation is a significant component of
the ice accumulation, deformed ice accounting for c 15
to 20% of the area covered in the year-round pack. Ablation
characteristics are inferred from observations made during
field work and from satellite imagery. These observations
indicate that surface-melt ablation typically seen on Arctic
pack is not seen on the Weddell pack inside the summer
edge. Using the physical-property data and transport inferred from ship and iceberg drifts, a new annual ice accumulation: > 3 m is inferred over the continental shelf in the
South compared to < 2 m previously estimated. The implication is that salt flux into the ocean over the shelf may
be significantly larger, thereby increasing the production of
Western Shelf Water. a component of Antarctic Bottom
Water. (Auth.) (Auth.)

DELINEATION AND ENGINEERING CHARAC TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al, Environmental assessment of the Alaskan continental shelf, Vol. 9, Hazards. Principal investigators' annual reports for the year ending March 1979, Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, Oct. 1979, p.93-115, 19 refs. Chamberlain, E.J., Arcone, S.A., Blouin, S.E., Delaney, A.J., Neave, K.G. 34-3056

SUBSEA PERMAFROST, PERMAFROST DISTRI-BUTION, BOTTOM SEDIMENT, BOREHOLES, TEMPERATURE MEASUREMENT, ENGINEER-ING GEOLOGY, SEISMIC SURVEYS, OFF-SHORE DRILLING, SEASONAL FREEZE THAW, BEALFORT SEA

THAW, BEAUFORT SEA

The objective of CRREL's subcea permafrost program is to obtain information on the distribution and properties of permafrost beneath the Beaufort Sea We are currently acquiring information on the distribution of ice-bonded permafrost from analysis of the velocity structure of commercial seismic records. This report summarizes the results of all studies to date, including engineering property analysis and preliminary interpretation of seismic data Emphasis applaced on results that are relevant to offshore development of this region. Discussion of the CRRLL drilling and laboratory program represents the most current interpretation of these data

MP 1289

MP 1288 BURIED VALLEYS AS A POSSIBLE DETERMI-NANT OF THE DISTRIBUTION OF DEEPLY BURIED PERMAFROST ON THE CONTINENTAL SHELF OF THE BEAUFORT SEA.
Hopkins, D.M., et al, Environmental assessment of the

Alaskan continental shelf, Vol. 9, Hazards. Principal investigators' annual reports for the year ending March 1979, Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, Oct. 1979,

p.135-141, 15 refs.
Sellmann, P.V., Chamberlain, E.J., Lewellen, R.I., Robinson, S.W.

34-3057 SUBSEA PERMAFROST, PERMAFROST DISTRIBUTION, BOREHOLES, BOTTOM SEDIMENT, RIVER BASINS, VALLEYS, BEAUFORT SEA.

OIL POOLING UNDER SEA ICE.

Kovacs, A., Environmental assessment of the Alaskan continental shelf, Vol.8, Transport. Principal investigators' annual reports for the year ending March 1979, Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, Oct. 1979, p.310-323, 3 refs. 34-3053

OIL SPILLS, SEA ICE, ICE ELECTRICAL PROP-ERTIES, BOTTOM ICE, FAST ICE, SUBGLACIAL OBSERVATIONS, OCEAN CURRENTS, ANISO-TROPY, REMOTE SENSING, ECHO SOUND-ING, ELECTROMAGNETIC PROPERTIES.

ING, ELECTROMAGNETIC PROPERTIES.

The object of the CRREL study is to (a) determine the cause of the significant relief which exists under the fast ice, (b) measure the variations in the relief under fast ice, using electromagnetic echo sounding, (c) determine if the under-rice relief is a series of individual pockets or consists of long rills, (d) estimate the quantity of oil which could pool up in the under-rice depressions should oil be released under the ice cover (e) use impulse radar to study the electromagnetic properties and anisotropy of sea ice Initial results from using a polarized radar antenna in the air from the NOAA helicopter indicate that the c-axis anisotropy is related to current direction, it should be possible to measure, from an airborne platform, the current direction at the ice/water interface. interface

MP 1291

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan continental shelf, Vol. 7, Transport. Principal investigators' annual reports for the year ending March 1979, Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, Oct. 1979,

p.181-207, 2 refs. Weeks, W.F.

34-3051

ICE MECHANICS, SEA ICE, ICE COVER THICK-SURE RIDGES, REMOTE SENSING, FAST ICE. PACK ICE.

MP 1292 INTERNATIONAL WORKSHOP ON THE SEA-

SONAL SEA ICE ZONE, MONTEREY, CALI-FORNIA, FEB. 26-MAR.1, 1979. Andersen, B.G., cd, Apr. 1980, Vol.2, 357p., For in-dividual papers see 34-3625 through 34-3632 or B-23446, F-23442 through F-23445, and F-23447. Weeks, W.F., ed, Newton, J.L., ed.

34-3624

MEETINGS, SEA ICE, PACK ICE, ICE PILEUP, ACOUSTICS, CLIMATOLOGY, ECOLOGY, OCEANOGRAPHY.

This volume comprises a series of state-of-the-art papers by individual authors, followed by disciplinary panel statements offering research suggestions and identifying particular prob-lems with the discipline under consideration. Several interdisciplinary panel reports are included—air-sea-ice interactions, biological interactions, engineering interactions, and acoustic interactions

MP 1293

OVERVIEW (INTERNATIONAL WORKSHOP ON THE SEASONAL SEA ICE ZONE).

Weeks, W.F., Apr. 1980, Vol 2, p 1-35, 2 refs 34-3625

SEA ICE DISTRIBUTION, SEASONAL VARIA-TIONS, MEETINGS, MODELS, AIR WATER IN-TERACTIONS, ICE WATER INTERFACE, METEOROLOGY, ENGINEERING, OCEANOG-RAPHY, OFFSHORE DRILLING

This overview is an attempt to summarize the principal conclusions that can be drawn from the workshop. The article is divided into three sections disciplinary studies (ice, oceanography, meteorology and elimatology, biological regimes, hydroacoustics, coastal processes), interdisciplinary studies, and engineering aspects of offshore resource exploration in the polar regions. Modeling of a wide variety of processes is discoursed. tion in the polar regions of processes is discussed

PHYSICAL OCEANOGRAPHY OF THE SEA-SONAL SEA ICE ZONE.

McPhee, M.G., Apr. 1980, Vol.2, p.93-132, Refs. p.116-118. Includes disciplinary panel statement, p.119-132. 34-3627

POLYNYAS, OCEANOGRAPHY, SEA ICE, ICE WATER INTERFACE, SEASONAL VARIA-TIONS, SALINITY, ICE EDGE.

This literature review is divided into four parts. The first deals with the role of continental shelves at the margins of polar oceans in maintaining water masses; the second emphasizes how the ocean might affect the advance and retreat of ice not contained by land; the third describes some special conditions found in the shear zone, and the fourth is a brief look at experimental techniques and instru-

MP 1295

SHORE ICE PILE-UP AND RIDE-UP: FIELD OBSERVATIONS, MODELS, THEORETICAL ANALYSES.

Kovacs, A., et al, Apr. 1980, Vol.2, p.209-298, Refs. p.282-288. Includes disciplinary panel statement. Sodhi, D.S. 34-3631
SHORES, COASTAL TOPOGRAPHIC FEA-

SHORES, COASTAL TOPOGRAPHIC FEATURES, ICE PILEUP, SEA ICE, FAST ICE, PRESSURE RIDGES, MATHEMATICAL MODELS.

MP 1296

NUMERICAL MODELING OF SEA ICE IN THE

SEASONAL SEA ICE ZONE. Hibler, W.D., III, Apr. 1980, Vol.2, p.299-356, Refs. p.317-320. Includes disciplinary panel statement. 34-3632

SEA ICE, SEASONAL VARIATIONS, COMPUT-ERIZED SIMULATION, ICE MODELS, MATH-EMATICAL MODELS.

Various approaches to modelling sea see have been tried by investigators, the author discusses the suitability of different types of simulations for particular research goals. Empirical studies are also reviewed. Literature covered relates to ice in both arctic and antarctic regions

MP 1297

DYNAMICS OF SNOW AND ICE MASSES.

Colbeck, S.C., ed, New York, Academic Press, 1980, 468p, Numerous refs. passim., Numerous refs. For individual papers see 34-3656 through 34-3662 or F-23452 through F-23455. 34-3655

ICE SHEETS, ICE SHELVES, GLACIERS, SEA ICE, ICEBERGS, AVALANCHES, SNOW, ICE.

ICE, ICEBERGS, AVALANCHES, SNOW, ICE.
This book reviews the dynamical aspects of snow and ice
masses on the geophysical scale. It is divided into seven
chapters, each of which describes the basic features of a
particular snow or ice mass. In each chapter a conceptual
framework is established on a physical basis, and a mathematical description is provided with as many references to the
technical literature as space allows. No attempt is made
to address particular applications of the information, but
the physical and mathematical descriptions of the properties
and processes provide for both an understanding of snow
and ice masses and a basis through which particular problems
can be addressed

SEA ICE GROWTH, DRIFT, AND DECAY.
Hibler, W.D., III, Dynamics of snow and ice masses, edited by S.C. Colbeck, New York, Academic Press, 1980, p.141-209, Refs. p.205-209.
34-3658

DRIFT. SEA ICE, THICKNESS, ICE COVER THICKNESS, ICE SURFACE, ICE FORMATION, MODELS, ICE STRENGTH, SIMULATION.

This review of the dynamics of sea ice is organized into the following sections—general characteristics of sea ice, physics of sea ice growth, drift and decay (ice thickness distribution, thermal processes and ice drift and deformation), and numerical simulation of sea ice growth, drift and decay.

MP 1299 FRESHWATER ICE GROWTH, MOTION, AND

Ashton, G.D., Dynamics of snow and ice masses, edited by S.C. Colbeck, New York, Academic Press, 1980. p.261-304. Refs. p.302-304. 34-3660

LAKE ICE, RIVER ICE, FRAZIL ICE, RIVERS, ICE JAMS, ICE BREAKUP, ICE MELTING, ICE FLOES, ICE FORMATION.

SOME PROMISING TRENDS IN ICE ME-

Assur, A., Symposium on Physics and Mechanics of Ice, Copenhagen, Aug 6-10, 1979. Proceedings. Edited by P. Tryde, Berlin, Springer-Verlag, 1980, p.1-

34-3728

GE MECHANICS, ICE CREEP, ICE SHEETS, STRESSES, LOADS (FORCES), ICE MODELS, RHEOLOGY, ICE COVER THICKNESS, SEA ICE, ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).

Ice sheets are inhomogeneous; properties vary strongly with depth. Theoretical treatment of plates with properties varying perpendicular to the plate has now been satisfactonly developed for floating ice sheets. However, other problems are still waiting for solutions. The use of model ice is developing rapidly such ice are made. Some suggestions of how to analyze breakthrough-loads on ice sheets diminish with duration of loading, but no satisfactory solution is available based upon classical procedures of applied mechanics.

MP 1301

EXPERIENCE GAINED BY USE OF EXTEN-SIVE ICE LABORATORY FACILITIES IN SOLV-ING ICE PROBLEMS.

Frankenstein, G.E., Symposium on Physics and Mechanics of Ice, Copenhagen, Aug. 6-10, 1979. Proceedings. Edited by P. Tryde, Berlin, Springer-Verlag, 1980, p.93-103, 12 refs.

ICE MECHANICS, ICE NAVIGATION, ICE CON-DITIONS, OFFSHORE STRUCTURES, ICE LOADS, FLOATING ICE, ICING, ICE PILEUP, FLOODING, LABORATORY TECHNIQUES.

The discovery of offshore oil in ice-infested waters has caused major concern to the design engineers

Some of the problems associated with offshore structures are ice forces, ic ng. and associated with offshore structures are ice forces, ic ng, and pile-up. Laboratory facilities have and will continue to solve many of the ice problems. The ice problem at navigation locks, for example, has been solved primarily due to laboratory studies. Also, the results of ice forces due to ice uplift have been virtually eliminated by controlled studies. Laboratories are becoming larger and more sophisticated. This should result in an increase in laboratory studies and a decrease in field studies. Solutions will come faster because conditions can be precisely controlled

MECHANICAL PROPERTIES OF POLYCRYS-TALLINE ICE.

Mellor, M., Symposium on Physics and Mechanics of Ice, Copenhagen, Aug. 6-10, 1979. Proceedings. Edited by P. Tryde. Berlin, Springer-Verlag, 1980, 34-3744

ICE CRYSTALS, ICE MECHANICS, ICE ELASTICITY, ICE CREEP, ICE STRENGTH, ICE CRACKS, VISCOELASTICITY, STRESS STRAIN DIAGRAMS, BRITTLENESS, TEMPERATURE

MP 1303

BENDING AND BUCKLING OF A WEDGE ON AN ELASTIC FOUNDATION.

Nevel, D.E., Symposium on Physics and Mechanics of Ice, Copenhagen, Aug. 6-10, 1979. Proceedings. Edited by P. Tryde, Berlin, Springer-Verlag, 1980, p.278-288, 5 refs.

ICE WEDGES, FOUNDATIONS, ELASTIC PROP-ERTIES, ICE CRACKS, FLEXURAL STRENGTH, LOADS (FORCES), ICE DEFORMATION, ANAL-YSIS (MATHEMATICS).

When an ice sheet begins to slide up a sloping structure, the ice cracks radially form the structure creating wedges Beam theory is used to analyze these wedges under the influence of both horizontal and vertical forces. Buckling and bending of these wedges are considered

ICE FORCES ON THE YUKON RIVER BRIDGE
—1978 BREAKUP.
Johnson, P.R., et al., Feb. 1979, FHWA-RD-79-82,
40p., PB80-144 553, 19 refs.
McFadden, T.

PIERS, BRIDGES, ICE LOADS, ICE PRESSURE. ICE MECHANICS, ICE STRENGTH, IMPACT STRENGTH, ICE BREAKUP, RIVER ICE.

MP 1305

THE ICEBERG COMETH.

Weeks, W.F., et al, Aug.-Sep. 1979, 81(8), p 66-75, 6 refs.

Mellor, M. 34-3793

ICEBERG TOWING.

The potential of towing icebergs to arid regions in the Southern Hemisphere is reviewed. Formidable technical problems Formidable technical problems

exist; some proposed solutions are listed. However, very little has been done to test the technology proposed. Towing, insulation, routes, and other aspects of reeberg-towing technology should be investigated by a trial tow to Western Australia, the area most favorably located for southern reeberg delivery

MP 1306 PRESSURE WAVES IN SNOW.

Brown, R.L., 1980, 25(91), p.99-107, 9 refs., In English with French and German summaries. 34-3802

SHOCK WAVES, SNOW DENSITY, LOADS (FORCES), SNOW STRENGTH, SHEAR STRESS, SNOW COMPRESSION, ANALYSIS (MATH-EMATICS).

EMATICS).

A dynamic constitutive law is used to study the response of medium-denuty snow to shock waves. The results show good correlation between theory and experiment, except for low-intensity shocks which produce small permanent density changes. In this case the validity of the data is questioned, although further experimental work is needed to settle this question. The results of this work also partially explain why snow is so effective in absorbing energy associated with stress waves. This is felt to be due to the work-hardening characteristics of snow

MP 1307 APPLICATION OF RECENT RESULTS IN FUNCTIONAL ANALYSIS TO THE PROBLEM OF WETTING PRONTS.

Nakano, Y., Apr. 1980, 16(2), p.314-318, 16 refs

SOIL WATER MIGRATION, SOIL PHYSICS, BOUNDARY VALUE PROBLEMS, SEEPAGE, POROUS MATERIALS, WETTABILITY, ANAL-YSIS (MATHEMATICS).

Traditionally, in hydrology and soil physics, wetting fronts appearing in porous media described by Darcy's law have not generally been considered to be singular surfaces. Some recent results from functional analysis are presented as evidence. * pporting the viewpoint that wetting fronts with a finite propagating speed generally are singular surfaces.

MP 1308 TIME-PRIORITY STUDIES OF DEEP ICE CORES.

Gow, A.J., May 1980, GD-8, p 91-102, 18 refs 34-4030

ICE CORES, DRILL CORE ANALYSIS, ANTARC-TICA—BYRD STATION.

TICA—BYRD STATION.

Both the Greenland and Antarctic ice sheets have been successfully core-drilled to bedrock, 1390 m at Camp Century, Greenland in 1966 and 2164 m at Byrd Station, Antarctica in 1968. Core and borchole studies at both sites have revealed a wealth of interesting results, especially at Byrd Station where extensive studies of cores were begun as soon as they were pulled out of the drill hole. Continuing investigations of these Byrd Station drill cores, including recent observations of apparent widespread recrystallization in certain sections of ice core, further confirm the importance of initiating as many studies as possible at the drill site. Any list of the studies that should be conducted on deep cores must recognize two kinds of research. I) those studies of a time-priority nature that must be initiated as soon as cores are pulled to the surface and, 2) other essential studies in which relaxation of the ice is not a factor. These latter studies can generally be deferred until cores are transported to more permanent storage facilities outside Antarctica. ed to more permanent storage facilities outside Antarctica

MP 1309 SMALL-SCALE TESTING OF SOILS FOR FROST ACTION. Sayward, J.M., 1979, 2(4), p.223-231, 18 refs

FROST ACTION, FROST HEAVE, ICE NEEDLES. SOIL WATER MIGRATION, SOIL TESTS.

SOIL WATER MIGRATION, SOIL TESTS.

A method is described for consenient study of frost action including soil heaving and needle ice formation. The apparatus is simple and small and the procedure requires only 25 cu cm soil specimens. The method could be useful for screening either large numbers or limited quantities of soils or soil additives for frost susceptibility. The method described was used to perform a limited number of tests with several soils. The tests obtained action in the form of soil heave, ice heave, or ice needles, yielding maximum heights up to three to six times the initial 40-mm soil depth. Maximum growth rates were up to 1 to 1 mm hr for soil heaves and 3 to 7 or more mm h for ice heaves and ice needles. Initial trials showed that thickener additives and possibly other treatments can restrict frost exten and possibly other treatments can restrict frost zetion

MP 1310

FATE AND EFFECTS OF CRUDE OIL SPILLED ON SUBARCTIC PERMAFROST TERRAIN IN INTERIOR ALASKA

Johnson, L.A., et al, Mar. 1980, EPA-600/3-80-040, 128p., Refs. p.78-83 Sparrow, E.B., Jenkins, T.F., Collins, C.M., Davenport, C.V., McFadden, T.

OIL SPILLS, PERMAFROST THERMAL PROP-ERTIES, ENVIRONMENTAL IMPACT, THER-MAL REGIME, SUBARCTIC REGIONS, SEA SONAL VARIATIONS, EXPLRIMENTATION.

This study was conducted to determine both the short-and long-term effects of spills of hot Prudhoe Bay crude and long-term effects of spills of hot Prudhoe Bay crude oil on permafrost terrain in subarctic interior Alaska. Two experimental oil spills of 7570 liters (2000 gallons) each on 500 sq m test plots were made at a forest site underlain by permafrost near Fairbanks, Alaska. The oil spills, one in winter and one in summer, were conducted to evaluate their effect during these two seasonal extremes. Oil movement, thermal regime, botanical effects, microbiological responses, permafrost impact, and composition of the oil in the soil were monitored for two years.

MP 1311

FREE CONVECTION HEAT TRANSFER CHAR-ACTERISTICS IN A MELT WATER LAYER. Yen, Y.-C., Aug. 1980, 102(3), p.550-556, 17 refs.

MELTWATER, HEAT TRANSFER, CONVECTION, ICE WATER INTERFACE, WATER TEMPERATURE, TEMPERATURE EFFECTS, ICE MELTING, ANALYSIS (MATHEMATICS).

MELTING, ANALYSIS (MATHEMATICS).

An experimental study was conducted on the formation of a water layer containing a maximum density, its effect on the onset of convection, and the heat transfer characteristics of such a system This water layer was formed by one-dimensional melting (either from below or above) of a cylinder of bubble-free ice. The layer depth at the onset of convection was determined by locating the inflection point on the water layer depth versus time curve, and was compared with layer depth calculated from a linear stability analysis of an identical problem. The results were compared with the analytical work of Veronis and were found to be in excellent agreement. Formation of a constant temperature layer was observed by measuring the water temperature distribution as melting progressed. The constant temperature was found to depend on T(h) (warm plate temperature) for melting from below, progressed. The constant temperature was found to depend on T(h) (warm plate temperature) for melting from below, but had a weaker dependence for melting from above. The heat flux to the melting surface increased linearly with T(h) for melting from below, but had a weaker dependence for meiting from above. Non-dimensional mean temperature profiles of the water layer were found to be in good agreement with those by Adrian for melting from above. In the case of melting from below, the mean temperature profile also fell into a single line with a somewhat higher value in the convection layer.

MP 1312

SNOW STUDIES ASSOCIATED WITH THE SIDEWAYS MOVE OF DYE-3.
Tobiasson, W., Eastern Snow Conference, 36th. Pro-

ceedings, Alexandria Bay, New York, 1979, p.117-34-4210

STRENGTH, BEARING STRENGTH, FOUNDATIONS, STRESSES, SNOW STABILITY, SNOW SURVEYS.

STABILITY, SNOW SURVEYS.

In 1977, DEW Line station DYE-3 on the Greenland Ice Cap was moved sideways 210 ft (64 m) onto a new undistorted foundation. When this life extension concept was proposed, abrupt failure of the supporting snow was a major concern. Snow samples were obtained and strength tested at CRREL to determine the chance of an abrupt failure of the supporting snow. Model studies were also performed to determine the bearing capacity of the snow, and predictions were made of foundation settlement during the move. The results indicated that the move could be accomplished safely.

MP 1313

REMOVAL OF VOLATILE TRACE ORGANICS FROM WASTEWATER BY OVERLAND FLOW LAND TREATMENT.

Jenkins, T.F., et al. 1980, A15(3), p.211-224, 14 refs. Leggett, D.C., Martel, C.J. 34-4200

WASTE TREATMENT, WATER TREATMENT, WASTE DISPOSAL

WASTE DISPOSAL.

A prototype overland flow land treatment system was studied to determine its effectiveness in reducing the levels of volatile trace organics in municipal wastewater.

Chlorinated primary wastewater water collected from the surface at various points downstope and runoff were analyzed by GC.MS, using a purge and trap sampler. Results indicated that efficient removal of a number of volatile substances including chloroform and toluene can be achieved by this method of treatment Loss of these substances was found to follow first order kinetics. The observed behavior is consistent with a volatilization process. ration process

WORKSHOP ON ENVIRONMENTAL PROTEC-TION OF PERMAFROST TERRAIN.

Brown, J., et al. Symmer 1980, 12(2), p.30-36, 8 refs. Hemming, J.E. 34.4198

PERMAFROST PRESERVATION. MENTAL PROTECTION, MEETINGS, THER-MAL EFFECTS, SOIL EROSION, ROUTE SUR-VEYS, SITE SURVEYS, DESIGN CRITERIA.

BREAK-UP OF THE YUKON RIVER AT THE

HAUL ROAD BRIDGE: 1979. Stephens, C.A., et al, Fairbanks, University of Alaska, Sep. 1979, 22p. + Figs., 5 refs. Report of field activi-

Hanscom, J.T., Osterkamp, T.E.

34-4193
RIVER ICE, ICE BREAKUP, ICE COVER THICKNESS, ICE FLOES, ICE ELECTRICAL PROPERTIES, WATER TEMPERATURE, ELECTRICAL
RESISTIVITY, VELOCITY, UNITED STATES—
ALASKA—YUKON RIVER.

MP 1316 MATERIALS AVAILABILITY STUDY OF THE DICKEY-LINCOLN DAM SITE.

Merry, C.J., et al, Case studies of applied advanced data collection and management, American Society of Civil Engineers, 1980, p.158-170, Also presented at the 12th International Symposium on Remote Sensing of Environment, Manila, Philippines, April 20-26,

McKim, H.L., Blackey, E.A.

35-153

EARTH DAMS, SITE SURVEYS, GEOLOGIC STRUCTURES, REMOTE SENSING, CONSTRUCTION MATERIALS, LAKES, TOPO-GRAPHIC FEATURES, MAPPING.

MP 1317 MP 1317

BREAK-UP DATES FOR THE YUKON RIVER;

PT.1. RAMPART TO WHITEHORSE, 1896-1978.

Stephens, C.A., et al, Fairbanks, University of Alaska,
Geophysical Institute, Apr. 1979, c50 leaves, 10 refs.
Fountain, A.G., Osterkamp, T.E.

35-133 ICE BREAKUP, ICE DETERIORATION, ICE CONDITIONS, ICE NAVIGATION, STATISTICAL ANALYSIS, UNITED STATES—ALASKA—YUKON RIVER.

MP 1312 BREAK-UP DATES FOR THE YUKON RIVER:

FT.2. ALAKANUK TO TANANA, 1883-1978.
Stephens, C.A., et al, Fairbanks, University of Alaska,
Geophysical Institute, May 1979, c50 leaves, 8 refs. in, A.G., Osterkamp, T.E.

35.134

ANALYSIS, ICE BREAKUP, STATISTICAL ANALYSIS, ICE NAVIGATION, ICE CONDITIONS, UNITED STATES—ALASKA—YUKON RIVER. MP 1319

ICE SHEET INTERNAL RADIO-ECHO RE-FLECTIONS AND ASSOCIATED PHYSICAL PROPERTY CHANGES WITH DEPTH.

Ackley, S.F., et al, Sep. 10, 1979, 84(B10), p.5675-5680, 13 refs.

Keliher, T.E.

ICE SHEETS, ICE CORES, RADIO ECHO SOUNDINGS, ICE PHYSICS, ANTARCTICA— FOLGER, CAPE.

FOLGER, CAPE.

In this paper, the measured physical properties of core to bedrock taken at Cape Folger, East Antarctica, are used to compute a depth-reflection coefficient profile for comparison with the observed radio-echo reflections. The measurements available on physical properties are density variations, bubble size and shape changes, and crystal fabric variations. In calculations to differentiate the effects of the physical peoperties, it appears that density variations account for the primary contributions to the calculated delectric property changes corresponding to the highest observed reflection coefficients. However, bubble changes alone can also account for reasonable, though lower, reflection coefficients at the depths corresponding to observed reflections. Crystal fabric variations correspondence between the depths of the bubble shape changes (which are definitely deformational features) and the depths of the density variations, and between both of these and the radio-echo layers, indicates that deformational recasts in the ice sheet's history are represented by the variations in physical properties and associated radio-echo records. (Auth. mod.)

MP 1326

MP 1326

"PACK ICE AND ICEBERGS"—REPORT TO POAC 19 ON PROBLEMS OF THE SEASONAL SEA ICE ZONE: AN OVERVIEW.
Weeks, W.F., et al. International Conference on Port

and Ocean Engineering Under Arctic Conditions, 5th, Trondheim, Norway, Aug. 13-18, 1979 Proceed-ings, Vol.3, Trondheim, University, 1979, p. 320-337 Denner, W.W., Paquette, R.G. 35-178

PACKICE, ICEBERGS, SEA ICE DISTRIBUTION. ICE CONDITIONS, ICE PHYSICS, REMOTE SENSING, RESEARCH PROJECTS, SEASONAL VARIATIONS, SEA WATER.

This paper reports the results of the Seasonal Sea Ice Zone (SSIZ) Workshop, held February 26, 1979 in Monterey, California. The purpose of the workshop was to summarize the existing knowledge of the SSIZ, to identify significant problem areas, and discuss approaches to finding solutions. The purpose of the report is to make the participants of POAC 79 ware of the important research problems of the SSIZ identified at the Workshop.

MP 1321 PROCEEDINGS OF THE SPECIALTY CONFERENCE ON COMPUTER AND PHYSICAL MODELING IN HYDRAULIC ENGINEERING.

Ashton, G.D., ed, New York, American Society of Civil Engineers, 1980, 492p., Refs. passim. For selected paper see 34-4161.

HYDRAULICS, ENGINEERING, COMPUTER APPLICATIONS, ICE PHYSICS, MODELS,

MP 1322 REVIEW OF BUCKLING ANALYSES OF ICE

Sodhi, D.S., et al, June 1980, SR 80-26, p.131-146, ADA-089 674, 14 refs. Nevel, D.E.

35.511

ICE SHEETS, ICE LOADS, ICE PRESSURE, ICE STRENGTH, ANALYSIS (MATHEMATICS), PLATES.

PLATES.

A review of the buckling analyses of floating ice sheets is presented. The theory used is that of a beam or plate on an elastic foundation. For beams, the results for all possible boundary conditions are presented and discussed. For plates, results of numerical solutions for a semi-infinite plate loaded over part of its boundary are presented and discussed. One solution is presented for an infinite plate loaded radially at a hole in the plate. In addition, results for wedge-shaped beams and plates are presented and discussed. Wedge-shaped ice sheets frequently occur due to previous cracking in the ice. MP 1323

INVESTIGATIONS OF SEA ICE ANISOTROPY, ELECTROMAGNETIC PROPERTIES, STRENGTH AND UNDER-ICE CURRENT ORIENTATION.

Kovacs, A., et al, May 1980, No.80-5, p.109-153, 16 refe

Morey, R.M. 35-550

35-30 SEA ICE, ANISOTROPY, ELECTROMAGNETIC PROPERTIES, ICE STRENGTH, OCEAN CUR-RENTS, SUBGLACIAL OBSERVATIONS, REMOTE SENSING, ICE PHYSICS, ICE COVER THICKNESS, ICE WATER INTERFACE, ICE CRYSTAL STRUCTURE.

MP 1324 HF TO VHF RADIO FREQUENCY POLARIZA-TION STUDIES IN SEA ICE AT PT. BARROW,

Arcone, S.A., et al, May 1980, No.80-5, p.225-245, 8 refs

Delaney, A.J. 35-553

SEA ICE. FAST ICE, POLARIZATION (WAVES), ANISOTROPY, ICE OPTICS, ICE COVER THICK-NESS, ELECTROMAGNETIC PROPERTIES.

NESS, ELECTROMAGNETIC PROPERTIES. The frequency dependence of the polarization-irotation properties of fast ice upon radiowaves in the HF-VHF range were studied at Pt. Bartow, Alaska, in the early spring 1979. Five sites were investigated at frequencies betwee. 10 and 173 MHz and at each site cores were taken and then physical properties measured. The polarization was studied with a pair of crossed dipole antennas, one a transmitter, the other a receiver, both of which were rotated simultaneously as a finel unit. The recording was desired to a receiver. the other a receiver, both of which were rotated simultaneously as a fixed unit. This procedure was designed to produce a four-lobe closerleaf pattern with maximum coupling occurring when the antennas were aligned at 45 deg to the coasis direction. The results showed strongest polarization between about 35 and 65 MHz. Above this band the high deconductivity of the sea ice which was measured accounts for the lack of cross coupling, but it is not yet understood why the data was so create below this band. Experimental difficulties are also discussed.

MP 1325 MODELING OF ANISOTROPIC ELECTRO-MAGNETIC REFLECTION FROM SEA ICE. Golden, K.M., et al, May 1980, No.80-5, p 247-294,

Ackley, S.F. 35-554

35-574
SEA ICE, BRINES, ANISOTROPY, ELECTROMAGNETIC PROPERTIES, ICE OPTICS, ICE
WATER INTERFACE, DIELECTRIC PROPERTIES, ICE STRUCTURE, POLARIZATION
(WAVES), MATHEMATICAL MODELS

The contribution of brine layers to observed reflective amsotropy of sea see at 100 MHz is quantitatively assessed. The sea see is considered to be a stratified, inhomogeneous, anisotropic diefective consisting of pure we containing ordered

arrays of conducting inclusions (brine layers). Below the transition zone, the ice is assumed to have constant azimuthal c-axis orientation within the horizontal plane, so the orientation of brine layers is unaform. The brine layers are also assumed to become increasingly well-defined with depth, since adjacent brine increasing temperature. A theoretical explanation for observed reflective anisotropy is proposed in terms of anisotropy entertain anisotropy and brine layer geometry are linked to anisotropy in the complex dielectric constant of sea ice. Subsequently, a numerical method of approximating the reflected power of a plane wave pulse incident on a slab of sea ice is presented and used to show the contribution of the above effects to the observed reflective anisotropy.

MP 1326 POINT SOURCE BUBBLER SYSTEMS TO SUP-

PRESS ICE. Ashton, G.D., Nov. 1979, 1(2), p.93-100, For another version see 33-4224. 8 refs.

J3-695 ICE REMOVAL, BUBBLING, ICE MELTING, HEAT TRANSFER, ICE COVER THICKNESS, AIR TEMPERATURE, WATER TEMPERATURE, MATHEMATICAL MODELS.

MATHEMATICAL MODELS.
An analysis of a point source bubbler system used to induce local melting of an ice cover is presented. The analysis uses empirical results of bubbler plume experiments and impingement heat transfer results to determine the rate of melting at the underside of an ice cover. Through a simple energy budget analysis of the ice cover, the melting of the ice cover and resulting extent of open water are determined as a function of air temperatures, depth and air discharge of the source, and water temperature. The analysis leads to a numerical simulation and an example simulation is presented.

MP 1327 PREPARATION OF POLYCRYSTALLINE ICE SPECIMENS FOR LABORATORY EXPERI-MENTS

Cole, D.M., Nov. 1979, 1(2), p.153-159, 10 refs.

ICE CRYSTALS, ICE SAMPLING, ICE STRUC-TURE, LABORATORY TECHNIQUES, ICE ME-CHANICS, POROSITY, BUBBLES.

MP 1328 MECHANICAL PROPERTIES OF POLYCRYS-TALLINE ICE: AN ASSESSMENT OF CURRENT KNOWLEDGE AND PRIORITIES FOR RE-SEARCH

Hooke, R.L., et al, Aug. 1980, 3(4), p.263-275, For another version see 33-3545.
Mellor, M.

ICE CRYSTALS, ICE MECHANICS, ICE CREEP, ICE DEFORMATION, STRAIN TESTS, STRESS STRAIN DIAGRAMS, ICE STRENGTH.

SHIP RESISTANCE IN THICK BRASH ICE. Mellor, M., Aug. 1980, 3(4), p.305-321, 8 refs.

ICE MECHANICS, ICE PRESSURE, SHIPS, IMPACT STRENGTH, ICE FRICTION, METAL ICE FRICTION, STRESSES, ICE NAVIGATION.

MP 1330 LOW TEMPERATURE PHASE CHANGES IN MONTMORILLONITE AND NONTRONITE AT HIGH WATER CONTENTS AND HIGH SALT CONTENTS.

Anderson, D.M., et al. May 1980, 3(2/3), p.139-144, & refs.

Tice. A.R.

UNFROZEN WATER CONTENT. SALINITY.
TEMPERATURE EFFECTS, PHASE TRANSFOR-MATIONS, SOIL FREEZING, CLAYS, IONS, LOW TEMPERATURE TESTS.

Prior work has revealed the existence of one or more low temperature phase changes in clay water systems in the temperature range 200C to arout 500C. The number and the temperatures at which these phase changes appear seems to be associated with the type of exchangable 1001(s) and the number and nature of individual water domains present. In this paper, we report the results of low temperature differential calorimetry on monimorphonic and nontrosite clays at high water and high salt enotests. The presence of electrolytes at high concentration is shown to have a very marked effect. The low temperature phase changes are completely absent at high electrolyte concentrations in these clay water systems. The presence of electrolytes also was observed to have a distinctive effect on the shape of the initial freezing peak associated with see segregation. Prior work has revealed the existence of one or more lo

MP 1331 FROST HEAVE IN AN INSTRUMEATED SOIL COLUMN.

Berg, R.L., et al, May 1980, 3(2/3), p.211-221, 4 refs. Ingersoll, J., Guymon, G.L.

35-737
FROST HEAVE, SOIL WATER, UNFROZEN WATER CONTENT, SOIL FREEZING, FROST PENETRATION, ICE FORMATION, TENSILE PROPERTIES, MEASURING INSTRUMENTS, TESTS.

MP 1332

SUMMARY OF THE ADSORPTION FORCE THEORY OF FROST HEAVING. Takagi, S., May 1980, 3(2/3), p.233-236, 5 refs.

FROST HEAVE, ADSORPTION, SOIL PRESSURE, SOIL WATER MIGRATION, FREEZING POINTS, WATER FILMS, THEROIES.

MP 1333

ONE-DIMENSIONAL FROST HEAVE MODEL BASED UPON SIMULTANEOUS HEAT AND WATER FLUX.

Guymon, G.L., et al, May 1980, 3(2/3), p.253-262, 23

Hromadka, T.V., II, Berg, R.L

FROST HEAVE, HEAT TRANSFER, SOIL WATER MIGRATION, SOIL FREEZING, MATH-EMATICAL MODELS, HEAT FLUX.

MP 1334

ADSORPTION FORCE THEORY OF FROST HEAVING.

Takagi, S., May 1980, 3(1), p.57-81, Refs. p.73-76.

35-819
FROST HEAVE, ADSORPTION, SOIL WATER MIGRATION, SOIL FREEZING, HEAT TRANSFER, STRESSES, WATER FILMS, THEORIES, ANALYSIS (MATHEMATICS).

MODELING OF ICE IN RIVERS.
Ashton, G.D., Modeling of rivers. Fdited by H.W.
Shen, New York, John Wiley and Sons, 1979, p.14/1-14/26, Refs. p.14/22-14/26. 35-1127

RIVER ICE, ICE FORMATION, ICE BREAKUP, ICE LOADS, ICE JAMS, FRAZIL ICE, ICE FLOES, MODELS.

MP 1336

SEA ICE ON BOTTOM OF ROSS ICE SHELF. Zotikov, I.A., et al, Oct 1979, 14(5), p.65-66, 6 refs. Zagorodnov, V.S., Rajkovskii, IU.V.

SEA ICE, ICE STRUCTURE, BOTTOM ICE, AN-TARCTICA—ROSS ICE SHELF.

The authors describ the structure of the ice of Ross Ice Shelf as it appeared in a J-9 core. Comments are given on an unusual boundary layer showing in the core and conclusions and estimates on growth rate are made

MP 1337 CORE DRILLING THROUGH ROSS ICE SHELF.

Zotikov, I.A., et al, Oct. 1979, 14(5), p.63-64, 2 refs Zagorodnov, V.S., Raĭkovskiĭ, IU.V. 35-651

33-031 ICE SHELVES, ICE CORING DRILLS, DRILL-ING, ANTARCTICA—ROSS ICE SHELF.
The ice drill and ice drilling methods and fluids used to pull a core from the Ross Ice Shelf are described and a brief analysis of the core is made

SUBSURFACE MEASUREMENTS OF MCMUR-DO ICE SHELF.

Gow, A.J., et al, Oct. 1979, 14(5), p.79-80, 2 refs. Kovacs, A 35-659

ICE CORES, BRINES, ICE COMPOSITION, ANTARCTICA—MCMLRDO SOUND

Study of brine content of sea are at McMurdo and its physical and chemical relationships to the ice and sea water was continued. Another continuing study concerns radar profiling up glacier from the exposed contact point of sea ice with the ice of Koettlitz Glacier.

MP 1339 DRIFTING BUOY MEASUREMENTS ON WED-

DELL SEA PACK ICE. Ackley, S.F., Oct. 1979, 14(5), p.106-108, 7 refs

SEA ICE, DRIFT, TEMPERATURE MEASURE-

The observational techniques of placing the buoys in the Wedd II Sea are described, the drift record and the temperature measurement record are shown, and a preliminary assessment and interpretation of the data received is given.

TURBULENT HEAT FLUX FROM ARCTIC LEADS.

Andreas, E.L., et al, Aug. 1979, 17(1), p.57-91, 50 refs. Paulson, C.A., Williams, R.M., Lindsay, R.W., Businger. J.A.

SEA ICE, HEAT TRANSFER, POLYNYAS, TUR-BULENT EXCHANGE.

MP 1341

PARTICULAR SOLUTIONS TO THE PROBLEM OF HORIZONTAL FLOW OF WATER AND AIR THROUGH POROUS MEDIA NEAR A WET-TING FRONT.

Nakano, Y., June 1980, Vol.3, p.81-85, 9 refs.

POROUS MATERIALS, WATER FLOW, AIR FLOW, BOUNDARY VALUE PROBLEMS, WET-TABILITY, SOIL WATER MIGRATION, INFIL-TRATION, ANALYSIS (MATHEMATICS).

MP 1342 PARTICULAR SOLUTIONS TO THE PROBLEM OF VERTICAL FLOW OF WATER AND AIR THROUGH POROUS MEDIA NEAR A WATER TABLE.

Nakano, Y., Sep. 1980, Vol.3, p.124-133, 12 refs 35-845

POROUS MATERIALS, ANALYSIS (MATH-EMATICS), WATER FLOW, AIR FLOW, WATER TABLE, BOUNDARY VALUE PROBLEMS, SOIL WATER MIGRATION, INFILTRATION.

THEORY AND NUMERICAL ANALYSIS OF MOVING BOUNDARY PROBLEMS IN THE HYDRO-DYNAMICS OF POROUS MEDIA. Nakano, Y., Feb. 1978, 14(1), p.125-134, 14 refs.

POROUS MATERIALS, HYDRODYNAMICS, BOUNDARY VALUE PROBLEMS, SOIL WATER MIGRATION, WATER FLOW, ANALYSIS (MATHEMATICS), THEORIES.

MP 1344

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, PV., et al, Environmental assessment of the Alaskan continental shelf, Vol.2. Principal investiga-tors' reports April-December 1979. Boulder, Colora-do, Outer Continental Shelf Environmental Assessment Program, March 1980, p 103-110. Chamberlain, E.J.

SUBSEA PERMAFROST, PERMAFROST DISTRIBUTION, DRILL CORE ANALYSIS, SEISMIC SURVEYS, BOTTOM SEDIMENTS, ENGINEER-ING. MAPPING.

MP 1345

SOVIET CONSTRUCTION UNDER DIFFICULT CLIMATIC CONDITIONS

Assur, A., Soviet housing and urban design. Edited by S.A. Grant. U.S. Dept. of Housing and Urban Development, Sep. 1980, p.47-53.

COLD WEATHER CONSTRUCTION, PERMA-FROST BENEATH STRUCTURES, PREFABRI-CATION, STANDARDS, HOUSES.

PERMAFROST BENEATH THE BEAUFORT SEA: NEAR PRUDHOE BAY, ALASKA.

Sellmann, P.V., et al, Mar. 1980, 102(1), p. 35-48, For the same paper from another source see 33-3864. refs.

Chamberlain, E.J. 35-1105

SUBSEA PERMAFROST, OFFSHORE DRILL-ING, PROBES, PENETRATION TESTS, BOTTOM SEDIMENT, OCEAN BOTTOM.

MP 1347

IMPACT FUSE PERFORMANCE IN SNOW (INITIAL EVALUATION OF A NEW TEST TECHNIQUE).

Aitken, G.W., et al, Army Science Conference, 12th, West Point, N.Y., U.S. Military Academy, June 17-20, 1980. Proceedings, Vol.1, Washington, D.C., Department of the Army, July 21, 1980, p.31-45, ADA-090 350, 8 refs. Richmond, P.W., Albert, D.G.

SNOW COVER, SNOW LOADS, EXPLOSION EFFECTS, IMPACT STRENGTH, PROJECTILE PENETRATION, VELOCITY, TESTS.

MP 1348 EVALUATION OF ICE-COVERED WATER CROSSINGS.

Dean, A.M., Jr., Army Science Conference, 12th, West Point, N.Y., U.S. Military Academy, June 17-20, 1980. Proceedings, Vol.1, Washington, D.C., Department of the Army, July 21, 1980, p.443-453, ADA-090 350, 11 refs. 35-1587

ICE CROSSINGS, ICE COVER STRENGTH, BEARING STRENGTH, FLOATING ICE, ICE COVER THICKNESS, MEASURING INSTRU-

MP 1349
LIQUID DISTRIBUTION AND THE DIELEC TRIC CONSTANT OF WET SNOW.
Colbeck, S.C., Workshop on the Microwave Regiote Sensing of Snowpack Properties, Fort Collins, Colora-do May 20.22, 1980. Proceedings. Edited by A. do, May 20-22, 1980. Proceedings. Edited by A. Rango. NASA conference publication 2153, Washington, D.C., NASA, Scientific and Technical Information Office, Oct. 1980, p 21-39, 15 refs. 35-1735

WET DIELECTRIC PROPERTIES, PERMEABILITY, LIQUID SOLID INTERFACES, SNOW WATER CONTENT, SNOW ELECTRI-CAL PROPERTIES, SNOW DENSITY, SNOW COVER STRUCTURE, WATER FLOW, POROSI-TY, ANALYSIS (MATHEMATICS).

TY, ANALYSIS (MATHEMATICS).

The mixing theory of Polder and Van Santen is revised for application to three cases of wet snow. The dielectric constant is calculated for a range of liquid contents and porosities. These calculated values compare favorably with experimental data for the two cases in which data are available. The application to a snow cover with a heterogeneous distribution of liquid is discussed. The possibility of applying this theory to calculate the imaginary part of the dielectric constant, must be explored further. constant must be explored further.

ROAD AND ITS ENVIRONMENT.

Brown, J., Sep. 1980, CR 80-19, p.3-52, ADA-094 35-1760

35-1/69
ROADS, CONSTRUCTION, ENVIRONMENTS, PIPELINES, PERMAFROST, CLIMATE, VEGETATION, GEOLOGY, GROUND ICE, UNITED STATES—ALASKA.

ROAD PERFORMANCE AND ASSOCIATED INVESTIGATIONS.

Berg, R L, Sep 1980, CR 80-19, p.53-100, ADA-094 497 35-1770

ROADBEDS, CONSTRUCTION, PERMAFROST BENEATH ROADS, ENGINEERING, SEASON-AL FREEZE THAW, THAW DEPTH, ROAD MAINTENANCE, DRAINAGE, PIPELINES, AC-TIVE LAYER.

DISTRIBUTION AND PROPERTIES OF ROAD DUST ALONG THE NORTHERN PORTION OF THE HAUL ROAD.

Everett, K.R., Sep. 1980, CR 80-19, p 101-128, ADA-094 497

DUST, SEASONAL VARIATIONS, ROADS, TUNDRA, VEGETATION, ENVIRONMENTAL IMPACT, WIND FACTORS

REVEGETATION AND RESTORATION INVES-TIGATIONS.

Johnson, L A, Sep 1980, CR 80-19, p 129-150, ADA-

REVEGETATION, ROADS, CONSTRUCTION, SOIL EROSION, PIPELINES.

ANALYSIS OF NON-STEADY PLASTIC SHOCK WAVES IN SNOW.

Brown, R.L., 1980, 25(92), p.279-287, 9 refs.

35-1822 SNOW MECHANICS, SHOCK WAVES, WAVE PROPAGATION, AVALANCHE TRIGGERING, EXPLOSION EFFECTS, SNOW DENSITY, PLAS-TIC PROPERTIES, ATTENUATION, PRESSURE,

ARCTIC ECOSYSTEM: THE COASTAL TUNDRA

AT BARROW, ALASKA.

Brown, J., ed, US/IBP synthesis series, No.12,
Stroudsburg, Pa., Dowden, Hutchinson and Ross, Inc., 1980, 571p., Refs. p.483-544. For individual chapters see 35-1930 through 35-1941.
Miller, P.C., ed, Tieszen, L.L., ed, Bunnell, F.L., ed.

ECOSYSTEMS, BIOMASS, NUTRI-TUNDRA. ENT CYCLE, SOIL MICROBIOLOGY, ORGANIC SOILS, ANIMALS, CLIMATIC FACTORS, VEGE-TATION, UNITED STATES—ALASKA—BAR-

COASTAL TUNDRA AT BARROW.

Brown, J., et al, Arctic ecosystem: the coastal tundra at Barrow, Alaska. Edited by J. Brown, P.C. Miller, L.L. Tieszen and F.L. Bunnell. Stroudsburg, Pa., Dowden, Hutchinson and Ross., Inc., 1980, p.1-29. Everett, K.R., Webber, P.J., MacLean, S.F., Jr., Murray, D.F. 35-1930

TUNDRA, ECOSYSTEMS, ORGANIC SOILS, VEGETATION, CLIMATE, POLYGONAL TOPOGRAPHY, LAKES, ENVIRONMENTS.

MP 1357

ICE FOG SUPPRESSION IN ARCTIC COM-MUNITIES.

McFadden, T., U.S. Army Cold Regions Research and McFadden, 1, U.S. Army Cold Regions Research and Engineering Laboratory, SR 80-40, Building under cold climates and on permafrost, collection of papers from a U.S.-Soviet joint seminar, Leningrad, USSR, Dec. 1980, p.54-65, 18 refs.

35-1971

33-1971 ICE FOG, FOG DISPERSAL, CHEMICAL ICE PREVENTION, VISIBILITY, TEMPERATURE EFFECTS, FILMS, AIR TEMPERATURE.

MP 1358

DESIGN OF FOUNDATIONS IN AREAS OF SIGNIFICANT FROST PENETRATION.

Linell, K.A., et al, U.S. Army Cold Regions Research and Engineering Laboratory, SR 80-40, Building under cold climates and on permafrost; collection of papers from a U.S.-Soviet joint seminar, Leningrad, USSR, Dec. 1980, p.118-184, 48 refs.

Lobacz, E.F., Stevens, H.W.

35-1975

PERMAFROST BENEATH STRUCTURES, FOUNDATIONS, FREEZE THAW CYCLES, PER-MAFROST HYDROLOGY, PERMAFROST DIS-TRIBUTION, FROZEN GROUND STRENGTH, FROST PENETRATION, SOIL MECHANICS, HEAT TRANSFER, SLOPE PROTECTION, DE-

REGULATED SET CONCRETE FOR COLD WEATHER CONSTRUCTION.

Sayles, F.H., et al, U.S. Army Cold Regions Research and Engineering Laboratory, SR 80-40, Building under cold climates and on permafrost, collection of papers from U.S.-Soviet joint seminar, Leningrad, USSR, Dec. 1980, p.291-314, 8 refs.

Houston, B.J.

COLD WEATHER CONSTRUCTION, WINTER CONCRETING, CONCRETE STRENGTH, CON-CRETE HEATING, COMPRESSIVE PROPERTIES, CEMENTS, CONCRETE CURRING, CONCRETE FREEZING, COUNTERMEASURES, TEMPERATURE EFFECTS

MP 1360 EXCAVATION OF FROZEN MATERIALS.

Moore, H.E., et al, U.S. Army Cold Regions Research and Engineering Laboratory, SR 80-40, Building under cold climates and on permafrost; collection of papers from U.S.-Soviet joint seminar, Leningrad USSR, Dec. 1980, p.323-345, 14 refs. Sayles, F.H.

COLD WEATHER CONSTRUCTION, EXCAVA-TION, FROZEN GROUND STRENGTH, EARTH-WORK, CONSTRUCTION EQUIPMENT, MAINTENANCE, COLD WEATHER OPERA-TION, COLD WEATHER SURVIVAL, TEMPERA-TURE EFFECTS, FLOOD CONTROL

MP 1361

MOISTURE GAIN AND ITS THERMAL CONSE-OUENCE FOR COMMON ROOF INSULA-TIONS

V., et al, Conference on Roofing Technolo-19-20, 1979, Proceedings, [1980], p.4-Tobiagy, 5t. 16, 19

35-2053

ROOFS, THERMAL INSULATION, MOISTURE TRANSFER, WETTABILITY, THERMAL CONDUCTIVITY, TESTS.

DUCTIVITY, TESTS.

This paper describes a method for determining the rate of moisture gain and the decay in thermal resistance caused by moisture in common roof insulatiors. Information on the rate of moisture gain for various insulations is tabulated (Table III) and graphed (Figures 4 and 5) The rate of moisture gain varies significantly with insulation type and wetting test boundary conditions. Graphs are presented to define the decay in thermal resistance of insulation samples at increasing moisture contents (Figures 6-11). Moisture significantly reduces the thermal resistance of most roof insulations

MP 1362

REMOVAL OF ORGANICS BY OVERLAND

PLOW.
Martel, C.J., et al, Proceedings of the National Seminar on Overland Flow Technology for Municipal Wastewater, Dallas, Texas, Sep. 16-18, 1980, t1980, 9p., 11 refs.

Bouzoun, J.R., Jenkins, T.F.

35-2052

35-2052
WASTE TREATMENT, WATER TREATMENT, FLOODING, SEDIMENTATION, SEEPAGE, SOIL TEMPERATURE, SOIL CHEMISTRY, SLOPE ORIENTATION, LAND RECLAMA-TION.

MP 1363 WASTE HEAT UTILIZATION THROUGH SOIL

METATING.
McFadden, T, et al, Oct 1980, EPS 3-WP-80-5, Symposium on Utilities Delivery in Northern Regions, 2nd, 1979. Proceedings, p.105-120, 13 refs.

Buska, J. 35-2112

WASTE DISPOSAL, HEAT SOURCES, HEAT RECOVERY, SOIL TEMPERATURE, HEATING, COOLING SYSTEMS, AGRICULTURE.

NONSTEADY ICE DRIFT IN THE STRAIT OF BELLE ISLE.

Sodhi, D.S., et al, Sea ice processes and models. Edited by R.S. Pritchard, Seattle, University of Washington Press, 1980, p.177-186, 9 refs.
Hibler, W.D., III.

35-2168

SEA ICE, DRIFT, ICE WATER INTERFACE, BOUNDARY LAYER, MATHEMATICAL MOD-ELS, VISCOUS FLOW.

ELS, VISCOUS FLOW.

The finite-element formulation of a linear viscous sea ice model has been presented. The temporal ice acceleration term is included in the momentum equations in order to compute nonsteady ice drift rates. This model is applied to the Strait of Belle Isle, where strong tidal streams move the pack ice back and forth. Using idealized sinusoidal variations of the tidal streams, it is found that the time lag between the water and the ice velocities is dependent upon the viscosity parameters. These results indicate that the ice is not drifting freely and the boundary layer near the shore affects the ice movement in the Strait. The viscosity parameters used in this study ar aliall in order to simulate a reasonable time lag between the ice and water velocities. The high shearing near the shores necessitates low viscosities proper simulation of the flow of pack ice in the Strait.

MP 1365

ICEBERG WATER: AN ASSESSMENT. Weeks, W.F., 1980, Vol.1, p.5-10, 27 refs. 35-2197

ICEBERGS, WATER SUPPLY, ICEBERG TOW-

INO.

This review of the idea of using icebergs as a source of fresh water starts with a historical survey covering the period up to April 1980 and stresses how the approach to the subject has changed with time.

Both the progress that have cuther just surfaced or never been adequately addressed are discussed. It is concluded that successful tows to Australia, clearly the most considerable proteins addressed and the problems. concluded that successful flows to Austrian, clearly the most consulty-reached potential delivery site, are possible if tecbergs can retain their structural integrity during tows in high seas and if schemes can be developed for docking and processing. Tows to sites in the northern hemisphere such as Saudi Arabia and California are significantly more difficult and will remain so until an effective and operationally-realistic method is developed for isolating the teckerg from the warm sea-water that will be encountered during part of the tow. Whatever the ultimate resolution of the iceberg-water proposal

may be, research stimulated by this idea has already resulted in a major improvement in our knowledge of the life and time of real icebergs in real oceans. (Auth.)

MP 1366

ACOUSTIC EMISSION RESPONSE OF SNOW. St. Lawrence, W.F., 1980, 26(94), p.209-216, 10 refs., In English with French and German summaries.

SNOW ACOUSTICS, AVALANCHE TRIGGER-ING, AVALANCHE FORMATION, STRESS STRAIN DIAGRAMS, RHEOLOGY, ULTRA-SONIC TESTS, MATHEMATICAL MODELS.

SUNIC TESTS, MATHEMATICAL MODELS.
In this work a model of the ultrasonic acoustic emission response in snow is developed. The model derived considers the acoustic emission response in snow as a function of stress and strain. It is suggested that the acoustic emission activity in snow is a quantitative indication of the creep rupture taking place in the material. The governing differential equation is developed; an example is then presented that considers the applicability of this equation to the release of certain types of avalanche.

MP 1367 PROPAGATION OF STRESS WAVES IN AL-PINE SNOW.

Brown, R.L., 1980, 26(94), p.235-243, 8 refs., In English with French and German summaries. 35-2366

35-2366 STRESSES, SHOCK WAVES, SNOW DENSITY, WAVE PROPAGATION, SNOW PHYSICS, PRES-SURE, ANALYSIS (MATHEMATICS), ALPINE LANDSCAPES.

LANDSCAPES.

The propagation of pressure waves in low-density snow is investigated analytically to determine the variation of wave pressure and wave speed with density and frequency. The results show that, for pressure waves that produce finite volumetric deformations, both pressure jump across the wave and wave-speed increase with initial density and final density the pressure jump was also found to increase with the wave frequency if other parameters were held constant, although the dependence on frequency is not as strong as the dependence on the initial and final densities. The relationship between pressure jump and frequency implies that high-frequency waves would tend to dissipate more quickly than lower-frequency waves, although like pre jurc, the attenuation rate would not be strongly frequency dependent.

MP 1368 THERMODYNAMICS OF SNOW METAMOR-PHISM DUE TO VARIATIONS IN CURVA-

Colbeck, S.C., 1980, 26(94), p.291-301, 28 refs., In English with French and German summaries.

35-23/2
METAMORPHISM (SNOW), THERMODYNAM-ICS, SNOW THERMAL PROPERTIES, HEAT TRANSFER, VAPOR DIFFUSION, TEMPERA-TURE GRADIENTS, ANALYSIS (MATHEMAT-ICS), WET SNOW.

In the absence of imposed temperature gradients, the metamorphism of dry snow is dominated by the slow process of vapor diffusion between surfaces of different radii of curvature vapor diffusion between surfaces of different radii of curvature. This process is so slow in a seasonal snow cover (where temperatures normally change on the scale of hours or days) that vapor migration is usually dominated by the imposed temperat;—e gradient. Thus radius of curvature contributes to but does not control metamorphism except for short periods in very fresh snow. As opposed to dry snow, liquid-saturated snow (i.e. pore space filled by the melt) is metamorphosed by heat flow arising from relatively large temperature differences among the particles. Grain growth in liquid-saturated snow is rapid because of the large temperature differences at nearly constant liquid pressure. in hquid-saturated snow is rapid because of the large tempera-ture differences at nearly constant liquid pressure. In wet snow with low liquid content (2-5% by volume), grain growth is dominated by vapor diffusion (as in dry snow) so grain growth is much slower than under conditions of houid saturation

MP 1369 STUDY OF OCEANIC BOUNDARY-LAYER

CHARACTERISTICS INCLUDING INERTIAL OSCILLATION AT THREE DRIFTING STATIONS IN THE ARCTIC OCEAN.

McPhee, M.G., June 1980, 10(6), p.870-884, 22 refs. 35.1050

BOUNDARY LAYER, DRIFT, PACK ICE, OCEAN CURRENTS, OSCILLATIONS, WIND FACTORS, DRIFT STATIONS.

CONSTITUTIVE RELATION FOR THE DEFOR-

MATION OF SNOW. St. Lawrence, W F., et al, Jan. 1981, 4(1), p.3-14, 16

refs. Lang, T.E

35:2414 SNOW DEFORMATION, SNOW COVER STRUC-TURE, STRESS STRAIN DIAGRAMS, SNOW COMPRESSION, VELOCITY, SNOW ACOUS-TICS, ANALYSIS (MATHEMATICS)

In this paper a constitutive equation which describes the uniaxial deformation of snow is developed. The basic

assumption underlying this work is that the stress-strain response can be derived by considering the structure of the material. The equation which describes the plastic portion of the deformation is developed by considering the relationship between three fundamental variables: the mean specing between ince grains, the relatative velocity between grains, and the fraction of the total number of grains which participate in the deformation process. The mean distance between ice grains is determined by a stereological investigation of the snow structure, and the velocity component is found by empirically characterizing the relaxation of the snow. To determine the mobility of the ice grains acoustic emission data are used. An equation describing the pattern of acoustic emissions for constant rates of deformation is derived and applied to a number of tests. Combining the above variables produces a compressive and tensile constitutive equation which reflects the behavior of the snow under both uniaxial deformations. uniaxial deformations

MP 1371

CYCLIC LOADING AND FATIGUE IN ICE. Mellor, M., et al, Jan. 1981, 4(1), p.41-53, 4 refs. Cole, D.M.

35-2417

ICE CRYSTALS, DYNAMIC LOADS, ICE STRENGTH, STRESS STRAIN DIAGRAMS, FATIGUE (MATERIALS), ICE CREEP, TIME

FACTOR.

Isotropic polycrystalline ice was subjected to cyclic loading in uniaxial compression at -5C, with stress limits 0-2 and 0-3 MPa, and frequencies in the range 0.043 to 0.5 Hz. Stras-strain records showed hysteresis loops progressing along the strain axis at non-uniform retes. The effective secant modulus, which was about half the true Young's modulus, decreased during the course of a test. The elastic strain amplitude and the energy dissipated during a loading cycle both increased with increase of time and plastic strain amplitude and search as the second course which were identical in form to classical constant stress creep curves, with a small cyclic alternation of recoverable strain about the mean curve. The results of the tests suggest that maximum resistance under compressive cyclic loading occurs at an axial plastic strain of about 1%, which is essentially the same as the failure strain for ductile yielding under constant stress and under constant strain-rate.

MP 1372

COLD REGIONS SCIENCE AND TECHNOLOGY BIBLIOGRAPHY.

Cummings, N.H., Jan. 1981, 4(1), p.73-75. 35-2420

BIBLIOGRAPHIES, GLACIOLOGY, PERMA-FROST, HYDROLOGY, ENGINEERING GEOLOGY, METEOROLOGY.

MP 1373

COLD CLIMATE UTILITIES DELIVERY DE-SIGN MANUAL. Smith, D.W., et al, 1979, EPS 3-WP-79-2, c300 leaves,

Numerous refs. passim.

33-4406

MANUALS, UTILITIES, NATURAL RE-SOURCES, WATER SUPPLY, WASTE DISPOSAL, WATER TREATMENT, WATER PIPELINES, PIPELINE FREEZING, THERMAL INSULA-TION

MP 1374

PROCEEDINGS 1972 TUNDRA BIOME SYM-

International Biological Programme. Tundra Biome 1972, 211p., For selected papers see 31-2031 through 31-2049. Symposium held at Lake Wilderness Center, University of Washington 3-5 April, 1972. Brown, J., coord, Bowen, S., ed.

TUNDRA VEGETATION, TUNDRA SOILS, SOIL CHEMISTRY, DECOMPOSITION.

MP 1375

CO2 EXCHANGE IN THE ALASKAN ARCTIC TUNDRA: METEOROLOGICAL ASSESSMENT BY THE AERODYNAMIC METHOD.

Coyne, P.I., et al, 1972 Tundra Biome Symposium, Lake Wildern as Center, Univ. of Washington, July 1972. Proceedings, 1972, p.36-39, 4 refs.

31-2036

TUNDRA VEGETATION, TURBULENT EX-CHANGE, CARBON DIOXIDE.

MP 1376 COMPARATIVE INVESTIGATION OF PERI-ODIC TRENDS IN CARBOHYDRATE AND LIPID LEVELS IN ARCTIC AND ALPINE

PLANTS. McCown, B.H., et al, 1972 Tundra Biome Symposium, Lake Wilderness Center, Univ. of Washington, July 1972. Proceedings, 1972, p.40-45, 3 refs.

Tieszen, L.L.

31-2037 ARCTIC LANDSCAPES, CELL MORPHOLOGY, LIPIDS, CARBOHYDRATES.

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAPROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al, Environmental assessment of the Alaskan continental shelf. Vol. 12. Geology. Prin-cipal investigators' reports for the year ending March 1976, Boulder, Colorado, Environmental Research Laboratories, 1976, p.391-408, Includes preliminary bibliography of Soviet literature on subsea permafrost,

p.404-408. Berg, R.L., Brown, J., Blouin, S.E., Chamberlain, E.J., Iskandar, A., Ueda, H.T.

31-361

RESEARCH PROJECTS, OFFSHORE DRILLING, SUBSEA PERMAFROST, BEAUFORT SEA.

MP 1378

ANTARCTIC SEA ICE DYNAMICS AND ITS

POSSIBLE CLIMATIC EFFECTS.
Ackley, S.F., et al, Sep. 1976, No.33, p.53-76, 20 refs.
Keliher, T.E.

31-448

, ICE COVER EFFECT, CLIMATE, RNE PHOTOGRAPHY, PHOTOIN-SEA ICE. SPACEBORNE SPACEBORNE PHOTOGRAPHY, PHOTOIN-TERPRETATION, HEAT LOSS, MICROWAVES. Ice extent charts prepared from satellite images by the U.S. Naval Fleet Weather Facility and passive microwave emission data from the Nimbus V satellite were examined for the winters of 1973 and 1974 to determine the variation between the two years of the heat loss by the atmosphere because of variations in sea ice extent and concentration. The microwave data indicate that most of the ea within the ice edge is less than 80% ice covered even during the coldest part of the year, probably because of ocean currents, waves, and swell, and convergence and divergence in the atmospheric forcing fields. Since the winter heat and moisture transports from open water are about two orders of magnitude larger than from an equal area of sea ice, even small areas of open water within the ice edge can greatly affect the energy exchange. These n-w data are compared with the assumption of 100% ice cover within the ice edge and with previously assumed mean values for the total area covered by ice in calculating the heat lost by the atmosphere during the winter period in high southern latitudes. A rapid decrease in sea ice extent observed during the winter of 1973 is correlated with a nearly real-time adjustment by the atmosphere to the change in the heat lost caused by the removal of the ice. This example indicates that sea ice dynamics is influential not only in long-term climate, but in synoptic-scale weather patterns as well. TERPRETATION, HEAT LOSS, MICROWAVES.

MP 1379

MISGIVINGS ON ISOSTATIC IMBALANCE AS A MECHANISM FOR SEA ICE CRACKING. Ackley, S.F., et al, Sep. 1976, No.33, p.85-94, 12 refs. Hibler, W.D., III, Kugzruk, F.K.

31-450

SEA ICE, ICE CRACKS, ISOSTASY, ICE PHY-SICS, ICE DENSITY.

In the AIDIEX ice pack model the formation mechanisms for ice cracks are ignored because of the many processes by which cracks may form. The authors question this concept and particularly the mechanism of isostatic imbalance. They cite the Young's modulus used in the AIDIEX model as being not representative of sea ice and that beam experiments in static tests lead them to question the validity of a purely clastic analysis.

DYNAMICS OF NEAR-SHORE ICE.

Weeks, W.F., et al, Environmental assessment of the Alaskan continental shelf; Vol. 14, Ice. Principal Investigators' reports for the year ending March 1976, Boulder, Colorado, Environmental Research Laboratories, 1976, p.9-34, 16 refs. Includes appendix No. 1 by A. Kovacs and A.J. Gow, Some characteristics of grounded floebergs near Prudhoe Bay, Alaska. Kovacs, A., Gow, A.J. 31-628

FAST ICE, ICE MECHANICS, ICE FLOES, ICE ISLANDS, SEA ICE, DRIFT, RADAR ECHOES, BOTTOM ICE, ICEBERGS, BOTTOM TOPOGRAPHY, UNITED STATES—ALASKA—PRUDHOE

MP 1381

INVESTIGATION OF ICE ISLANDS IN BAB-BAGE BIGHT.

Kovacs, A., et al, Creare, Inc. Technical note 118, Hanover, New Hampshire, Creare, Inc., 1971, 46 leaves, 24 refs

Mellor, M.

SEA ICE, ICE ISLANDS, ICE STRUCTURE, SUB-GLACIAL OBSERVATIONS, ICE DENSITY, GROUNDED ICE.

RHEOLOGICAL IMPLICATIONS OF THE INTERNAL STRUCTURE AND CRYSTAL FABRICS OF THE WEST ANTARCTIC ICE SHEET AS REVEALED BY DEEP CORE DRILLING AT BYRD STATION. Gow, A.J., et al, Dec. 1976, 87(12), p.1665-1677. 51

refe

Williamson, T. 31-1071

ICE SHEETS, ICE CRYSTAL STRUCTURE, RHEOLOGY, ICE DEFORMATION, ANTARCTICA—BYRD STATION.

RHEOLOGY, ICE DEFORMATION, ANTARC-TICA—BYRD STATION.

Crystalline textures and fabrics of ice cores from the 2,164-m-thick ice sheet at Byrd Station, reveal the existence of an anisotropic ice sheet. A gradual but persistent increase in the c-axis preferred orientation of the ice crystals was observed between the surface and a depth of 1,200 m. This progressive growth of an oriented crystal fabric is accompanied by a twentyfold increase in crystal size between 56 and 500 m, followed by virtually no change in crystal size between 600 and 1,200 m depth. A broad vertical clustering of c axes develops by 1,200 m. Between 1,200 and 1,300 m, the structure transforms into a fine-grained mosaic of crystals with their basal glide planes now oriented substantially within the horizontal. This highly oriented fine-grained structure, which persists to 1,800 m depth, is compatible only with a strong horizontal shear deformation in this part of the ice sheet. Rapid transformation, accompanied also by the growth of very large crystals, is attributed to the overriding effect of relatively high temperatures in the bottom layers of old ice at Byrd Station rather than to a significant decrease in stress The zone of single-maximum fabrics between 1,200 and 1,800 m also contains numerous layers of volcanic dust which appear to be actively associated with shearing in the ice sheet. Some slipping of ice along the bed rock are also major contributors to the flow of the ice indicate that plastic deformation (intracrystalline glide) in the zone of strong single-maximum fabrics and movement of ice along discrete shear planes situated well above bed rock are also major contributors to the flow of the ice sheet. (Auth. mod.)

ECOLOGICAL AND ENVIRONMENTAL CONSEQUENCES OF OFF-ROAD TRAFFIC IN NORTHERN REGIONS.

Brown, J., Surface Protection Seminar, Anchorage, Alaska, Jan. 19-22, 1976. Proceedings. Edited by M.N. Evans, Anchorage, Alaska, Bureau of Land Management, Aug. 1976, p.40-53, 19 refs.

31-1088 PERMAFROST PRESERVATION, ARCTIC LANDSCAPES, TUNDRA, ALL TERRAIN VEHICLES, PROTECTION, ENVIRONMENTAL IM-PACT, REVEGETATION, HUMAN FACTORS, THAW DEPTH, SOIL TRAFFICABILITY, VEGETATION PROTECTION, DAMAGE, GROUND THAWING.

THAWING.

The consequences of off-road activities depend on when the activity occurs (summer vs. winter), the degree of impact, the nature and response of the underlying permafrost to the surface modification, and the rate at which the damaged environment will recover. Regulations based on a knowledge of the environmental variables and how they react to impact are required to minimize impact in these areas which are sensitive to human and natural perturbations. We should not underestimate the requirement for good environmental information and adequate resource mapping as first, necessary steps.

VEHICLE FOR THE FUTURE.

VEHICLE FOR THE FOLUKE.
Snughter, C.W., Surface Protection Seminar, Anchorage, Alaska, Jan. 19-22, 1976. Proceedings. Edited by M.N Evans, Anchorage, Alaska, Bureau of Land Management, Aug. 1976, p.272-279, 5 refs. 31-1111

January and the control of the contr tion, operator sensitivity, and access priorities also affect surface damage. More important than vehicle design and selection are the management decisions to be made concerning regulation of off-road travel.

CHEMISTRY OF INTERSTITIAL WATER FROM SUBSEA PERMAFROST, PRUDHOE BAY, ALASKA.

lakandar, I.K., et al, International Conference on Permafrost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p.92-98, With Russian and French summaries. 20 refs.
Osterkamp, T.E., Harrison, W.D.

WATER CHEMISTRY, SUBSEA PERMAFROST, INTERSTITIAL WATER.

MP 1386 ANTARCTIC SOIL STUDIES USING A SCAN-NING ELECTRON MICROSCOPE.

Kumai, M., et al, International Conference on Permarost, 3rd, Edmonton, Alberta, Canada, July 10-13, 1978. Proceedings. Vol.1, Ottawa, National Research Council of Canada, 1978, p. 106-112, With Russian and French summaries. 12 refs. Anderson, D.M., Ugolini, F.C. 22-3678

ELECTRON MICROSCOPY, CRYOGENIC SOILS, MORAINES, SOIL COMPOSITION, GRAIN SIZE, WEATHERING, ANTARCTICA— VICTORIA LAND.

The textures of moraine soils from southern Victoria Land were investigated, using a scanning electron microscope fitted with an energy dispersive X-ray analyzer. Electron micrographs of soil grains from lower Wright Valley showed sharpedges and smooth surfaces, indicating a low degree of mechanical and chemical weathering. The soil grains were 11% quartz and 4% magnetite Chlorides were found on 17% of the soil grains. By contrast, electron micrographs of soil grains from the Beacon Valley showed rounded grains indicating a high degree of mechanical and chemical weathering. The soil grains were 20% quartz. Rhombohedral contracts of SOM were found on 60% of the soil grains. The textures of morainic soils from southern Victoria Land ing The soil grains were 20% quartz. Rhombohedral cr, stals CaSO4 were found on 60% of the soil grains Chlorides were found on 30% of the soil grains Chlorides were found on 30% of the soil grains. Because of the high degree of weathering, it was concluded that the morainic soils from the Beacon Valley are much older than those of the lower Wright Valley.

COST OF LAND TREATMENT SYSTEMS. Reed, S.C., et al, Sep. 1979, EPA-430/9-75-003, 135p., 45 refs.

Crites, R.W., Thomas, R.E., Hais, A.B. 35-2464

SEEPAGE, WASTE TREATMENT, SEWAGE TREATMENT, WATER TREATMENT, COST ANALYSIS, FLOW RATE, SURFACE DRAIN-AGE, LAND RECLAMATION.

Cost information for planning is presented for the major land treatment concepts including slow rate, rapid infiltration and overland flow. Cost categories include land, preapplication treatment, transmission, storage, land application, and recovery of renovated water.

MP 1388

MEASURING BUILDING R-VALUES FOR LARGE AREAS.

Flanders, S.N., et al, 1981, Vol.254, p.137-138. Marshall, S.J. 35-2463

BUILDINGS, WALLS, THERMAL REGIME, HEAT FLUX, SURFACE TEMPERATURE, TEM-PERATURE MEASUREMENT

A method is being developed for measuring the R-values of large areas of building envelopes. This is a summary of progress to date. Temperature extremes on the building surface are located with an infrared videocamera, the R-values at those locations determined with contact thermal sensors and R-values interpolated for all other locations from the thermosema. the thermograms

MP 1389

REALTH ASPECTS OF LAND TREATMENT.
Reed, S.C., Cincinnati, Oh., U.S. Environmental Protection Agency, 1979, 43p., Prepared for Seminar on Land Treatment of Municipal Wastewater Effluents, June 1979. 52 refs. 35-2493

WASTE TREATMENT, POLLUTION, HEALTH, WATER TREATMENT, LAND RESTORATION.

MP 1390

HAND-HELD INFRARED SYSTEMS FOR DE-TECTING ROOF MOISTURE.

Technics ROOF MOISTURE.

Tobiasson, W., et al, Symposium on Roofing Technology, Gaithersburg, Md., Sep 21-23, 1977. Proceedings, (1977), p.261-271, 4 refs.

Korhonen, C., Van den Berg, A.

MOOFS, MOISTURE DETECTION, MOISTURE METERS, INFRARED RECONNAISSANCE, THERMAL INSULATION.

LANDSAT DIGITAL ANALYSIS OF THE INI-TIAL RECOVERY OF BURNED TUNDRA AT KOKOLIK RIVER, ALASKA.
Hall, D.K., et al, 1980, No.10, p.263-272, 8 refs.
Ormsby, J.P., Johnson, L.A., Brown, J.

35-2462

TUNDRA, FIRES, ENVIRONMENTAL IMPACT, REMOTE SENSING, ANALYSIS (MATHEMATICS), LANDSAT, REVEGETATION.

MP 1392 LAND DISPOSAL: STATE OF THE ART.

Reed, S.C., National Symposium on Ultimate Disposal of Wastewaters and Their Residuals, Durham, N.C., April 26-27, 1973. Proceedings. Edited by F.E. McJunkin and P.A. Vesilind, Raleigh, North Carolina State University, 1973, p.229-261, 42 refs. 35-2469

WASTE DISPOSAL, WATER TREATMENT, EN-VIRONMENTAL PROTECTION, SEEPAGE, CLI-MATIC FACTORS, FLOW RATE, VEGETATION, AEROSOLS, HEALTH.

MP 1393

WINDOW PERFORMANCE IN EXTREME

Flanders, S.N., et al, Specialty Conference on the Northern Community, Scattle, Wa., Apr. 8-10, 1981. Proceedings. Edited by T.S. Vinson, New York, American Society of Civil Engineers, 1981, p.396-408, 2 refs.

Buska, J., Barrett, S. 35-2514

33-2314 WINDOWS, COLD WEATHER CONSTRUC-TION, WEATHERPROOFING, MOISTURE, CLI-MATIC FACTORS, COUNTERMEASURES.

Extreme cold causes heavy buildup of frost, ice and condensa-tion on many windows. It also increases the incentive for improving the airtightness of windows in Alaska to avoid moisture accumulation in homes and barracks. We base moisture accumulation in homes and barracks. We base our conclusions on a two-year study of Alaskan military bases that included recording humidity and temperature data, observing moisture accumulation on windows and measuring airtightness with a fan pressurization device Our study shows that tightening Alaskan windows to permit only 30% of the air leakage allowed to current American standards for window airtightness is economically attractive.

MP 1394

AQUACULTURE FOR WASTEWATER TREAT-MENT IN COLD CLIMATES. Reed, S.C., et al, Specialty Conference on the North-ern Community, Seattle, Wa., Apr. 8-10, 1981. Pro-ceedings. Edited by T.S. Vinson, New York, Ameri-can Society of Civil Engineers, 1981, p.482-492, 12

Bouzoun, J.R. 35-2519

WASTE TREATMENT, WATER TREATMENT, PLANTS (BOTANY).

PLANTS (BOTANY).

Aquaculture systems for wastewater treatment often include plants, finned fish, animals and microorganisms in various combinations in aquatic settings such as ponds, marshes, bogs and other forms of wetlands. Natural settings have often been used in the past but there is a trend toward constructed systems which permit more reliable management at higher rates of treatment. This paper evaluates the potential for application of aquaculture concepts for wastewater treatment in cold climates. Constructed wetlands and the enclosed high rate processes offer the most promise of the concepts considered. Systems based on plants are more efficient, require less area and are easier to control than concepts involving higher forms of animals.

MP 1308

MP 1395

WINTER AIR POLLUTION AT FAIRBANKS, ALASKA.

Coutts, H.J., et al, Specialty Conference on the Northern Community, Seattle, Wa., Apr. 8-10, 1981. Proceedings. Edited by T.S. Vinson, New York, American Society of Civil Engineers, 1981, p.512-528, 16 cefs.

Jenkins, T.F.

35-2522

J3-222 AIR POLLUTION, CHEMICAL ANALYSIS, EN-VIRONMENTAL IMPACT, MOTOR VEHICLES, HUMAN FACTORS, STANDARDS.

HUMAN FACTORS, STANDARDS.

Air quality measurements were made for both gases and particulates at several locations near Fairbanks, Alaska, during winter. The results indicated that carbon monoxide levels downtown frequently exceeded air quality standards and were significantly elevated at more rural locations up to 22 km from the downtown area. High levels were found to be associated with temperature inversions. Nitric oxide levels were measured and found to range from less than 50 to over 500 parts per billion (ppb) downtown. Levels of 1 to 68 ppb were measured in a more rural location. The major source of both CO and NO at Fairbanks was found to be auto exhaust. Levels of particulate lead in the downtown area were found to exceed Federal Standard for all 4 winter months. Lead levels at the more rural

site were only about one-tenth those of downtown and did not exceed standards

MP 1396

ICE FORCE MEASUREMENT ON THE YUKON RIVER BRIDGE.

McFadden, T., et al, Specialty Conference on the Northern Community, Seattle, Wa., Apr 8-10, 1981. Proceedings. Fdited by T.S. Vinson, New York, American Society of Civil Engineers, 1981, p.749-777,

Haynes, D., Burdick, J., Zarling, J. 35-2536

ICE BREAKUP, ICE PRESSURE, ICE LOADS, IM-PACT STRENGTH, BRIDGES, ICE COVER STRENGTH, LOADS (FORCES), ICE COVER THICKNESS, RADAR ECHOES.

The Alasian Projects Office of Cold Regions Research and Engineering Lauratory has been studying the forces imposed on the Yi kon River bridge by ice during breakup. The study inverved four consecutive breakups from 1977 thru 1950. Forces have been measured using load cells mounted on the front of the auraber 5 pier to intercept the ice as it strikes the pier. Accelerometers mounted on piers support 4 and 5 were used to measure the response of on the front of the number 5 pier to intercept the ice as it stitkes the pier. Accelerometers mounted on piers number 4 and 5 were used to measure the response of the pier to the ice impacts. Ce-libration procedures were employed to determine a transfer function which relates the accelerations to the arplied forces. Ice thicknesses were measured using stort pulse radar techniques. River ice damaged or destroyed the first generation load cell designs, but some useful data was obtained before failure. Radar techniques show some promise for the measurement of ice thicknesses during breakup

MP 1397

MP 1397
ANALYSIS OF VELOCITY PROFILES UNDER ICE IN SHALLOW STREAMS.
Calkins, D.J., et al, Workshop on Hydraulic Resistance of River Ice, Burlington, Ontario, Sep. 23-24, 1980.
Proceedings Edited by G Tsang and S Beltaos, Burlington, Ontario, National Water Research Institute, 1981, p.94-111, 6 refs.
Deck D.S. Martingen, C.P.

Deck D.S., Martinson, C.R. 35-2545

STREAM FLOW, ICE COVER EFFECT, FLOW RATE, SHEAR STRESS, SURFACE ROUGHNESS, ICE BOTTOM SURFACE, PROFILES.

MP 1398

MP 1398
HARNESSING FRAZIL ICE.
Perham, R.E., Workshop on Hydraulic Resistance of River Ice, Burlington, Ontario, Sep. 23-24, 1980.
Proceedings. Edited by G. Tsang and S. Beltaos. Burlington, Ontario, National Water Research Institute, 1981, p 227-237.
35-2554

FRAZIL ICE, ICE CONTROL, RIVER ICE, RIVER FLOW, FLOW RATE, HYDRODYNAMICS, ICE FORMATION.

FORMATION.

The techniques for analyzing velocity profiles should be carefully considered in shallow streams where the flow depth is less than 1 m. The two procedures, a) mean and maximum velocity determinations and b) intercept evaluation of log (depth)-velocity plots, yield different results for the various resistance coefficients and shear stress values. The mean-max-velocity method generally predicts higher values than the other and is recommended for shallow streams. The minimum distance from a boundary to the position of maximum velocity for a good velocity profile appears to be roughly 15 to 20 cm with a 5 cm diameter sensor

LAND TREATMENT OF WASTEWATERS FOR RURAL COMMUNITIES.

RORAL COMMONATIES.

Reed, S.C., et al, Rural Environmental Engineering Conference, Warren Vt., Sept. 26-28, 1973. Proceedings. Water pollution control in low density areas. Edited by W.J. Jewell, Hanover, N.H., University Press of New England, 1975, p.23-39, 7 refs Buzzell, T.D.

WASTE TREATMENT, WATER POLLUTION, SEEPAGE, SURFACE DRAINAGE, IRRIGATION, DESIGN CRITERIA, COST ANALYSIS

RATIONAL DESIGN OF OVERLAND FLOW SYSTEMS.

Martel, C.J., et al, National Conference on Environ-mental Engineering, New York, July 8-10, 1980. Proceedings, New York, American Society of Civil Engineers, 1980, p.114-121, 9 refs. Adrian, D.D., Jenkins, T.F., Peters, R.E.

WASTE TREATMENT, WATER TREATMENT, FLOODING, HYDRAULICS, GRASSES, SLOPES, RUNOFF, SEEPAGE, TIME FACTOR, DESIGN.

ENERGY AND COSTS FOR AGRICULTURAL REUSE OF WASTEWATER.

REUSE OF WASLEWAIER.
Sletten, R.S., et al, National Conference on Environmental Engineering, New York, July 8-10, 1980.
Proceedings, New York, American Society of Civil Engineers, 1980, p.339-346, 9 refs.
Reed, S.C., Middlebrooks, E.J.

WATER TREATMENT, WASTE TREATMENT, LAND RECLAMATION, SEEPAGE, AGRICUL-TURE, FLOODING, SANITARY ENGINEER-ING, COST ANALYSIS.

MP 1402 FORAGE GRASS GROWTH ON OVERLAND

PLOW SYSTEMS.
Palazzo, A.J., et al, National Conference on Environraiazzo, A.J., et al, National Conference on Environ-mental Engineering, New York, July 8-10, 1980. Proceedings, New York, American Society of Civil Engineers, 1980, p.347-354, 16 refs. Martel, C.J., Jenkins, T.F.

35-2573

WASTE TREATMENT, WATER TREATMENT, FLOODING, IRRIGATION, GRASSES, CHEMI-CAL COMPOSITION, LAND RECLAMATION, SLOPES, SANITARY ENGINEERING.

MP 1403 SPRAY APPLICATION OF WASTEWATER EF-FLUENT IN A COLD CLIMATE: PERFORM-ANCE EVALUATION OF A FULL-SCALE PLANT.

Cassell, E.A., et al, National Conference on Environmental Engineering, New York, July 8-10, 1980. Proceedings, New York, American Society of Civil Engineers, 1980, p.620-626, 7 refs.

Meals, D.W., Bouzoun, J.R., Martel, C.J., Bronson, W.A. Cassell, E.A., et al, National Conference on Environ-

WASTE TREATMENT, WATER TREATMENT, CHEMICAL COMPOSITION, LAND RECLAMA-TION, COLD WEATHER PERFORMANCE, HY-DROLOGY, SEASONAL VARIATIONS.

MP 1404 HEALTH ASPECTS OF WATER REUSE IN

REUSE IN REUSE IN REUSE IN Reed, S.C., Apr. 1979, 105(EE2), p.434-435, Discussion of a paper by J. Crook, Ibid., Aug. 1978, Proc. paper No. 13928. 35-2580

WASTE TREATMENT, WATER TREATMENT, WATER POLLUTION, BACTERIA, HEALTH, AEROSOLS, LAND RECLAMATION.

MP 1405 TUNDRA AND ANALOGOUS SOILS.

Everett, K.R., et al, Tundra ecosystems: a comparative analysis. Edited by L.C. Bliss, et al. International Biological Programme 25, Cambridge University, 1981, p.139-179, Refs. p.176-179.
Vasil'evskaia, V.D., Brown, J., Walker, B.D.

TUNDRA, SOIL FORMATION, GEOMOR-PHOLOGY, PERMAFROST, SEASONAL FREEZE THAW, VEGETATION, CLIMATIC FACTORS, ECOSYSTEMS, SOIL COMPOSITION, SOUTH SHETLAND ISLANDS, MACQUARIE IS-LAND, SOUTH GEORGIA.

LAND, SOUTH GEORGIA.

Properties of Arctic, sub-Arctic, sub-Antarctic, mountain and mantime tundra soils are described.

Climate, seasonal freeze thaw regime of tundra soils, soil composition, geomorphology and vegetation are discussed.

Data on soil profiles for the South Shetland Is. Macquarie 1 and South Georgia

MP 1406 MUNICIPAL SLUDGE MANAGEMENT: ENVI-RONMENTAL FACTORS.

Reed, S.C., ed, Oct. 1977, EPA 430/9-77-004, Var. p. 6 refs. 35-2715

SLUDGES, WASTE DISPOSAL, WASTE TREAT-MENT, WATER TREATMENT, LAND RECLA-MATION, ENVIRONMENTAL PROTECTION, BACTERIA, LEGISLATION, AGRICULTURE.

USE OF PILING IN FROZEN GROUND.

Crory, F.E., American Society of Civil Engineers National Convention, Session No. 3, Portland, Oregon, Apr. 14-18, 1980. Cold regions engineering, Portland, Oregon, 1980, 21 p., 24 refs.

35-2711
PILE DRIVING, FOUNDATIONS, FROZEN
GROUND STRENGTH, COLD WEATHER CONSTRUCTION, PERMAFROST DEPTH, PILE
LOAD TESTS, BEARING STRENGTH, FROST
HEAVE, HEAT TRANSFER.

MP 1408 ROOFS IN COLD REGIONS.

Tobiasson, W., American Society of Civil Engineers. National Convention, Session No. 3, Portland, Oregon, Apr. 14-18, 1980. Cold regions engineering, Portland, Oregon, 1980, 21p., 10 refs.

ROOFS, WATERPROOFING, COLD WEATHER CONSTRUCTION, INSULATION, MOISTURE, CLIMATIC FACTORS.

MP 1409 ANALYSIS OF WATER IN THE MARTIAN REGOLITH.

Anderson, D.M., et al, 1779, Vol.14, p.33-38, 9 refs. Tice, A.R. 35-2756

MARS (PLANET), SOIL WATER, ADSORPTION,

MARS (PLANET), SOIL WATER, ADSORPTION, WATER VAPOR, THERMODYNAMICS, SOIL MICROBIOLOGY, TEMPERATURE EFFECTS.

One of the scientific objectives of the Viking Mission to Mars was to accomplish an analysis of water in the Martian regolith The analytical scheme originally envisioned was severely compromised in the latter stages of the Lander instrument package design. The presence of a duncrust at one of the Lander sites is taken as possible evidence for the presence of hygroscopic minerals on Mars. The demonstrated presence of atmospheric water vapor and thermodynamic calculations lead to the belief that adsorbed water could provide a relatively favorable environment for endolitic organisms on Mars similar to types recently discovered in the dry antarctic deserts

MP 1410 ESTIMATION OF HEAT AND MASS FLUXES OVER ARCTIC LEADS.

Andreas, E.L., Dec. 1980, 108(12), p.2057-2063, 26 refs.

POLYNYAS, SEA ICE, HEAT TRANSFER, MASS TRANSFER, TURBULENT EXCHANGE, HEAT FLUX, ANALYSIS (MATHEMATICS).

FLUX, ANALYSIS (MATHEMATICS).

Recent work on the turbulent transfer of scalar quantities following a step increase in the surface value of the scalar is directly applicable to the problem of estimating heat and mass transfer from Arctic leads in winter. With the transfer relations, turbulent fluxes can be computed from standard meteorological observables; and from the Nusselt number equality, partitioning of the turbulent fluxes can be evaluated —in particular, the partitioning of the heat flux between sensible and latent components.

PILES IN PERMAFROST FOR BRIDGE FOUN-

Crory, F.E., et al, ASCE Structural Engineering Conference, Scattle, Washington, May 8-12, 1967. ference preprint 522, [1967], 41p., 6 refs.

35.2753

35-2753
PERMAFROST BENEATH RIVERS, PILE DRIVING, FOUNDATIONS, BRIDGES, PERMAFROST PRESERVATION, BEARING
STRENGTH, SETTLEMENT (STRUCTURAL),
SOIL TEMPERATURE, DESIGN CRITERIA,
FROST HEAVE, COUNTERMEASURES,

STREAMS.

This cooperative research study has focused considerable attention on the ground temperatures existing beneath and adjacent to streams in permafrost areas. An appreciation of the changes in the thaw area beneath the stream, both at the time of construction and for the life of the structure, is essential to proper string of the bridge foundation. Location of abutments and piers outside of the potential thaw zone of the stream, or penetration at the most advantageous points to depths sufficient to achieve the required bearing capacity, is essential.

The design of piles based on depth of embedment, affrect acregith or dynamic driving formulas in frozen soils is of title value if the permafrost condition is later destroyed. Emphasis must be placed on retaining the original permafrost conditions and providing for frost action.

UNFROZEN WATER CONTENTS OF SUBMA-RINE PERMAFROST DETERMINED BY NU-CLEAR MAGNETIC RESONANCE.

Tice, A.R., et al, International Symposium on Ground Freezing, 2nd, Trondheim, Norway, June 24-26, 1980. Preprints, Trondheim, University, Norwegian Institute of Technology, 1980, p.400-412, 10 refs. Anderson, D.M., Sterrett, K.F.

30-32 SUBSEA PERMAFROST, UNFROZEN WATER CONTENT, MELTING POINTS, NUCLEAR MAGNETIC RESONANCE, TEMPERATURE EFFECTS, TEMPERATURE MEASUREMENT, DRILL CORE ANALYSIS.

Prior work resulted in the development of techniques to measure the unfrozen water contents in frozen soils by nuclear magnetic resonance (NMR) It has been demonstrated that NMR is a promising new method for the determination of phase composition (the measurement of unfrozen water content as a function of temperature) which circumvents many of the limitations inherent in the adiabatic and isothermal calorimetric techniques. The NMR technique makes it possible, in a non-destructive, non-intrusive way, to explore hysteress by determining both cooling and warming curves. Corrections are made for dissolved paramagnetic impurities which have the effect of increasing the signal intensity at decreasing temperatures. The results demonstrate that NMR techniques can be effectively utilized both at and below the melting point of ice in frozen soils and that accurate melting points (freezing point depressions) can be determined. Prior work resulted in the development of techniques to determined.

MP 1413 COST-EFFECTIVE USE OF MUNICIPAL WAS-TEWATER TREATMENT PONDS.

Reed, S.C., et al, Session on Appropriate Technology in Water Supply and Waste Disposal at the ASCE National Convention, Chicago, Illinois, Oct. 16-20, 1978. ASCE preprint 3435, New York, American Society of Civil Engineers, 1979, p.177-200, 23 refs. Hais, A.B. 35-2751

WASTE TREATMENT, WATER TREATMENT, PONDS, COST ANALYSIS, STATISTICAL ANALYSIS, DESIGN.

ANALYSIS, DESIGN.

Treatment ponds are a cost-effective alternative for municipal wastewater treatment. When compared to other secondary treatment alternatives, ponds are generally the least costly, require less energy and less skilled operational attention. They can be designed to consistently meet BOD removal requirements and can achieve significant reductions in nutrients, bacteria, and viruses.

MP 1414 LAND TREATMENT SYSTEMS AND THE ENVI-RONMENT.

McKim, H.L., et al, Session on Appropriate Technology in Water Supply and Waste Disposal, at the ASCE National Convention, Chicago, Illinois, Oct. 16-20,-1978. ASCE preprint 3453, New York, American Society of Civil Engineers, 1979, p.201-225, 47 refs. Bouzoun, J.R., Martel, C.J., Palazzo, A.J., Urban, N.W.

WASTE DISPOSAL, WATER TREATMENT, LAND RECLAMATION, SEEPAGE, FLOODING, WASTE TREATMENT, ENVIRONMEN-ING, WASTE TRE

MP 1415 SELECTED DESIGN PARAMETERS OF EXIST-

SELECTED DESIGN PARAMETERS OF EXIST-ING SYSTEMS FOR LAND APPLICATION OF LIQUID WASTE—A COMPUTER FILE. Iskandar, I.K., Annual Conference of Applied Re-search and Practice on Municipal and Industrial Waste, 2nd, Madison, Wisconsin, Sep. 17-21, 1979. Proceedings, 1979, p.65-88, 5 refs. 35-2757

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, COMPUTER PROGRAMS, DESIGN.

Due to increasing interest in renovating wastewater by applica-tion on land, a computer file was established to store and retrieve information on design parameters, performance charac-teristics and published information on existing land application systems. The purpose of establishing this file was to provide assistance to design engineers during the planning of new land treatment systems. Currently there are about 350 domestic and 75 foreign systems on file. Two hypotheti-cal examples are included for illustration.

TRATOR'S GUIDE TO UNDERSTANDING AND MANAGING THE POTHOLE PROBLEM.

CRREL, 1981, 24p., 9 refs. Preliminary draft for presentation at the 11th Annual New England Asphalt Paving Conference, University of New Hampshire, Durham, N.H., 17 March 1981. Bilello, M.A.

ROAD MAINTENANCE, PAVEMENTS, DAMAGE, FROST ACTION, MUNICIPAL ENGINEERING, SAFETY, FATIGUE (MATERIALS), DRAINAGE, CRACKING (FRACTURING).

MP 1417 LAND TREATMENT: PRESENT STATUS, FU-TURE PROSPECTS.

Pound, C.E., et al. June 1978, 48(6), p.98-102, Also in: Articles on water and waste treatment, pollution control and related subjects. Reprinted from Civil engineering, Sep. 1977 through Sep. 1978, [1979], p.76-

Crites, R.W., Reed, S.C.

35-2760

35-2760
LAND RECLAMATION, SEWAGE TREAT-MENT, WASTE TREATMENT, WATER TREAT-MENT, LEGISLATION, WATER POLLUTION, COST ANALYSIS

MP 1418 EPA POLICY ON LAND TREATMENT AND THE CLEAN WATER ACT OF 1977

Thomas, R.E., et al, Mar. 1980, 52(3), p.452-460. 10 τefs.

Reed, S.C. 35-2759

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, LEGISLATION, WATER POLLUTION, DESIGN.

TRAVELING WAVE SOLUTION TO THE PROB-LEM OF SIMULTANEOUS FLOW OF WATER AND AIR THROUGH HOMOGENEOUS POR-OUS MEDIA.

Nakano, Y, Feb. 1981, 17(1), p.57-64, 16 refs.

POROUS MATERIALS, WATER FLOW, AIR FLOW, WAVE PROPAGATION, HYDRAULICS, BOUNDARY LAYER, WETTABILITY, ANAL-YSIS (MATHEMATICS).

A traveling wave solution was derived for the problem of simultaneous flow of water and air through homogeneous porous media.

The properties of the solution generally depend upon the hydraulic characteristics of a given problem. The properties of the solution are presented for a specific case in which the hydraulic characteristics are given in specific functional forms for this specific case a singularity occurs in the solution of both a saturated-unsaturated boundary and a wetting front. Some applications of the solution are discussed. and a wetting front. are discussed.

MP 1420 INTERNATIONAL AND NATIONAL DEVELOP-MENTS IN LAND TREATMENT OF WASTEWA-TER.

McKim, H L., et al, Technology Transfer Seminar on Effluent Irrigation under Prairie Conditions, Regina, Saskatchewan, Jan. 24-25, 1979. Papers, Canada, Environmental Protection Service, (1979), 28p., 58 refs

Jenkins, T.F., Martel, C.J., Palazzo, A.J.

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, PONDS, IRRIGATION, INTERNATIONAL COOPERATION.

MP 1421 TOXIC VOLATILE ORGANICS REMOVAL BY TOXIC VOLATILE ORGANICS REMOVAL BY OVERLAND FLOW LAND TREATMENT. Jenkins, TF, et al, Water Pollution Control Federation. Annual Conference, 53rd, Las Vegas, Nev, Sep. 28-Oct. 3, 1980. Proceedings of the research symposia (Preprints), Washington, D.C., Water Pollution Control Federation, (1981), 14p., 27 refs. Leggett, D.C., Martel, C.J., Peters, R.E., Lec, C.R. 35-2894 35-2894 WASTE TREATMENT, WATER TREATMENT. SURFACE WATERS, FLOODING.

MP 1422

AQUACULTURE SYSTEMS FOR WASTEWA-TER TREATMENT: AN ENGINEERING AS-SESSMENT.

Reed, S.C., et al, June 1980, 430/9-80-007, 127p., Refs. passim. For selected papers see 35-2860 and 35-2861.

Bastian, R.K. 35-2859

WASTE TREATMENT, WATER TREATMENT, SANITARY ENGINEERING, PONDS, COLD WEATHER PERFORMANCE.

MP 1423

ENGINEERING ASSESSMENT OF AQUACUL-TURE SYSTEMS FOR WASTEWATER TREAT-MENT: AN OVERVIEW.

Reed, S.C., et al, June 1980, 430/9-80-007, p.1-12. Bastian, R.K., Jewell, W. 35-2860

WASTE TREATMENT, WATER TREATMENT, SANITARY ENGINEERING, PONDS.

MP 1424 MODELING A VARIABLE THICKNESS SEA ICE COVER.

Hibler, W.D., III, Dec. 1980, 108(12), p.1943-1973, 62 refs.

SEA ICE, ICE COVER THICKNESS, SEASONAL VARIATIONS, DRIFT, THERMODYNAMICS, MODELS, LATENT HEAT, POLYNYAS, MASS BALANCE, ICE EDGE, ANALYSIS (MATH-EMATICS)

MP 1425

MP 1425
SEASONAL GROWTH AND ACCUMULATION
OF NITROGEN, PHOSPHORUS, AND POTASSIUM BY ORCHARDGRASS IRRIGATED WITH
MUNICIPAL WASTE WATER.

Palazzo, A.J., Jan.-Mar. 1981, 10(1), p.64-68, 23 refs. 35-3515

WASTE TREATMENT, WATER TREATMENT, IRRIGATION, LAND RECLAMATION, VEGETATION, GROWTH, SEASONAL VARIATIONS, GRASSES, NUTRIENT CYCLE.

A 2-year field study was performed to determine the seasonal growth and nutrient accumulation of a forage grass receiving 7.5 cm/week of domestic accumulations. growth and nutrient accumulation of a lorge grass receiving 75 cm/lweek of domestic primary-treated waster water. The average N and P concentrations in the waste water were 31 5 and 6 1 mg/liter, respectively An estiblished sward of 'Pennlate' orchardgrass (Dactylis glomerate L.) was managed on an annual three-cutting system. Grass samples were on an annual three-cutting system. Grass samples were taken periodically during the growing season to determine plant dry matter accumulation and uptake of N, P, and K.

MP 1426 REVIEW OF SEA-ICE WEATHER RELATION-SHIPS IN THE SOUTHERN HEMISPHERE. Ackley, S.F., 1981, No.131, Sea level, ice and climatic

change, proceedings of the symposium held 7-8 Dec. 1979, edited by I. Allison, p.127-159, Refs. p.157-159. 35-3026

SEA ICE DISTRIBUTION, WEATHER, WIND (METEOROLOGY), OCEAN CURRENTS, AN-TARCTICA.

Within the last decade data on sea ice from satellite coverage have become available for the Southern Hemisphere. The data record is reviewed with some consideration given to the different mechanisms of ice advection by wind forcing, thermodynamic growth, and ocean mixing. These mechanisms control the ice edge around Antarctica and lead to the characteristic advance-retrieat relationships for the Weddell Sea, East Antarctica, and the Ross Sea. Recent statistical and function (EOF) analyses have shown two primary areas of higher annual variation of sea ice conditions which are presumed to be of dynamic (winds and currents) rather than thermodynamic (temperature) origin. It is possulated that atmospheric forcing of the sea ice system causes changes in air-sea energy transfers that then drive the atmosphere to its own anomaly condition. Further correlations that may define the mechanism of sea ice response to the forcing fields and supply stronger evidence of weather and climate responses to ice variations, may be available by analysis of the Global Weather Experiment drifting buoy data obtained during 1979 (Auth mod)

MP 1427

MP 1427 SEA-ICE ATMOSPHERE INTERACTIONS IN THE WEDDELL SEA USING DRIFTING RUOVS

Ackley, S.F., 1981, No.131, Sea level, ice and climatic change proceedings of the symposium held 7-8 Dec 1979, edited by I. Allison, p.177-191, 23 refs 35-3029

SEAICE, ATMOSPHERIC CIRCULATION, PACK ICE, ATMOSPHERIC PRESSURE, DRIFT, AIR TEMPERATURE, WIND FACTORS, WEDDELL

Air-dropped data buoys were placed on the Weddell Sea pack ice during December 1978 These buoys transmit

information via the NIMBUS satellite giving data on their position, surface pressure, and surface temperature. The velocities of four buoys during fall showed values up to 40 cm/s (35 km/day). The highest sustained velocities appear to coincide with sudden drops in air temperature. Schwerdifeger (1979) has postulated a model of winds in the western Weddell Sea dominated by thermal rather than pressure gradient forces due to the damming of cold air from continental barrier and katabatic winds against the mountains of the Antarctic Peninsula. This model is examined to explain the drift rates associated with cold air outbreaks. (Auth)

MP 1428 DELINEATION AND ENGINEERING CHARAC TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA.

Sellmann, P.V., et al, Environmental assessment of the Alaskan continental shelf, Vol.4. Hazards. Principal investigators' annual reports for the year ending March 1980, Rockville, Md., U.S. National Oceanic and Atmospheric Administration, 1981, p.125-157, 14

Chamberlain, E.J., Delaney, A.J., Neave, K G. 35-3256

SUBSEA PERMAFROST, PERMAFROST DISTRI-BUTION, BOTTOM SEDIMENT, DRILL CORE ANALYSIS, MAPPING, ENGINEERING, SEIS-MIC REFRACTION, WAVE PROPAGATION

LAKE CHAMPLAIN ICE FORMATION AND ICE FREE DATES AND PREDICTIONS FROM METEOROLOGICAL INDICATORS.

Bates, R.E., Eastern Snow Conference, 37th. Proceedings, Peterborough, Ontario, Canada, 1980, p.125-143, 10 refs. For another version of this paper see 34-1745. 35-3153

LAKE ICE, ICE FORMATION, ICE GROWTH, FREEZEUP, ICE BREAKUP, WEATHER FORE-CASTING, ICE FORECASTING, WATER TEMPERATURE, WIND VELOCITY, LANDSAT, NAVIGATION.

NAVIGATION.

A 19-year record of annual closing and opening dates of the Lake Champlain ferry season was found to accurately approximate the freeze-over and breakup dates for the ferry crossing area between Gordon Landing, Vermont, and Cumberland Head, N Y. These lake navigation records, when compared statistically with the lake's wintertime thermal structure and climatological data for the same years of at nearby Lake Champlain locations, allowed accurate predictions of ice formation. From nearby, air temperature records. nearoy Lake Champiani notations, allowed accurate predictions of ice formation From nearby air temperature records, cumulative freezing degree-day (C) curves were plotted for each year of record and ice formation dates and standard deviations were predicted with considerable accuracy Several methods of predicting ice formation on Lake Champian were attempted The most accurate approach used a combination of water temperatures and freezing degree-days. A method of predicting ice growth rates is shown and the influence of wind speed on ice cover formation and prediction on a large body of water such as this is also discussed.

MP 1430 NEW 2 AND 3 INCH DIAMETER CRREL SNOW SAMPLERS.

Bates, R.E., et al, Eastern Snow Conference, 37th. Proceedings, Peterborough, Ontario, Canada, 1980, 199-200, 1 ref. Extended abstract Rand, J H. Redfield, R 35-3163

SNOW SAMPLERS, ROOFS, SNOW LOADS, SNOW WATER EQUIVALENT, ICE LENSES

SEA ICE STUDIES IN THE WEDDELL SEA ABOARD USCGC POLAR SEA. Ackley, S.F., et al. 1980, 15(5), p.84-96, 7 refs Gow, A.J., Buck, K.R., Golden, K.M

35-3188

SEA ICE, DRIFT, BIOMASS, WEDDELL SEA.

SEA ICE, DRIFT, BIOMASS, WEDDELL SEA. The purpose of this study was a investigate several characteristics of Weddell Sea pack her that may affect the relative roles of dynamics and thermodynamics of pack hee development in this region. The physical and structural properties of the pack here were surveyed using core samples. Significant amounts of frazil here were found. If this formation of frazil here is as widespreau as suspected, then the role of deformation (the opening and cloung of leads and polynyasis may have a greater role in the formation of Weddell Sea pack here than similar processes do in the arctic pack. I our data buoya were deployed. The initial locations are shown, and the studies for which the buoy data will be used are discussed. Observations during the cruise confirmed the ubiquitous presence of algee in nearly all forms of ree sampled and point to close links between pack her formation and enhanced algal production.

ABIOTIC COMPONENTS; INTRODUCTION. Brown, J., Tundra ecosystems: a comparative analysis. Edited by L.C. Bliss, O.W. Heal and J.J. Moore. International biological programme, No.25. Cambridge University Press, 1981, p.79.

35-3377

ECOSYSTEMS, HYDROLOGY, CLIMATIC FAC-TORS, SOILS, SITE SURVEYS.

MP 1433 ANALYSIS OF PROCESSES OF PRIMARY PRODUCTION IN TUNDRA GROWTH FORMS. Tieszen, L.L., et al, Tundra ecosystems: a comparative analysis. Edited by L.C. Bliss, O.W. Heal and J.J. Moore. International biological programme, No.25, Cambridge University Press, 1981, p.285-356, Refs. 248, 256 p.348-356. 35-3384

TUNDRA, BIOMASS, GROWTH, NUTRIENT CY-CLE, WATER RESERVES, CLIMATIC FACTORS, SEASONAL VARIATIONS, SOIL TEMPERA-TURE, PHOTOSYNTHESIS.

MP 1434

POINT BARROW, ALASKA, USA.

Brown, J., Tundra ecosystems: a comparative analysis. Edited by L.C. Bliss, O.W. Heal and J.J. Moore. International biological programme, No.25, Cambridge University Press, 1981, p.775-776, 1 ref. 35-3400

TUNDRA ECOSYSTEMS, VEGETATION. METEOROLOGICAL DATA, ANIMALS, OR-GANIC SOILS, DECOMPOSITION, GEOMOR-PHOLOGY, UNITED STATES—ALASKA—BAR-

MP 1435

HEAT TRANSFER IN COLD CLIMATES.

Lunardini, V.J., New York, Van Nostrand Reinhold Co., 1981, 731p., 35 refs. 35-3429

HEAT TRANSFER, MASS TRANSFER, PERMA-FROST PHYSICS, TEMPERATURE EFFECTS, PHASE TRANSFORMATIONS, SOIL PHYSICS, STEFAN PROBLEM, GROUND ICE, SNOW PHY-SICS, SOIL WATER, COLD WEATHER SURVIV-AL, SOLAR RADIATION.

MP 1436

INVESTIGATION OF THE ACOUSTIC EMIS-SION AND DEFORMATION RESPONSE OF FI-NITE ICE PLATES.

Xirouchakis, P.C., et al, Offshore Technology Conference, 13th, Houston, Texas, May 4-7, 1981. Proceedings, Vol.3, 1981, p.123-133, 34 refs.
St. Lawrence, W.F.

35-3448
ICE CRACKS, ICE ELASTICITY, PLATES, ACOUSTIC MEASUREMENT, VISCOELASTICITY, CRACKING (FRACTURING), ICE CRYSTALS, FLEXURAL STRENGTH.

A procedure is described for monitoring the microfracturing of ice plates subjected to constant loads. Sample time records of fresh water ice plate deflections as well as corresponding total acoustic emission activities are presented. The linear clastic as well as viscoelastic response for a simply supported rectangular ice plate is given in the present investigation acoustic emission methods are used to study the microfracturing activity in polycrystalline ice subjected to flexural loads. The relationship between acoustic emissions and the time dependent inclastic flexural deformation in ice is studied.

Furthermore, the influence of the magnitude of the applied load and the rate of deformation on cracking activity is explored.

MP 1437

MP 1437

SOME APPROACHES TO MODELING PHASE CHANGE IN FREEZING SOILS. Hromadka, T.V., II, et al, Apr. 1981, 4(2), p.137-145,

Guymon, G.L., Berg, R.L. 35-3670

SOIL FREEZING, PHASE TRANSFORMATIONS, THERMAL REGIME, UNFROZEN WATER CONTENT, SOIL WATER, MATH-EMATICAL MODELS.

EMATICAL MODELS.

Phase change effects associated with freezing soils dominate the thermal state of the soil regime. Furthermore, freezing of soil water influences the soil moisture regime by providing a moisture sink which tends to draw mobile soil moisture to freezing fronts. Consequently, it is critical to general purpose models that soil water phase change effects and the interrelated problem of enarmating the moisture sink effects (i.e., conversion of liquid water to ice) be accurately modeled. The choice of such a model will not only influence the precision of simulated temperatures and water contents in a freezing soil, but will also have a significant impact on computational efficiency. A review of several current models that assume unfrozen water content is functionally related to subfreezing temperatures indicates that within

a freezing soil the soil water flow model and heat transport a freezing soil the soil water flow model and next transport model narameters are restricted in spatial gradients according to the spatial gradient of modeled unfrozen water content. A freezing soil model based on the concept of sothermal phase change of soil water is proposed as an alternative

MP 1438
CYLINDRICAL PHASE CHANGE APPROXYMA-WITH EFFECTIVE THERMAL DIF-FUSIVITY.

Lunardini, V.J., Apr. 1981, 4(2), p.147-154, 13 refs.

PHASE TRANSFORMATIONS, FREEZE THAW CYCLES, THERMAL DIFFUSION, PERMA-FROST HEAT BALANCE, LATENT HEAT, PIPES (TUBES), ANALYSIS (MATHEMATICS).

(TUBES), ANALYSIS (MATHEMATICS).

No exact, general, solution exists for phase change in a cylindrical geometry. In fact, even approximate solutions are rare and limited in applicability. The use of the effective thermal diffusivity concept has allowed a closed form approximate solution to be generated for phase change around a circular cylinder in an indefinite medium. The effective diffusivity method permits solutions to be found for phase change problem amalogous to the phase change problem. Phase change problems are often intractable with the usual mathematical methods. The cylindrical formulae given here are shown to be of acceptable accuracy, for most engineering purposes, over a wide range of parameters. No other simple, closed form, approximation is known for the cylindrical system. Although the accuracy of the effective diffusivity method has been demonstrated for the cylindrical geometry, application to other geometries must be verified.

MP 1439

MP 1439

COASTAL-INLAND DISTRIBUTIONS OF SUM-MER AIR TEMPERATURE AND PRECIPITA-TION IN NORTHERN ALASKA.

Haugen, R.K., et al, Nov. 1980, 12(4), p.403-412, 22

35-3196 TUNDRA, PRECIPITATION (METEOROLOGY), AIR TEMPERATURE, SHORES, LONG RANGE FORECASTING, WIND FACTORS, UNITED STATES—ALASKA—NORTH SLOPE

STATES—ALASKA—NORTH SLOPE.

Using data from summer air temperature stations from the inland tundra to the immediate coastal area, regression analyses of the air temperature data from 1975 to 1978 were used to predict temperature values across the Alaskan Arctic Coastal Plain based upon latitude and longitude. This provides the best approximation of average values based on existing data. Mean monthly temperature, mean daily range of temperature, and thawing-degree days all increase with distance from the coast. The estimated July normal for Atkasook, 48 km south of the coast, is 3.7 C, while the established 30-yr normal for Barrow, on the coast, is 3.7 C. The July average temperature 6 km due south of the open water of Prudhoe Bay is 2 C higher than on the immediate coast. Within the area under the dominant influence of the sea preceive, regression analyses suggest a more precise relationship between air temperature and distance along the prevailing wind vector (N75 E) than between temperature and distance due north to the sea. due north to the sea.

MODELING NITROGEN TRANSPORT AND TRANSFORMATIONS IN SOILS: 1. THEORETICAL CONSIDERATIONS.

Selim, H.M., et al, Apr. 1981, 131(4), p.233-241, 24 refs. For Pt. 2 see 34-4080. Iskandar, I.K.

35-4081 SOIL CHEMISTRY, NUTRIENT CYCLE, TRANS-FORMATIONS, SOIL WATER, WATER FLOW, WASTE TREATMENT, WATER TREATMENT, MATHEMATICAL MODELS.

MATHEMATICAL MODELS.

A numerical model was developed to simulate water and nitrogen transport and transformations through water-unsaturated, multilayered soil profiles

The nitrogen transformation processes considered were nitrification, dentification, immobilization, mineralization, and ionic exchange of ammonism.

Plant uptakes of water and nitrogen were also included An explicit-implicit finite difference approximation method was used to salve the nitrogen transport and transformation. An explicit-imputed timite enterence approximation memors was used to solve the nitrogen transport and transformation equations simultaneously with the water flow equation. Model evaluation and sensitivity analysis for a wide range of values for the rate of nitrification, distribution coefficient for ammonium exchange, and rate of N uptake were investigations. (Auth.)

MP 1441

MODELING NITROGEN TRANSPORT AND TRANSFORMATIONS IN SOILS: 2. VALIDA-TION.

Iskandar, I.K, et al, May 1981, 131(5), p.303-312, 12 refs. For Pt. 1 see 35-4081. Selim. H.M.

SOIL CHEMISTRY, NUTRIENT CYCLE, TRANS-FORMATIONS, WASTE TREATMENT, WATER TREATMENT, IONS, MODELS.

The nitrogen model described in Part I was evaluated using experimental data from a greenhouse lysimeter study for

two soils, Windsor sandy loam and Charlton silt loam. Secondary treated waste water was applied to each soil at the rate of 3.8 centimeters twice weekly for 25 weeks. Furthermore, (15) N-enriched NH4 cation-N was applied at the beginning of the experiment, in one waste water application. A mixture of grasses was grown on each lysimeter and was harvested every 2 to 4 weeks. Solution samples were collected and analyzed for N,and the soil water pressure head was monitored frequently at different soil depths. Model predictions agreed well with pressure head data with depth and time, at well as gravimetrically determined soil water content with depth for the two soils. (Auth. mod.)

MP 1442 ICE DISTRIBUTION AND WINTER SURFACE CIRCULATION PATTERNS, KACHEMAK BAY,

ALASKA.
Gatto, L.W., International Geoscience and Remote Sensing Symposium (IGARSS'81), Washington, D.C., June 8-10, 1981. Digest, Vol.2, New York, Institute of Electrical and Electronics Engineers, 1981, p.995-1001, 6 refs. 35-3591

SEA ICE DISTRIBUTION, OCEAN CURRENTS. REMOTE SENSING, WIND FACTORS, LAND-SAT, WINTER, SEASONAL VARIATIONS, UNITED STATES—ALASKA—KACHEMAK SAT, W UNITED

INLET CURRENT MEASURED WITH SEASAT-1 SYNTHETIC APERTURE RADAR.

Shemdin, O.H., et al, Oct. 1980, 48(4), p.35-37, 4 refs. Jain, A., Hsiao, S.V., Gatto, L.W. 35-3704

WATER INTAKES, WATER FLOW, RADAR ECHOES, MICROWAVES, VELOCITY.

FOR PHOSPHORUS REMOVAL FROM MUNICIPAL WASTE WATER AT MANTECA, CALIFORNIA.

Iskandar, I.K., et al, Oct.-Dec. 1980, 9(4), p.616-621, 18 refs.

Syers, J.K. 35-3705

SOIL CHEMISTRY, WASTE DISPOSAL, WATER TREATMENT, IRRIGATION, WASTE TREAT-

MEN1. The concentrations of dissolved inorganic phosphate (DIP) in soil solution collected at 0.8 and 1.6 m in soils which had received municipal waste water for 4 and 13 years ranged from 7.3 to 13.9 microgram P/ml. In some cases, these concentrations were higher than that in the added waste water. Sorption studies indicated that the ability of soils from the control site to remove added P from solution was low. Waste water addition caused a substantial decrease in the P sorption capacity of surface soils and a marked change in isotherm shape from a curvilinear to an essentially linear isotherm. a marked change in isotherm shape from a curvilinear to an essentially linear isotherm. Sorption capacity generally increased down the profile to 60 cm on the treated sites. Only a small proportion of the total P accumulated from mastic water addition was in the organic form. Large amounts of P were extractable by 0.01 M CaCl2, particularly in the upper 45 cm of the profiles receiving waste water. Although lack of crop removal of P and a high infiltration rate may be partly responsible for the poor performance of the Manteca system in terms of P removal from waste water, the very low P sorption capacity of the soil is regarded as the major factor.

MODELING HYDROLOGIC IMPACTS OF WIN-TER NAVIGATION.

Daly, S.F., et al, Specialty Conference Water Forum '81, San Francisco, Aug. 10-14, 1981. Proceedings. Vol.2, New York, American Society of Civil Engineers, 1981, p 1073-1080, 12 refs.

Weiser, J.R. 35-4166

ICE NAVIGATION, ICE LOADS, ICE BOOMS, ICE CONTROL, ICE JAMS, RIVER ICE, LAKE ICE, WATER LEVEL, WATER FLOW, MODELS. ICE, WATER LEVEL, WATER FLOW, MODELS. This paper reports on a study undertaken to determine the hydrologic and hydraulic impacts of a proposed winter navigation demonstration program on the St. Lawrence River. The study assessed the impacts of modifying currently operational ice control booms on the levels and flows of Lake Ontario and the St. Lawrence River at several locations to control to the study assumed that an ice control boom would be modified in allow vessel transits for winter navigation. A one-dimensional hydraulic transient model that simulated w. "r profiles and flows in the St. Lawrence River under both open water and ice covered conditions was utilized to determine the impacts of the increased ice (over thickings downstream caused by this increased ice cover thickings downstream caused by this modification. (Auth mod.)

SNOW REMOVAL EQUIPMENT.

Minsk, L.D., Handbook of snow: principles, processes, management and use. Edited by D.M. Gray and D.H. Male, Toronto, Pergamon Press, 1981, p.648-670, 11 refs.

35-3762

SNOW REMOVAL, EQUIPMENT, ROAD MAINTENANCE. WINTER MAINTENANCE.

MP 1447

APPLICATION OF REMOVAL AND CONTROL METHODS. SECTION 1: RAILWAYS; SECTION 2: HIGHWAYS; SECTION 3: AIR-

Minsk, L.D., et al, Handbook of snow: principles, pro-cesses, management and use. Edited by D.M. Gray and D.H. Male, Toronto, Pergamon Press, 1981,

p.671-706, 24 refs. Brohm, D K., Cohen, S., Hawkins, L.M.E.

35-3/63
SNOW REMOVAL, ICE CONTROL, WINTER MAINTENANCE, ROAD MAINTENANCE, RAILROADS, AIRPORTS, BRIDGES, EQUIPMENT, WHITEOUT, SNOW FENCES, SAND-

MP 1448
ICE CONTROL AT NAVIGATION LOCKS.

Hanamoto, B., Specialty Conference Water Forum '81, San Francisco, Aug. 10-14, 1981. Proceedings. Vol.2. New York, American Society of Civil Engineers, 1981, p.1088-1095.

ICE CONTROL, ICE NAVIGATION, LOCKS (WATERWAYS), BUBBLING, TESTS.

(WATERWATS), BUBBLING, 12515.

A method for controlling ice at navigation locks is presented.

A high-flow air screen placed across the entrance of a lock holds back ice floating downstream or pushed head of traffic.

The analysis is based on low-flow bubbler systems. The applicability of this analysis to high-flow systems is examined by conducting laboratory tests. (Auth.)

MP 1449

ICE CONTROL ARRANGEMENT FOR WINTER NAVIGATION.

Perham, R.E., Specialty Conference Water Forum '81. San Francisco, Aug. 10-14, 1981. Proceedings. Vol.2, New York, American Society of Civil Engineers, 1981, p 1096-1103, 9 refs.

35-4169
ICE NAVIGATION, ICE CONTROL, RIVER ICE, ICE JAMS, ICE BOOMS, WATER LEVEL.
This paper presents a four-year summary of the main effects of the booms on ice and ship interaction and vice-versa. Throughout the four winter seasons, relatively small quantities of ice were lost over and between the booms. Ships usually slid through without influencing the boom force levels, although, at times, the changes they wrought could be large. One boom needed strengthening and artificial islands were added for ice stability upstream. These devices and frequent icebreaker operations were able to compensate for the ice movement caused by winter navigation in this area

MP 1450

KINETIC NATURE OF THE LONG TERM STRENGTH OF FROZEN SOILS.

Fish, A.M., International Symposium on Ground Freezing, 2nd, Trondheim, Norway, June 24-26, 1980 Preprints, Trondheim, University, Norwegian Institute of Technology, 1980, p.95-108, 23 refs.

tute of Technology, 1980, p.95-108, 23 refs.
36-8
FROZEN GROUND STRENGTH, SOIL CREEP,
STRESSES, SOIL TEXTURE, TRIAXIAL TESTS,
RHEOLOGY, TEMPERATURE EFFECTS,
ANALYSIS (MATHEMATICS).
Temperature dependences of the failure activation energy
of frozen soils in the temperature range from -0.55 to
-00C were studied The analysis was based upon experimental data on the long-term failure of six frozen soils
wanchester and Ottawa sands, Sufficied and Bat-Bayoss clays, Hanover
silt and Kelovey sandy loam The failure activation energy
was expressed as a function of the theological parameters
of the long-term strength equation in the form of the sum
of two components an initial value that is independent
of failure stress and a stress-dependent increment of the
activation energy. The analysis showed that the initial
value of the failure activation energy varied between the
limits of 10.4 and 19.4 kcal/mole, the variation of stressdependent increments was between 0.3 and 6.6 kcal mole,
and the sum varied from 12.9 to 19.7 kcal mole. The
smaller initial and sum values of the activation energy refer
to the clay soils and the greater values to the sandy soils

MP 1451

STRENGTH OF FROZEN SILT AS A FUNCTION OF ICE CONTENT AND DRY UNIT WEIGE.
Sayles, F.H., et al, International Symposium on Ground Freezing, 2nd, Trondheim, Noiway, June 24 26, 1980. Preprints, Trondheim, University, Norwegian Institute of Technology, 1980, p.109-119, 12 1ef3 Carbee, D.L.

36.9 FROZEN GROUND STRENGTH, GROUND WA-TER, WATER CONTENT, STRESS STRAIN DIA-GRAMS. COMPRESSIVE PROPERTIES. GROUND ICE, LOADS (FORCES), GRAIN SIZE GROUND ICE, LOADS (FORCES), GRAIN SIZE. A total of 45 unconfined compression tests were conducted on frozen specimens of remolded, saturated Fairbanks silt at dry unit weights ranging from 993 to 1490 kilograms per cubic meter with total water contents ranging from 0.28 to 0.58. The rate of strain was 0.005/s. Using the criterion that the ice matrix in the soil fractures at the first point of significant yield shown in the stress-strain curve, which occurs at less than 0.01 strain in this study, the "ice matrix strength" is shown to be nearly proportional to the volumetric ice content of the soil for these tests. The strength at 0.2 strain appears to be nearly independent of the dry unit weight and water content of the soil.

OVERCONSOLIDATION GROUND FREEZING. FERECTS OF

Chamberlain, E.J., International Symposium Ground Freezing, 2nd, Trondheim, Norway, June 24-26, 1980. Preprints, Trondheim, University, Norwe-gian institute of Technology, 1980, p.325-337, 10 refs.

36-27
SOIL FREEZING, CLAY SOILS, FREEZE THAW
TESTS, FROZEN GROUND SETTLING, FROZEN GROUND STRENGTH, FROZEN GROUND
MECHANICS, SOIL WATER MIGRATION,
WATER CONTENT, STRESSES, DENSITY
(MASS/VOLUME), SOIL STRUCTURE.

(MASS/VOLUME), SOIL STRUCTURE. Settlement of clay soils after freezing and thawing is the result of the suction forces that draw pore water to the freezing front. These suction forces cause an increase in the effective stress on the clay beneath the freezing front, and thus cause an overconsolidation of the clay. As these suction forces often exceed 1 atmosphere, their direct measurement is not easy. The volume changes resulting from the freezing and thawing of clays are related to the plastic limit and have been observed in the laboratory to eash high as 25%. If provisions are not made to account for these volume changes in a ground freezing project, considerable damage to structures can occur from settlement and the resulting stresses. the resulting stresses.

MP 1453

STUDY OF THE CHOANOF AGELLATES (ACANTHOECIDAE) FROM THE WEDDELL SEA, INCLUDING A DESCRIPTION OF DIAPHANOECA MULTIANNULATA N. SP. Buck, K.R., Feb. 1981, 28(1), p.47-54, 20 refs.

36-454 SEA ICE, MICROBIOLOGY, MARINE BIOLO-GY, ANTARCTICA—WEDDELL SEA.

GY, ANTARCTICA—WEDDELL SEA.

Eight species of loricate choanoflagellates (Acanthoecidae) have been observed, by light and electron microscopy, in samples obtained from the Weddell Sea during the austral summer of 1977. The distribution of most species within the Weddell Sea was widespread. Habitats included the water column, the edge of (or ponds on) ice floes, and the interior of ice floes. The distributional, environmental, habitat, and/or morphological range of all previously described species is expanded Methods of variation of transverse costal diameters between genera may be potentially useful to the understanding of taxonomy and phylogeny of this family. (Auth mod)

MP 1454

NUMERICAL SOLUTIONS FOR RIGID-ICE MODEL OF SECONDARY FROST HEAVE.

O'Neill, K., et al. International Symposium on Ground Freezing, 2nd, Trondheim, Norway, June 24-26, 1980. Preprints. Trondheim, University. Norwegian Insti-tute of Technology. 1980, p.656-669, 10 refs.

Miller, R.D.

FROST HEAVE, GROUND ICE, SOIL FREEZING, ICE FORMATION, ICE LENSES, ANALYSIS (MATHEMATICS), TEMPERATURE EF-FECTS

MP 1455 ON THE ACOUSTIC EMISSION AND DEFORMATION RESPONSE OF FINITE ICE PLATES. Xirouchakis, P.C., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings,

Ouébec, Canada, Université Laval, 1981, p.385-394,

St. Lawrence, W.F.

36-226

36-226
ICE ACOUSTICS, ICE CRACKS, FRACTURING,
FLEXURAL STRENGTH, ICE LOADS, ICE
CRYSTAL STRUCTURE, MICROSTRUCTURE,
ICE DEFORMATION, STRESSES, STRAIN
TESTS, ANALYSIS (MATHEMATICS).

IBSIS, ANALISIS (MATHEMATICS).

In the present investigation acoustic emission methods are used to study the microfracturing activity in polycrystalline tocs subjected to flexural loads Experimental results obtained in the laboratory indicate that the acoustic emissions recorded from ice are important in describing the deformation and fracture of ice.

MT/ 1456

DYNAMIC ICE-STRUCTURE INTERACTION ANALYSIS FOR NARROW VERTICAL STRUC-TURES.

Eranti, E., et al. International Conference on Port and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Québec, Canada, Université Laval, 1981, p.472-479, 7

Haynes, F.D., Määttänen, M., Soong, T.T. 36-233

ICE SOLID INTERFACE, ICE MECHANICS, ICE LOADS, ICE PRESSURE, ICE STRUCTURE, DY-NAMIC LOADS, PENETRATION TESTS, EX-PERIMENTATION, FATIGUE (MATERIALS).

PERIMENTATION, FATIGUE (MATERIALS). This paper describes a method of computing the ice force and response of the structure on the basis of information given for ice velocity and properties of ice and the structure. The method is a step-by-step procedure using mode shape analysis involving two basic phases. During the first phase the structure penetrates into the ice sheet until a random loading rate dependent ice strength is reached. The ice sheet then fails within an area with finite length. Both the penetration and the failed zone are assumed to depend linearly on force. The ice forces and structural responses have been computed for a test structure at the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, and the results are found to be consistent with those actually measured in laboratory experiments.

MP 1457 MP 1457

SUMMER CONDITIONS IN THE PRUDHOE BAY AREA, 1953-75.

Cox. G.F.N., et al. International Conference on Port

and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Québec, Canada, Université Laval, 1981, p.799-808, 9

Dihn. W.S.

36-262

SEA ICE DISTRIBUTION, ICE CONDITIONS, RADIOMETRY, SEASONAL VARIATIONS, PETROLEUM INDUSTRY, ICE BREAKUP,

FREZEUP.

Long-term, site-specific statistics on the summer recommittons in the Harmson Bay-Camden Bay area are presented in probabilistic terms. The statistics are based on twenty-three years of ice observations acquired by commercial ships and tecbreakers, ice reconnaissance flights, and various satellites. Data is given on breakup and freezeup dates, the first occurrence of open water, and the number of continuous and total open water days. The impact of the summer rec conditions on petroleum activities in the study area are also briefly discussed.

MP 1458 PRELIMINARY RESULTS OF ICE MODELING IN THE EAST GREENLAND AREA.

Tucker, W.B., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Québec, Canada, Université Laval, 1981, p.867-878, 13 refs

Hibler, W.D., III

ICE MODELS, ICE PLASTICITY, STRESSES, DRIFT, THERMODYNAMICS, SEA ICE, BUOY-ANCY, VISCOSITY.

ANCY, VISCOSITY.

A sea ice model which employs a viscous-plastic constitutive law has been applied to the East Greenland area. The model is run on a 40-km spatial scale at 1.4 day time steps for a 60-day period, using forcing data beginning 1. October 1979. Preliminary results verify that the model predicts reasonable inkinesses and velocities well within the ice margin. Separate simulations show that thermodynamics only and free drift with thermodynamics produce inadequate results. In particular, the free drift simulation produces unrealistic ice trajectories with excessive drift toward the coast and unreasonable nearthore thicknesses. the coast and unreasonable nearshore thicknesses. The net results of these simulations tend to verify that internal

ice stress, thermodynamics, and ice import must be considered to properly model this region.

MP 1450 POOLING OF OIL UNDER SEA ICE.

Kovacs, A., et al. International Conference on Port and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Québec, Canada, Université Laval, 1981, p.912-922,

Morey, R.M., Cundy, D.F., Dicoff, G.

OIL SPILLS, SEA ICE, ICE BOTTOM SURFACE, ICE COVER THICKNESS, PROFILES, RADAR ECHOES, ECHO SOUNDING, WATER POLLUTION, ENVIRONMENTAL IMPACT.

TION, ENVIRONMENTAL IMPACT.

Ice thickness profiles were constructed for six fast ice locations in the vicinity of Prudhoe Bay, Alaska, using a radar echo sounding system. The sounding data revealed in detail the undulating relief of the bottom of the sea we in which oil could pool up if released under the ice. In general, ice bottom morphology was found to reflect variation of the surface snow cover thickness and ice deformation. However, at several sites the ice bottom relief could not be correlated with these factors. Slush ice accumulations of up to 0.5 m were apparently the cause of this bottom roughness. Estimates of the volume of oil that could pool up in the ice bottom relief range from 20,000 to 60,000 cu m/sq km. For undeformed fast ice with no bottom slush ice growth, the potential pooling capacity varied from about 10,000 to 35,000 cu m/sq km. The effect of slush ice relief and structure on potential under-ice oil pooling is for the most pait unknown.

MP 1460 SEA ICE PILING AT FAIRWAY ROCK, BERING STRAIT, ALASKA: OBSERVATIONS AND THEORETICAL ANALYSIS.

Kovacs, A., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Québec, Canada, Université Laval, 1981, p.985-1000, 15 refs.

Sodhi, D.S.

36-276 36-276
SEA ICE, ICE PILEUP, ICE CONDITIONS, ICE
FORMATION, PRESSURE RIDGES, REMOTE
SENSING, LANDSAT, GROUNDED ICE, FLEX-URAL STRENGTH, FLOATING ICE, ANALYSIS (MATHEMATICS), OFFSHORE STRUCTURES.
Information on sea ice conditions in the Bering Strait and the icefoot formation around Fairway Rock, located in the strait, is presented. Cross-sectional profiles of Fairway Rock and the relief of the icefoot are given along with theoretical analyses of the possible forces active during icefoot formation. It is shown that the ice cover most likely fails in flexure as opposed to crushing or buckling, as the former requires less force Field observations reveal that the Fairway Rock icefoot is massive, with ridges up to 15 m high, a seaward face only 20 deg from vertical, and interior ridge slopes averaging 33 deg. The icefoot is believed to be grounded, and its width ranges from less than 10 to over 100 meters. (MATHEMATICS), OFFSHORE STRUCTURES.

MP 1461 PLANETARY AND EXTRAPLANETARY EVENT RECORDS IN POLAR ICE CAPS.

Zeller, E.J., et al, Colloquium on Planetary Water, 3rd, Niagara Falls, New York, Oct 27-29, 1980. Pro-ceedings, Buffalo, N.Y., State University of New York, (1980), p.18-27, 6 refs Parker, B.C., Gow, A.J.

36-565

than 10 to over 100 meters.

ICE SHEETS, LAND ICE, GLACIER MASS BAL-ANCE, PLANETARY ENVIRONMENTS, ATMO-SPHERIC COMPOSITION, VOLCANIC ASH.

ASTILLA COMPOSITION, VOLCANIC ASTI. ASTI. A curve of intrate-N concentration, plotted from 1653 individual analyses from a 108 meter firm core drilled at South Pole Station in 1978-79, is presented. The most prominent feature of the background curve is the sharp drop in nitrate between 1650 and 1720, a period of unusually low solar activity. It is suggested that a comparison of this data with those of polar caps of other players would make it possible to identify solar system-wide creets.

DISTINGUISHING CHARACTERISTICS OF DIAMICTONS AT THE MARGIN OF THE MATANUSKA GLACIER, ALASKA.

Lawson, D.E., 1981, Vol.2, p.78-84, 34 refs. 36-636

GLACIAL DEPOSITS, SUBGLACIAL DRAIN-AGE, MORAINES, SEDIMENT TRANSPORT.

The origins of diamictons deposited at the Matanuska Glacter are identified in stratigraphic scauences mainly by the presence or absence of a pebble fabric, internal structure, and variation in gravel-size clast distribution. These properties correlate in gravel-size elast distribution These properties correlate with major differences in depositional mechanisms and source material. Melt-out till mostly inherits fabric, internal structure, and grain-size distribution from its debris-laden basal ice source — Sediment flow deposits and ice-slope collusium (deposited by ablational slope processes) have properties devel-oped by resedimentation mechanisms — Melt-out till ranges

from stru-tu, cless to stratified with interspersed lenses and discontinuous laminae, and generally possesses a well-defined pebble fabric.

MP 1463

ECOLOGICAL IMPACT OF WHEELED, TRACKED, AND AIR CUSHION VEHICLE TRAFFIC ON TUNDRA.

Abele, G., International Society for Terrain-Vehicle Systems International Conference, 7th, Calgary, Alberta, Aug. 16-20, 1981. Proceedings, Hanover, N.H., ISTVS, 1981, p.11-37, 19 refs.

TUNDRA, DAMAGE, ALL TERRAIN VEHICLES, TRACKED VEHICLES, ENVIRONMENTAL IMPACT, VEHICLE WHEELS, PLANT ECOLOGY.

ECOLOGY.

Traffic tests were conducted on Alaskan tundra near Barrow in 1971. The impact of an air cushion vehicle is significantly less than that of a tracked or wheeled vehicle and is limited to whatever damage is done to the vegetation by skirt contact, the effects of cushion pressure and cushion air flow are insignificant. The impact of wheeled and tracked vehicles influenced primarily by the type and geometry of tires or tracks, ground contact pressure, and the number of traffic

. MP 1464

SUBSEA TRENCHING IN THE ARCTIC.

Mellor, M., International Society for Terrain-Vehicle Systems. International Conference, 7th, Calgary, Alberta, Aug. 16-20, 1981. Proceedings, Hanover, N.H., ISTVS, 1981, p.843-882, Refs. p.873-875.

TRENCHING, OCEAN BOTTOM, BOTTOM SEDIMENT, PIPELINES, ICE SCORING, PRES-SURE RIDGES, ICEBERGS.

Environmental conditions are described for the continental shelf of the western Arctic, and for the shelf of Labrador shelf of the western Arctic, and for the shelf of Labrador and Ne "foundland. Special emphasis a signe to the gouging of bettom sediments by ice pressure ridges zi-u icebergs, and an approach to systematic risk analysis is outlined Protection of subsea pipelines and cables by trenching and direct embedment is discussed, touching on burial depth, degree of protection, and environmental impact. __nventional land techniques can be adapted for trenching across the beach and through the shallows, but in deeper water reaction environments. special equipment is required

MP 1465 MORPHOLOGICAL INVESTIGATIONS OF FIRST-YEAR SEA ICE PRESSURE RIDGE SAILS.

Tucker, W.B., et al, 1981, Vol.5, p.1-12, 16 refs Govoni, J.W.

PRESSURE RIDGES, SEA ICE, ICE STRUCTURE, ICE COVER THICKNESS, OFFSHORE STRUCTURES, ICE PRESSURE, ICE STRENGTH.

MP 1466 COLD WEATHER CONSTRUCTION MATERI-ALS; PART 2—REGULATED-SET CEMENT FOR COLD WEATHER CONCRETING, FIELD VALI-DATION OF LABORATORY TESTS

Houston, B.J., et al. Sep. 1981, C-75-11, 33p.

36-1028 CONSTRUCTION MATERIALS, WINTER CON-CRETING, CONCRETE STRENGTH, CEMENTS, CONCRETE PLACING, CONCRETE AGGRE-GATES, TEMPERATURE EFFECTS, TESTS.

MP 1467 SURFACE DISTURBANCE AND PROTECTION DURING ECONOMIC DEVELOPMENT OF THE NORTH.

Brown, J. et al, Novosibirsk, Nauka, 1981, 88p., In Russian with English table of contents enclosed. Refs. p.59-80.

36-1009

PERMAFROST PRESERVATION, HUMAN FAC-TORS, DAMAGE, OIL SPILLS, PERMAFROST DISTRIBUTION.

MP 1468 SEA ICE: THE POTENTIAL OF REMOTE SENS-

Weeks, W.F. Fall 1981, 24(3), p 39-48. 36-1047

SEA ICE, LAKE ICE, ICE PHYSICS, REMOTE SENSING, SPACEBORNE PHOTOGRAPHY. MP 1469

MODELING OF ANISOTROPIC ELECTRO-MAGNETIC REFLECTIONS FROM SEA ICE. Golden, K.M., et al. Sep 20, 1981, 86(C9), p.8107-8116, 17 refs.

36-1089

SEA ICE, ICE SALINITY, ELECTROMAGNETIC PROPERTIES, ANISOTROPY.

The contribution of brine layers to observed reflective anisotropy of sea ice at 2100 MHz is quantitatively assessed, and a theoretical explanation for observed reflective anisotropy is proposed in terms of anisotropic electric flux penetration into the brine layers. The sea ice is assumed to be a stratified diefectric consisting of prue ice containing ellipsoral containing the preferred crystallographic containing axes perpendicular to the preferred crystallographic containing ellipsoral containing ellipsoral containing ellipsoral containing ellipsoral containing ellipsoral containing ellipsoral e

MP 1470

INTEGRAL TRANSFORM METHOD FOR THE LINEARIZED BOUSSINESQ GROUNDWATER FLOW EQUATION.

Daly, C.J, et al, Aug. 1981, 17(4), p.875-884, 10 refs Morel-Seytoux, H.J. 36-1123

GROUND WATER, WATER FLOW, MATH-EMATICAL MODELS, SOIL WATER.

EMATICAL MODELS, SOIL WATER.

An analytical procedure is developed for the determination of potentiometric head in nonhomogeneous aquifers. Both steady and unsteady flow conditions are considered. The analytical procedure is based upon the use of orthogonal functions. It consists essentially of assuming an appropriate orthogonal series for both the aquifer properties and the unknown potentiometric head. The technique is applied to several one- and two-dimensional flow problems where conditions are described by the linearized Boussinesq equation. The result of the analysis is the expression of potentiometric heads in analytic form. Subsequent use of Darcy's law yields accurate, analytic equations for the associated velocity fields. Such representations of the flow field are a potential benefit for prediction of mass transport in groundwater since benefit for prediction of mass transport in groundwater since velocity is known as a continuous function of space and time. Other useful features of the orthogonal series approach include its straightforward application. The approach is also shown to eliminate the introduction of discretization errors associated with the use of node systems which are required by many alternative numerical methods.

WATERSHED MODELING IN COLD REGIONS: AN APPLICATION TO THE SLEEPERS RIVER RESEARCH WATERSHED IN NORTHEAST-ERN VERMONT.

Stokely, J.L., Hanover, N.H., Dartmouth College, June 1980, 241p., M.E. thesis. Refs. p.175-192.

36-1275
WATERSHEDS, SNOWMELT, RUNOFF, FROZEN GROUND, SOIL WATER, STREAM FLOW,
SNOW ACCUMULATION, ABLATION, MODELS, COMPUTER APPLICATION, HYDROLOGY, FLOODS.

DISTORTION OF MODEL SUBSURFACE RADAR PULSES IN COMPLEX DIELECTRICS. Arcone, S.A., Sep.-Oct. 1981, 16(5), p.855-864, 19

SEA ICE, GROUND ICE, ICE ELECTRICAL PROPERTIES, RADAR ECHOES, SUBSURFACE INVESTIGATIONS, WAVE PROPAGATION, ELECTRIC FIELDS, MATHEMATICAL MODELS, DIELECTRIC PROPERTIES.

ELS, DIELECTRIC PROPERTIES.

The propagation of subsurface radar pulses in complex dielectric media is studied numerically. The model waveform is a 10-ns sinusoidal cycle, and the media properties are similar to those of most ground or sea ice. When the real part of the dielectric permittivity is frequency independent and the imaginary part is dominated by the de resistivity, amplitudes of the positive and negative half cycles unbalance, and the sinusoidal zero crossing is delayed from as normal position. In these cases, if reflector depth is known, the dielectric constant can be intersured from the time delay of the leading edge of the signal, and the de resistivity can be estimated from a comparison of the input and output pulse power spectra. When dive-ciric permittivity is frequency dependent through a simple islazation process, sweeform distortion depends on relazation frequency. In addition, distortion depends on relaxation frequency. In addition, if reflector depth is known, the dielectric relaxation parameters may be estimated when the medium relaxation frequency lies above and below the major portion of the pulse bandwidth. respectively

MP 1473 SNOW MEASUREMENTS IN RELATION TO VEHICLE PERFORMANCE.

Harrison, W.L., July, 1981, No.81-16, p 13-24, ADA-106 972, 2 rcfs.

SNOW COMPRESSION, VEHICLES, TRACTION, SNOW DEPTH, SNOW DRIFT, SNOW CRYSTAL STRUCTURE, SNOW DENSITY, SNOW COVER

APPLICATION OF ENERGETICS TO VEHICLE TRAFFICABILITY PROBLEMS.

Brown, R.L., July, 1981, No.81-16, p.25-38, ADA-106 972, 8 refs.

36-1393

SNOW COVER EFFECT, TRACTION, VEHI-CLES, TRAFFICABILITY, SNOW DENSITY, SNOW COMPACTION.

MP 1475

PREDICTION METHODS.

Harrison, W.L., July, 1981, No.81-16, p.39-46, ADA-106 972

36-1394
SNOW COVER EFFECT, TRACTION, VEHI-CLES, TRAFFICABILITY, SNOW STRENGTH, FORECASTING, MATHEMATICAL MODELS, SNOW DEPTH, VEHICLE WHEELS, TRACKED

MP 1476

FIELD INVESTIGATIONS.

Harrison, W.L., July, 1981, No.81-16, p.47-48, ADA-106 972. 36-1395

SNOW COVER EFFECT, TRACTION, VEHI-CLES, TRAFFICABILITY, TESTS.

MP 1477

ANALYSIS OF VEHICLE TESTS AND PER-FORMANCE PREDICTIONS. Berger, R.H., et al, July, 1981, No.81-16, p 51-67, ADA-106 972.

Brown, R.L., Harrison, W.L., Irwin, G.S. 36-1396

SNOW STRENGTH, VEHICLES, TRACTION, SHEAR STRESS, LOADS (FORCES), SNOW COMPACTION, TESTS, SNOW DEPTH, FORE-CASTING, ANALYSIS (MATHEMATICS).

MP 1478

Shallow snow test results.

Harrison, W.L., July, 1981, No.81-16, p.69-71, ADA-106 972. 36-1397

SNOW DEPTH, SNOW COVER EFFECT, VEHI-CLES, TRACTION, TRAFFICABILITY, SHEAR STRESS, TESTS.

OBSERVATIONS OF CONDENSATE PRO-FILES OVER ARCTIC LEADS WITH A HOT-FILM ANEMOMETER.

Andreas, E.L., et al, 1981, Vol.107, p.437-460, Refs.

p.457-460. Williams, R.M., Paulson, C.A.

POLYNYAS, PACK ICE, PROFILES, DROPS (LIQUIDS), TURBULENT EXCHANGE, WATER TEMPERATURE, TEMPERATURE GRADIENTS, CONDENSATION, ANEMOMETERS. ANALYSIS (MATHEMATICS).

MP 1480

THERMAL ENERGY AND THE ENVIRON-MENT.

Crosby, R.L., et al, Hanover, N.H., U.S. Army Cold Regions Research and Engineering Laboratory, Nov. 1975, 3p. + 2p. figs., Presented at Energy and Environment Conference, Dallas, Texas.

Aamot, H.W.C., Wright, E.A. 36-1422

HEAT SOURCES, HEAT LOSS, THERMAL EF-FECTS, THERMAL POLLUTION, ENVIRON-MENTAL IMPACT, COLD WEATHER CON-STRUCTION, POLAR REGIONS.

INLET CURRENT MEASURED WITH SEASAT-1 SYNTHETIC APERTURE RADAR. Shemdin, O.H., et al, Oct 1980, 48(4), p.35-37, 4 refs

Jain, A., Hsiao, S.V., Gatto, L.W. 36-1430

WATER INTAKES, OCEAN CURRENTS, REMOTE SENSING, AIRBORNE RADAR, MICROWAVES.

MP 1482 COMPARISON OF THERMAL OBSERVA-TIONS OF MOUNT ST. HELENS BEFORE AND DURING THE FIRST WEEK OF THE INITIAL 1980 ERUPTION.

St. Lawrence, W.F., et al, Sep. 26, 1980, Vol.209, p.1526-1527, 11 c-fs.
Qamar, A., Moore, J., Kendrick, G.

THERMAL REGIME, VOLCANOES, TEMPERATURE MEASUREMENT, INFRARED RECONNAISSANCE, MOUNTAINS, VOLCANIC ASH, UNITED STATES—WASHINGTON—MOUNT SAINT HELENS.

MP 1483

RESULTS FROM A MATHEMATICAL MODEL OF FROST HEAVE.

Guymon, G.L., et al, 1981, No.809, p.2-6, 13 refs. Berg, R.L., Johnson, T.C., Hromadka, T.V., II. 36-1729

JOI 127 FROST HEAVE, HEAT TRANSFER, SOIL WATER MIGRATION, FROST PENETRATION, TEMPERATURE EFFECTS, MATHEMATICAL

A one-dimensional model for simulation of frost heave in a vertical soil column is presented. The model is based on simultaneous computation of heat and moisture transport in a freezing or thawing soil. Thermal processes at the freezing front are approximated by a lumped isothermal approach. The model accurately simulates frost heave, soil pore-water pressures, and temperatures when compared soil pore-water pressures, and temperatures when compared with a laboratory freezing column; however, to achieve adequate correlation certain model parameters must be determined by calibration. Because the model, like the frost-heave process itself, is highly sensitive to environmental and soil parameters that are varieble in both time and space, purely deterministic simulations will not provide sufficiently accurate predictions. Consequently, further development of the model is required in order to include a statistical-probabilistic approach for estimating frost heave within specified confidence limits.

MP 1484

REFFECT OF FREEZING AND THAWING ON RESILIENT MODULUS OF A GRANULAR SOIL EXHIBITING NONLINEAR BEHAVIOR.

Colc, D.M., et al, 1981, No 809, p.19-26, 15 refs. Irwin, L.H., Johnson, T.C.

FREEZE THAW CYCLES, SUBGRADE SOILS, SOIL STRENGTH, SOIL FREEZING, GROUND THAWING, ELASTIC PROPERTIES, STRESSES, DENSITY (M \SS/VOLUME), SOIL TEMPERA-TURE.

Freeze-thaw Also experienced in areas of seasonal frost recete-thaw in experienced in areas of seasonal frost can cause white it alonas in the supporting capacity of subgrade materials. The U.S. Army Cold Regions Research and Engineering, aboratory is currently engaged in a program to assess these variations in a number of soils used in roadway and airfield construction. The complete testing and analysis procedure for one of these test soils is presented.

MP 1485 SIM''I TING FROST ACTION BY USING AN INSTRUMENTED SOIL COLUMN.

Ingersoll, J., et al, 1981, No.809, p 34-42, 6 refs.

Betr R.L. 36-1 14

FROST ACTION, FROZEN GROUND MECHANICS, FREEZE THAW TESTS, SOIL WATER, SOIL TEMPERATURE, WATER CONTENT, MATH-EMATICAL MODELS.

The use of an instrumented soil column in tests to develop a mathematical mode of the frost-heave process is described. Tensiometers, heat-flo. meters, thermocouples, and electrical a manematical mode of the irost-neare process is ackerited resistivity gages were installed throughout a soil column filled with Fairbanks siit. Chena Hot Syrings siit, or West Lebanon gravel. The column was 100 cm long and about 14 cm in diameter. An open system was used and absorption was monitored during the freezing process. Tests were conducted by using a constant rate of frost penetration, a constant heat-flow rate, or three sequentially lower temperature step changes at the soil surface. The soil column has provided critical data for verification of a one-dimensional mathematical model for estimating frost heave. As more soils are tested, this equipment will assist in improving and developing algorithms for the mathematical model and the most critical parameters that affect frost heave in a given soil-eg, surcharge, free water level, and hydraulic conductivity. A procedure is also presented for determining the saturated and unsaturated hydraulic conductivity and moisture-retention characteristics of a soil.

MP 1486

COMPARATIVE EVALUATION OF FROST-SUSCEPTIBILITY TESTS. Chamberlain, E.J., 1981, No.809, p.42-52, 89 refs.

SOIL FREEZING, SOIL WATER, FROST RESIST-ANCE FROST HEAVE, GROUND ICE, FREEZE THAW TESTS, FROST ACTION, GRAIN SIZE, PARTICLE SIZE DISTRIBUTION.

Methods of determining the frost susceptibility of soils are identified and presented. More than 100 criteria were found, the most common were based on particle-size characterfound, the most common were based on particle-size characteristics. These particle size enteria are frequently aumation such as grain-size distribution, uniformity coefficients, and Atterberg limits. Other types of information, such as permeability, mineralogy, and soil classification, have also been required. More complex methods that require tests based on pore-size distribution, mosture tension, hydraulic conductivity, heave sixes, and frost heave have also been proposed. However, none has proved to be a universal test for determining the frost susceptibility oils soils. Based on this survey, four methods are proposed for further study: the U.S. Army Corps of Engineers Frost-susceptibility Classification Systems, the moisture-tension/hydraulic-conductivity test, a new frost-heave test, and the California bearing ratio after-thaw test.

SIMULATION OF THE ENRICHMENT OF AT-MOSPHERIC POLLUTANTS IN SNOW COVER

Colbeck, S.C., Oct. 1981, 17(5), p.1383-1388, 17 refs. 36-1887

JO-188/
AIR POLLUTION, SNOW IMPURITIES, RUNOFF, MELTWATER, WATER POLLUTION,
SNOW MELTING, FREEZE THAW CYCLES,
SOLUBILITY, SNOW DEPTH.

SOLUBILITY, SNOW DEPTH.

The soluble impurities contained in a snow cover can be concentrated as much as five fold in the first fractions of snowmelt runoff. In addition, daily impurity surges are possible. Melt-freez cycles concentrate the impurities in the lower portion of the snow cover, hence preparing the impurities for rapid removal. Environmental damage can occur due to the concentration and rapid release of atmospheric pollutants from the snow, especially in areas of 'acid precipitation'. The enrichment of the solut's impurities is explained and the results of laboratory experiments are given. are given.

MP 1488

TESTS OF FRAZIL COLLECTOR LINES TO AS-

SIST ICE COVER FORMATION.
Perham, R.E., Dec. 1981, 8(4), p.442-448, With French summary. 1 ref.

36-1866
FRAZIL ICE, ICE FOUMATION, ICE ACCRETION, ICE GROWTH, WATER FLOW, ICE COVER STRENGTH, RIVER ICE, NUCLEATING AGENTS, ICE BOOMS.

A preliminary investigation was made of the effect of frazil A preliminary investigation was made of the effect of frazilice on arrays of lines positioned in flowing water under uniter conditions. It was found that the lines would provide a stable basis for forming an ice cover on many stream reaches that would normally remain open because of high velocity and shyllow depths. Tests were conducted in a refrigerated frum, a d in small mountain rivers. Flume depths varied from 2-22 cm and river depths varied from 33-50 cm. Average flow velocities had a range of 0.06-8 m/s in the rivers. Frazilice would grow on a line quite rapidly achieving a disancter of 32 mm in 15 min, on a 32 mm late line in the flume. In the river, overnight accumulations reached 20 cm in depth. A few drag force measurements were made which yielded an average shear drag coefficient of 0.16. The results suggest methods of increasing our control over ice.

MP 1489

ONE-DIMENSIONAL TRANSPORT FROM A HIGHLY CONCENTRATED, TRANSFER TYPE

SOUT CE. O'Net., K. 1982, 25(1), p.27-36, With French, German and Ki secto summaries. 27 refs.

36-1862 HEAT TRANSFER, MASS TRANSFER, FLOW RATE, ANALYSIS (MATHEMATICS).

RATE, ANALYSIS (MATHEMATICS). In both heat and mass transfer, situations arise in which an entity considered as a source/sink has strength which can only be expressed in terms of an unknown rate of source—flow field transfer. This occurs when transfer between the source and medium is driven by a dependent variable difference which is unknown, because the responding medium value is unknown. Manifold mathematical completutes arise when in addition the source is highly concentrated spatially relative to the size of the overall domain. A 1-dim convective-diffusive transport equation suitable for this cause may be solved by simultaneous use of the Fourier transform and its inverse in the same equation, together with other transformation and manipulation. From the solution obtained for the case of constant source intensity, one may construct a general expression for the solution when source intensity varies arbitrarily in time. Explicit expressions are obtained for solution of the fundamental case of temporally sinusoidal source intensity.

MP 1490

SMALL CALIBER PROJECTILE PENETRA-TION IN FROZEN SOIL. Richmond, P.W., July 1980, 4(3), p.801-823, 11 refs.

PROJECTILE PROJECTILE PENETRATION, FROZE GROUND STRENGTH, IMPACT STRENGTH. FROZEN MP 1491 REMOTE SENSING OF WATER QUALITY USING AN AIRBORNE SPECTRORADIOME-

McKim, H.L., et al, International Symposium on Remote Sensing of the Environment, 14th, San Jose, Costa Rica, Apr. 23-30, 1980. Proceedings, 1980, p. 1353-1362, 6 refs.
Merry, C.J., Layman, R.W.
36-1886

30-1880 WATER CHEMISTRY, REMOTE SENSING, SUS-PENDED SEDIMENTS, SPECTROSCOPY, RADI-OMETRY, AIRBORNE EQUIPMENT.

OMETRY, AIRBORNE EQUIPMENT.

An airborne spectroradiometer with 500 parallel channels has been used to monitor water quality in various water environments. Field experiments were run to test and evaluate the instrument's response to various amounts of suspended materials in water. Procedures were evaluated in the laboratory to separate the various components from the total reflected radiance and to correlate the spectral distribution of the subsurface reflectance to the organic/inforganic materials in the water. It was concluded that qualitative read quantitative measurement of turbidity within a water body is possible using the airborne spectroradiometer. The accuracy of the quantitative measurement is still under investingation, but suspended sediment concentration of less than 5 ppm can be detected. Organic and inorganic constituents can be qualitatively differentiated

FULL-DEPTH AND GRANULAR BASE COURSE DESIGN FOR PROST AREAS.

Eaton, R.A., et al, Jan. 1982, 108(TE1), p.27-39, 13 refe

Payne, J.O., Jr.

Payne, J.O., Jr.
36-2081
FROST PENETRATION, SUBGRADE SOILS,
PAVEMENTS, BEARING STRENGTH, FREEZE
THAW CYCLES, FROST HEAVE, SOIL
STRENGTH, SOIL WATER, FREEZING INDEXES, DESIGN CRITERIA, DYNAMIC
LOADS, DEFORMATION.

LOADS, DEFORMATION.

When properly designed and constructed, the Asphalt Institute full-depth pavement concept can be a viable design alternative for seasonal frost areas. The Corps of Engineers reduced subgrade strength frost. The the test conditions. For each design, two different thicknesses were studied in test sections placed over 12 in. of prepared subgrade and tested under light traffic conditions in Hanover, New Hampshite. After design traffic loading was exceeded, pavement failure occurred as expected in the thinner full-depth section. The thanner reduced subgrade strength section was stull in good condition after experiencing twice its design loading. Frost penetrations, pavement n-factors (surface transfer coefficients), Benkelman Beam deflections, and the spring subgrade moisture contents are also compared for the two designs

MP 1493 CONTINUOUSLY DEFORMING FINITE ELE-MENTS FOR THE SOLUTION OF PARABOLIC PROBLEMS, WITH AND WITHOUT PHASE CHANGE. Lynch, D.R., et al, 1981, Vol.17, p 81-96, 27 refs.

O'Neill, K.

36-2159
FREEZE THAW CYCLES, STEFAN PROBLEM,
LIQUID SOLID INTERFACES, LATENT HEAT,
BOUNDARY VALUE PROBLEMS, PHASE
TRANSFORMATIONS, HEAT TRANSFER, TEMPERATURE EFFECTS, ANALYSIS (MATH-

MP 1494

APPROXIMATE SOLUTION TO NEUMANN PROBLEM FOR SOIL SYSTEMS. Lunardini, V.J., et al, Mar. 1981, 103(1), p.76-81, 12

Varotta, R.

Various, N.
36-2256
SOIL TEMPERATURE, HEAT BALANCE,
FREEZE THAW CYCLES, BOUNDARY LAYER,
PHASE TRANSFORMATIONS, THERMAL
PROPERTIES, TEMPERATURE EFFECTS,
ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).

An approximate solution to the Neumann problem has been obtained by using the heat balance integral method. The accuracy of the solution is shown to be very good for all practical soil system cases. The thermal properties of soil systems are also expressed in terms of only the liquid volumetric fraction and combine with the approximate solution to give a rapid, accurate solution for freeze thaw problems without using graphs, tables, or transcendental equitions. A simple relation is also given for the analogous problem in cylindrical coordinates, but its range of validity is somewhat limited.

MP 1495

ACOUSTIC EMISSIONS DURING CREEP OF FROZEN SOILS.

Fish, A.M., et al, 1982, No.750, p.194-206, 18 refs. Sayles, F.H. 36-2402

GROUND PHYSICS, FROZEN GROUND STRENGTH, SOIL CREEP, ACOUSTICS, RHEOLOGY, STRESSES, COMPRESSIVE PROPERTIES, SOIL FREEZING, DEFORMA-

Deformation, time-dependent failure, and acoustic emissions Deformation, time-dependent failure, and acoustic emissions during unconfined compression tests of frozer Fairbanks silt were studied. Acoustic emissions (AE) are detected when the applied stress exceeds a threshold level. This threshold stress is related to the limit of long-term strength of the frozen soil. Under stress exceeding the limit of the long-term strength, the accumulation of acoustic emissions with time can be correlated with creep deformation, that is, plots of the cumulative number of acoustic pulses versus time of the cumulative number of acoustic pulses versus time have shapes similar to those of creep curves with primary, secondary, and tertiary stages. Such correspondence made it possible to describe both phenomena from the viewpoint of the unified kinetic theory of strength. Experimental data are presented, and unified constitutive equations describing deformations, time-dependent failure, and the accumulation of the acoustic emissions during short-term creep of frozen soils are derived. The time to incipient failure, when the AE rate reaches a minimum, is considered to be the most important characteristic of a creep process. It is shown that this time can be predicted theoretically if the parameters of the AE process and the stress state of the frozen soil are known.

MP 1496

PHASE CHANGE AROUND INSULATED BU-RIED PIPES: QUASI-STEADY METHOD. Lunardini, V.J., Sep. 1981, Vol. 103, p.201-207, 13 refs.

36-2401

FREEZE THAW TESTS, UNDERGROUND PIPE-LINES, HEAT TRANSFER, STEFAN PROBLEM, PHASE TRANSFORMATIONS, PIPELINE INSULATION, THERMAL INSULATION, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

The heat transfer problem for cylinders embedded in a medium with variable thermal properties cannot be solved excatly if phase change occurs. Approximate solutions have been found using the quasi-steady method. The temperature field, phase change location, and pipe surface heat transfer can be estimated using graphs presented for parametric rangers of temperature, thermal properties, burial depth, and insulation thickness. The accuracy of the graphs increases as the Stefan number decreases and they should be of particular value for insulated hot pipes or refrigerated gas lines.

MP 1497
HIGHLY EFFICIENT, OSCILLATION FREE SO-LUTION OF THE TRANSPORT EQUATION OVER LONG TIMES AND LARGE SPACES. O'Neill, K, Dec. 1981, 17(6), p.1665-1675, 28 refs 36-2428

SOLUTIONS, FLUID FLOW, DIFFUSION, CON-VECTION, TIME FACTOR, ANALYSIS (MATHEMATICS).

MP 1498

VENTING OF BUILT-UP ROOFING SYSTEMS. Tobiasson, W., Conference on Roofing Technology, 6th, Gaithersburg, MD, Apr. 30-May 1, 1981. Proceedings, 1981, p.16-21, 12 refs. 38.39RI

ROOFS, VENTILATION, THERMAL INSULA-TION, MOISTURE, DRYING, DRAINS, VAPOR BARRIERS.

BARRIERS.

Table I summarizes the information presented in this paper. The following rules of thumb are offered. I. Bituminous built-up membranes should be vented during construction to allow excess moisture to dissipate. 2. Do not rely on senting above wet-applied decks or wet-applied insulations to dry into the space below. 4. To make roofing systems less vulnerable to moisture problems avoid using moisture-sensitive materials for the bottom ply of a membrane. 5 There is no reason to vent the insulation of a roof lacking a vapor retarder. In fact, venting such roofs may do more thermal and moisture harm than good 6. When a vapor retarder is required, focus money and efforts that might be spent on vents to improving the quality of the vapor retarder. 7 Do not expect to be able to encapsulate insulation in a vapor tight, pressuriable envelope Consequently, do not worry too much about creating excess pressures within the roofing system (except within the membrane itself). 8 Do not expect to be able to dry out wet insulation in compact roofs by venting. 9 Seme drying of wet fibrous glass insulation is possible by draining away water.

MP 1499

CRREL FROST HEAVE TEST, USA.

Chamberlain, E.J., et al, Nov. 1981, No.22, p.55-62. 7

Carbee, D.L.

36-2480

FROST RESISTANCE, SOIL FREEZING, FROST HEAVE, MEASURING INSTRUMENTS, TEMPERATURE EFFECTS, TESTS.

PERATURE EFFECTS, TESTS.

The CRREL frost heave test for determining the frost susceptibility of soils and granular base materials is described. The CRREL test is conducted with a constant rate of frost penetration of 13 cm/day with water freely avaible. The frost susceptibility classification system is based on the average rate of heave for 12 days. A summary of nearly 400 tests is given to show the wide range of results for similar materials. A summary of the U.S. Army Corps of Engineers Frost Design Classification System is also given to show for what materials the frost heave test is required.

OVERVIEW OF SEASONAL SNOW METAMOR-PHISM.

Colbeck, S.C., Feb. 1982, 20(1), p.45-61, 43 refs., Presented at the U.S.-Canadian Workshop on the Properties of Snow, Snowbird, Utah, April 8-10, 1981.

SNOW PHYSICS, METAMORPHISM (SNOW), SNOW COVER STRUCTURE, SNOW WATER CONTENT.

CONTENT.
The grains in seasonal snow undergo rapid and radical transformations in sixe, shape, and cohesion. These grain characteristics affect all of the basis properties of snow. Snow is characterized as either wet or dry depending on the presence of liquid water. Wet snow is markedly different at low and high liquid contents. Dry snow is characterized as either an equilibrium form or a kinetic growth form; that is, it is either well rounded or faceted. Of course, many snow grains display either transitional features between two of these categories or features which arise from other processes. Snow is classified depending on the dominant processes of its metamorphism

MP 1501

PREDICTION OF ICE GROWTH AND CIRCU-LATION IN KACHEMAK BAY, BRADLEY LAKE HYDROELECTRIC PROJECT.

Daly, S.F., Bradley Lake Hydreolectric Project, Alas-ka; environmental impact statement—Appendixes. Anchorage, U.S. Army Corps of Engineers, March 1982, p.(C)1-(C)9. 36-2575

36-2575
ICE GROWTH, OCEAN CURRENTS, SEA ICE DISTRIBUTION, ENVIRONMENTAL IMPACT, ELECTRIC POWER, SUSPENDED SEDIMENTS, UNITED STATES—ALASKA—KACHEMAK

MP 1502

HISTORICAL SHORELINE CHANGES ALONG THE OUTER COAST OF CAPE COD.

Gatto, L.W., Environmental geologic guide to Cape Cod National Seashore. Edited by S.P. Leatherman, Amherst, University of Massachusetts, 1979, p.69-90, 9 refs.

SHORELINE MODIFICATION, SHORE ERO-SION, PHOTOINTERPRETATION, WATER LEV-EL, AERIAL SURVEYS, HISTORY.

EL, AERIAL SURVEYS, HISTORY.

The objectives of this investigation were to analyze past patterns of shoreline change, estimate the amounts of change in the positions of the high water line and sea cliff break and base, and estimate rates of accretion and erosion. Distances from selected reference points to the high water line, cliff break, and cliff base were measured using photonieripretation techniques on black and white 9 x 9 in serial photographs acquired in 1938, 1952, 1971 and 1974. The amounts and rates of change are calculated for the intervals between the dates of photo acquisition and for the total period from 1938 to 1974.

MP 1503

HISTORICAL SHORELINE CHANGES AS DE-TERMINED FROM AERIAL PHOTOINTER-PRETATION.

Gatto, L.W., Remote Sensing Symposium, Reston, Va., Oct 29-31, 1979. Proceedings. U.S. Army Corps of Engineers, [1980], p.167-170.

SHORELINE MODIFICATION, SHORE ERO-SION. PHOTOINTERPRETATION. AERIAL SURVEYS. PHOTOGRAMMETRY.

SURVEYS, PHOTOGRAMMETRY.

The protection and preservation of shorelines and coastal areas along oceans, takes, reservoirs and rivers have become increasingly important with more intensive use and development of these areas by the growing population. Shoreline crosson and subsequent shoreline recession are of primary concern since they cause property loss, changes in shoreline habitats and degraded water quality. USACRREL has been investigating many of the complex crosson processes, site specific rates of crosson and problems caused by shoreline crosson. As an integral part of these comprehensive investigating the processes of the property of the property of the processes.

gations, historical and recent aerial photographs have been used to document historical shoreline characteristics and conditions, to determine past patterns of regional shoreline changes, to monitor the areal extent of shoreline erosion, and to estimate the historical rates of change in shoreline

MP 1504

POTHOLES: THE PROBLEM AND SOLU-TIONS

Eaton, R.A., Apr. 1982, 74(479), p.160-162.

36-3938
PAVEMENTS, DAMAGE, ROAD MAINTENANCE, FREEZE THAW CYCLES, DRAINAGE,
FROST HEAVE, FATIGUE (MATERIALS),
PRECIPITATION (METEOROLOGY), CRACKS.

MP 1505 ROOF MOISTURE SURVEYS.

Tobiasson, W., Apr. 1982, 47(479), p.163-166, 4 refs.

ROOFS, WATERPROOFING, MOISTURE DE-TECTION, DRAINAGE, INFRARED PHOTOG-RAPHY, LEAKAGE.

MP 1506

OVERLAND FLOW: AN ALTERNATIVE FOR WASTEWATER TREATMENT.
Martel, C.J., et al, Apr. 1982, 47(479), p.181-184, 6

Lee, C.R. 36-4010

WASTE TREATMENT, WATER TREATMENT, RUNOFF, LAND RECLAMATION, SLOPE ORIENTATION.

MP 1507

PHASE CHANGE AROUND A CIRCULAR CYL-INDER

Lunardini, V.J., Aug. 1981, 103(3), p.598-600, 14 refs.

PHASE TRANSFORMATIONS, PIPES (TUBES), HEAT TRANSFER, FREEZE THAW CYCLES, FROZEN GROUND PHYSICS, BOUNDARY LAYER, HEAT BALANCE, ANALYSIS (MATHEMATICS).

MAINTAINING BUILDINGS IN THE ARCTIC. Tobiasson, W., et al, July-Aug. 1977, S(4), p.244-251, In English and French.

Flanders, S.N., Korhonen, C.

36-2638

THERMAL INSULATION, BUILDINGS, HEAT TRANSFER, MOISTURE TRANSFER, MAINTE-

TRANSFER, MOISTURE TRANSFER, MAINTE-NANCE, UREA, LEAKAGE, INFRARED PHO-TOGRAPHY, UNITED STATES—ALASKA.

Close interest in the work of CIB working commission W 40 on heat and moisture transfer has prompted the authors, who are scientists working with the US Army Cold Regions Research and Engineering Laboratory, to send us these two summaries of remedial work on houses in Alaska The first indicates the scope for simple injection of urea formaldehyde foam to improve thermal insulation of old wood-frame buildings; the second shows how infra-red photography can cut the cost of repairs to leaking roofs

MP 1509

CAN WET ROOF INSULATION BE DRIED OUT. Tobiasson, W., et al, Thermal insulation materials and systems for energy conservation in the '80s, edited by F.A. Govan, D.M. Greason and J.D. McAllister, Philadelphia, American Society for Testing and Materials, 1983, p.626-639, ASTM STP 789, 11 refs Korhonen, C., Coutermarsh, B.A., Greatorex, A. 38-3980

ROOFS, THERMAL INSULATION, MOISTURE, DRYING, VENTILATION, VAPOR BARRIERS.

DRYING, VENTILATION, VAPOR BARRIERS. Nondestructive techniques are being widely used to locate wet insulation in compact roofing systems. Now that wet insulation can be found, breather vents and so-called breathable" membranes are being promoted to dry out wet insulation, thereby recovering its thermal effectiveness. Our exposure tests in New Hampshire indicate that the above ventuing methods are all rather ineffective in drying scaled specimens of perlite and fibrous glass roof insulation. It would take many decades to dry our specimens at the rates we measured over the past two years. Cross-ventilation within the insulation increased the rate of drying. For perlite insulation, the faster rate would still result in a drying time measured in decades. For fibrous glass insulation the drying time was reduced to 13 years. We have succeeded in drying fibrous glass insulation in a roof by removing the water with a vacuum cleaner.

MP 1510

SNOW COVER MAPPING IN NORTHERN MAINE USING LANDSAT DIGITAL PROCESS-ING TECHNIQUES.

Merry, C.J., et al, Satellite hydrology. Annual William T. Pecora Memorial Symposium, 5th, American Water Resources Association, June 1979, p.197-198, Summary only.

McKim, H.L., Bates, R.E., Ungar, S.G., Cooper, S., Power, J.M.

VEGETATION, SNOW COVER DISTRIBUTION, SNOW WATER EQUIVALENT, SNOW DEPTH, MAPPING, LANDSAT.

VEGETATION SELECTION AND MANAGE-MENT FOR OVERLAND FLOW SYSTEMS.

Palazzo, A.J., et al, Land treatment of municipal wastewater. Edited by F.M. D'Itri, Sevenoaks, England, Butterworths, 1982, p.135-154, 19 refs. Jenkins, T.F., Martel, C.J.

36-2749

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, VEGETATION, GROWTH, NUTRIENT CYCLE, AGRICULTURE.

MP 1512 CONFIGURATION OF ICE IN FROZEN MEDIA.

Colbeck, S.C., Feb. 1982, 133(2), p.116-123, 9 refs. 36-2865

ICE CRYSTAL STRUCTURE, ICE CRYSTAL GROWTH, GROUND ICE, SANDS, ICE AIR INTERFACE, POROSITY, WATER CONTENT, TRANSFER, MASS FLOW, EXPERIMEN-TATION.

The configuration and fabrics of ice in frozen glass beads The configuration and fabries of ice in frozen glass beads and sands with a low initial water content were observed. As suggested by Miller, the air-ice interface is convex, and pores seem to fill unstably. This produces an uneven ice distribution when the water supply is limited. Many different ice shapes and crystal distributions were observed, indicating a mixture of kinetic crystal growth processes and equilibrium constraints. Ice dendrites arose from rapid growth. Both single and multicrystalline structures were found. Clearly, a wide variety of situations is possible, depending on growth rates, nucleation sites, and local paths of heat and mass flow.

SOME FIELD STUDIES OF THE CORRELA-TION BETWEEN ELECTROMAGNETIC AND DIRECT CURRENT MEASUREMENTS GROUND RESISTIVITY.

Arcone, S.A., 1982, No.741, p.92-110, 11 refs.

SOIL PHYSICS. ELECTRICAL RESISTIVITY, ELECTROMAGNETIC PROSPECTING, PERMA-FROST PHYSICS, MAGNETIC SURVEYS, ELEC-TRIC FIELDS, GROUND ICE.

Electromagnetic (em) and direct-current (d-c) methods of measuring ground resistivity have been compared at permafrost and nonpermafrost sites. The em methods utilized the principles of magnetic induction and plane wave surface impedance. Layered ground models were derived from the d-c sounding data, and the theoretical values of the em methods for these models were compared with the em field results. Both em methods correlated well with the d-c data in the two cases of simple, multilayered ground of large extent. In several cases of resistive inhomogeneities, the magnetic induction data correlated well with the d-c data. In one case of a resistive inhomogeneity, the surface impedance responded well only qualitativel) and may have given some false indications of resistive substructure. It appears that in all cases where the volume of exploration was comparable, there was reasonable correlation. It is estimated that the standard data analysis procedure which assumes layering of infinite extent will apply well for the surface impedance method when disturbances in the local layering are greater than a skin depth away from the point of measurement, and for the magnetic induction method when disturbances in the layering are at a distance from the interloop axis that is greater than the interloop separation. Electromagnetic (em) and direct-current (d-c) methods of

MULTI-YFAR PRESSURE RIDGES IN THE CANADIAN BEAUFORT SEA. Wright, B., et al., Oct. 1981, 5(2-3), p.125-145, For

another source of the article and abstract see 33-4609 (MP 1229) 16 refs Hnatiuk, J., Kovaes, A.

36-3745

SEA ICE. PRESSURE RIDGES, ICE STRUCTURE.

MP 1515

DESIGN AND USE OF THE CRREL INSTRU-MENTED VEHICLE FOR COLD REGIONS MO-

BILITY MEASUREMENTS.
Blaisdell, G.L., 1982, No.820217, International Congress and Exposition, Detroit, Michigan, Feb.22-26, 1982, 11p., 2 refs. 36-2755

TRACTION, COLD WEATHER OPERATION, TIRES, SURFACE PROPERTIES, RUBBER SNOW FRICTION, INTERFACES, VEHICLES, TESTS, COMPUTER APPLICATIONS.

COMPUTER APPLICATIONS.

The U.S. Army Cold Regions Research and Engineering Laboratory has recently acquired an instrumented vehicle for the measurement of forces at the tire/surface material interface. The CRREL instrumented vehicle (CIV) is equipped with moment-compensated triaxial load cells mounted in the vertical, longitudinal (in the direction of motion) and side directions. In addition, accurate wheel and vehicle speeds and rear axle torque and speed are measured. Modifications to the vehicle to facilitate the performance of traction and motion resistance tests include four lock-out type hubs to allow front, rear- or four-wheel drive and a dual brake system for front-, rear- or four-wheel braking. A minicomputer-based data acquisition system is installed in the vehicle to control data collection and for data processing, analysis, and display. Discussion of the vehicle includes its operation and use for the evaluation of the tire performance and surface material properties of motion resistance and traction. MP 1516 MP 1516

Blaisdell, G.L., et al, 1982, No.820346, International Congress and Exposition, Detroit, Michigan, Feb. 22-26, 1981, 7p., 8 refs. Harrison, W.L. 36-2756

RUBBER SNOW FRICTION, SNOW SURFACE, TRACTION, VEHICLES, ANALYSIS (MATH-EMATICS).

EMATICS). Research on vehicle mobility in snow has recently become significantly updated by the use of instrumented vehicles. Utilizing triaxial load cells in the front wheel assemblies, the vehicles are capable of measuring the traction and motion resistance forces located at the tire/snow interface. Based on these measured quantities, snow surface characterization parameters are developed. Also, using an energetics approach, a tire performance parameter is developed which offers a measure of the slip-shear energy expended by a tire moving a unit distance. This paper presents the methods, equipment and philosophy followed by the authors in evaluating tire performance in a shallow snow cover. Definitions of terms are contained in the Appendix. of terms are contained in the Appendix.

MP 1517

ON THE DIFFERENCES IN ABLATION SEA-SONS OF ARCTIC AND ANTARCTIC SEA ICE. Andreas, E.L., et al, Feb. 1982, 39(2), p.440-447, 41 refs.

Ackley, S.F. 36-2836

ICE MELTING, ABLATION. METEOROLOGICAL FACTORS.

Arctic sea ice is freekled with melt ponds during the ablation season. Antarctic sea ice has few, if any On the basis of a simple surface heat budget, the authors investigate the meteorological conditions necessary for the onset of surface melting in an attempt to explain these observations. The low relative humidity associated with the relatively dry winds off the continent and an effective radiation parameter winds off the continent and an effective radiation parameter smaller than that characteristic of the Arctic are primarily responsible for the absence of melt features in the Antarctic. Together these require a surface-layer air temperature above OC before Antarctic sea ice can melt. A ratio of the bulk transfer coefficients less than I also contributes to the dissimilarity in Arctic and Antarctic ablation seasons. The effects of wind speed and of the sea-ice roughness on the absolute values of bulk transfer coefficients seem to moderate regional differences, but final assessment of this hypothesis awaits better data, especially from the Antarctic (Auth.) (Auth)

MP 1518

SEDIMENT LOAD AND CHANNEL CHARAC-TERISTICS IN SUBARCTIC UPLAND CATCH-MENTS.

Slaughter, C.W., et al., 1981, 20(1), p.39-48, 12 refs. Collins, C.M. 36-2830

J6-28JU DISCONTINUOUS PERMAFROST, CHANNELS (WATERWAYS), GEOMORPHOLOGY, SEDI-MENT TRANSPORT, HYDROLOGY, DRAIN-AGE, SUSPENDED SEDIMENTS, WATER-SHEDS, STATISTICAL ANALYSIS

Sediment load in low-order streams of the unglaciated Yukon-Tanana Uplands of central Alaska may be related to drainage basin characteristics and to stream channel morphology. This has been investigated by analysis of selected physical hydrologi-cal and water quality data for the 104 sq km Caribou-Poker Creeks Research Watershed, 'ocated at 65 deg. 07 min N. 147 deg. 30 min W in a region of rolling to steep uplands and discontinuous permafrost. Channel morphology

data are available for first-, second- and third-order streams. Sediment load for selected points was determined over 45 weeks during summer of 1978 and 1979. Consistent differences in sediment yield, hydrologic regime and channel morphology have been determined between permafrost and non-permafrost drainages.

MP 1519 ROLE OF RESEARCH IN DEVELOPING SUR-FACE PROTECTION MEASURES FOR THE ARCTIC SLOPE OF ALASKA.

Johnson, P.R., Symposium: Surface Protection

through Prevention of Damage (Surface Managethrough Prevention of Damage (Surface Management); Focus: The Arctic Slope, Anchorage, Alaska, May 17-20, 1977. Proceedings. Edited by M.N. Evans. Anchorage, Alaska State Office, Bureau of Land Management, Mar. 1978, p.202-205.

36-2855
SNOW ACCUMULATION, ENVIRONMENTAL
PROTECTION, SNOW ROADS, ICE ROADS,
SNOWDRIFTS, WIND FACTORS, SNOW
FENCES, UNITED STATES—ALASKA—NORTH SLOPE.

SLOPE.

The U.S. Army Cold Regions Research and Engineering Laboratory (USA CRREL) has long conducted research in anow, i.e., and permafrost. It also translates foreign language engin ...nng papers and publishes research reports, monographis, and bibloographies. Snow and ice roads and construction pads have been used, primarily on the Arctic Slope, during the last few winters. Some have been successful but problems exist which will require further experience and research to solve. One problem is that of snow supply. Snowfall on the Arctic Slope is limited, particularly early in the season when it is most desired. Few good data are available on total quantities and the time pattern of snowfall but Wyoming Snow Gages, now being installed by a number of government agencies and private organizations, are beginning to provide some data which can be used with some confidence. The snow which falls is often blown off by the strong winds which are common in the area so it is r x available where it is needed Research is under way on equipment and techniques for collecting snow and inducing drifting.

MP 1520 GROUND PRESSURES EXERTED BY UNDER-GROUND EXPLOSIONS.

Johnson, P.R., Symposium: Surface Protection through Prevention of Damage (Surface Management); Focus: The Arctic Slope, Anchorage, Alaska, May 17-20, 1977. Proceedings. Edited by M.N. Evans, Anchorage, Alaska State Office, Bureau of Land Management, Mar. 1978, p.284-290, 3 refs.

36-287)
FROZEN GROUND STRENGTH, ENVIRONMENTAL PROTECTION, SOIL PRESSURE, EXPLOSION EFFECTS, SHOCK WAVES, WAVE
PROPAGATION, ENVIRONMENTAL IMPACT,
BLASTING, MARINE BIOLOGY, UNITED
STATES—ALASKA—NORTH SLOPE.

STATES—ALASKA—NORTH SLOPE.

Peak shock pressures in frozen soal resulting from underground explosions of moderate size and their effect on fish populations are examined, based on current knowledge of shock pressure patterns and the sensitivity of fish eggs and young and adult fish to such pressures. The peak shock pressures attenuate rapidly with distance from explosion and it appears that moderate-sized explosions, such as those from standard seismic shots, can be fired within a few hundred feet of water bodies without exceeding allowable peak shock pressures in the water bodies. Experimental studies should be carred out to confirm the pattern of peak shock pressure attenuation and examine the effectiveness of shock transmission between frozen ground and the water bodies. frozen ground and the water bodies.

MP 1521 USING SEA ICE TO MEASURE VERTICAL HEAT FLUX IN THE OCEAN.

McPhee, M.G., et al, Mar. 20, 1982, 87(C3), p.2071-2074, 8 refs.

Untersteiner, N.

36-2868
SEA ICE, ICE SALINITY, HEAT FLUX, SEA WATER, TEMPERATURE GRADIENTS, ICE GROWTH, DRIFTING STATIONS, WATER TEMPERATURE, SALINITY.

TEMPERATURE, SALINITY.

Results of an experiment performed at drifting ice station FRAM I in the Arctic Ocean northwest of Spitzbergen during March-May 1979 indicate that sensible heat flux from the ocean to the ice cover was less than 2 W/sq m. The estimate is based on measurements of temperature gradient, growth rate, and salinity of young sea ice. Uncertainty in the magnitude of the heat flux results more from evidence of horizontal inhomogeneity in the growing ice sheet than from measurement extrast. from measurement crr srs

MP 1522 APPROACH ROADS, GREENLAND 1955 PRO-

U.S. Arctic Construction and Frost Effects Laboratory, June 1959, No.3-505, 100p., For preliminary version see ACFEL TR 60, or 25-2537.

36-2877 PERMAFROST BENEATH ROADS, PERMA-FROST THERMAL PROPERTIES, GLACIER FLOW, GLACIER MELTING, ROADS, MAINTE-NANCE, THAW DEPTH, MELTWATER, ICE TEMPERATURE, ROADBEDS, CONSTRUCTION, GRAVEL, EQUIPMENT, GREENLAND— CAMP TUTO.

MP 1523
BASELINE DATA ON TIDAL FLUSHING IN COOK INLET, ALASKA.
Gatto, L.W., Preliminary analysis report, SR/T contract No.160-75-89-02-10, June 1973, 11p., Unpublished lished manuscript. 9 refs. 36-2878

30-28 78
TIDAL CURRENTS, SUSPENDED SEDIMENTS,
OCEAN CURRENTS, WATER POLLUTION,
SEDIMENT TRANSPORT, SEDIMENTATION,
REMOTE SENSING, SEASONAL VARIATIONS,
UNITED STATES—ALASKA—COOK INLET.

MP 1524 ACOUSTIC EMISSIONS FROM POLYCRYS-TALLINE ICE.

St. Lawrence, W.F., et al, Mar. 1982, 5(3), p.183-199, 18 refs. Cole. D.M.

36-2870

36-2870
ICE CRYSTAL STRUCTURE, ICE ACOUSTICS, DYNAMIC LOADS, STRESSES, STRAINS, FRACTURING, AIR TEMPERATURE, MATHEMATICAL MODELS, MECHANICAL TESTS.

EMATICAL MODELS, MECHANICAL TESTS.

The acoustic emission response from fine-grained polycrystalline ice subjected to constant compressive loads was examined.

A number of tests were conducted with the nominal stress
ranging from 0 8 to 367 MPa at a temperature of -5C.

The acoustic emission response was recorded and the data
are presented with respect to time and strain. The source
of acoustic emissions in ice is considered in terms of the
formation of both microfractures and visible fractures that
develop without catastrophic faulure of the ice A model
to describe the acoustic emission response is developed.

DEFORMATION AND FAILURE OF ICE UNDER CONSTANT STRESS OR CONSTANT STRAIN-RATE.

Mellor, M., et al, Mar. 1982, 5(3), p.201-219, 8 refs. Cole, D.M.

ICE DEFORMATION, STRESS STRAIN DIA-GRAMS, ICE MECHANICS, AIR TEMPERA-TURE, TESTS, ISOTOPES.

Fine-grained isotopic ice was tested in uniaxial compression at -5C. Tests were made under: I. Constant strain rate, and 2 Constant stress, with total axial strains up to about 7%. Direct comparison of the results for constant stress and constant strain rate suggests that the two tests give much the same information when interpreted suitably Detailed comparisons and interpretations of the data will be given in a subsequent paper.

ON MODELING MESOSCALE ICE DYNAMICS USING A "ISCOUS PLASTIC CONSTITUTIVE

Hibler, W.D., III, et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Vol.3, Québec, Canada, Université Laval, 1981, p 1317-1329, 9 refs. Includes discussion and authors

reply. Udin, I., Ullerstig, A.

JOLYNA ICE MECHANICS, VISCOSITY, ICE PLASTICI-TY, RHEOLOGY, MATHEMATICAL MODELS, PLASTIC FLOW, ICE COVER THICKNESS, VELOCITY, ICE STRENGTH.

VELOCITY, ICE STRENGTH.

The behavior of an ice dynamics model employing a viscous plastic theology is investigated. Time and space scales of the order of 3 hours and 20 km are emphasized. However, whenever possible the results are presented in a nondimensional form. Numerical parameter variations examined include the effect of the "ingid" creep rate on numerical convergence rate, the effects of ice strength on the numerical adjustment time needed to fully attain ideal plastic flow, and the effect of grid size on the behavior of simulated ice dynamics based on the results of these studies a viable numerical procedure for simulating mesoscale plastic flow is proposed.

MP 1527
SEA ICE RUBBLE FORMATIONS OFF THE
NORTHEAST BERING SEA AND NORTON
SOUND COASTS OF ALASKA.

Kovacs, A., International Conference on Port and Novaes, A., international Conference on Fort and Ocean Engineering under Arctic Conditions, 6th, Québec, Canada, July 27-31, 1981. Proceedings, Vol.3, Québec, Canada, Université Laval, 1981, p.1348-1363, 21 refs.

SEA ICE, PRESSURE RIDGES, ICE SURFACE, ICE FORMATION, GROUNDED ICE, PHOTOGRAPHY, AERIAL SURVEYS, UNITED STATES— ALASKA—NORTON SOUND, BERING SEA.

RIVER ICE SUPPRESSION BY SIDE CHAN-NEL DISCHARGE OF WARM . ATER.

Ashton, G.D., IAHR International Symposium on Ice, Québec, Canada, July 27-31, 1981. Proceedings, Vol.1, Québec, Canada, Université Laval, 1982, p.65-80, 3 refs. Includes discussions and replies. 36-3023

36-3023
RIVER ICE, ICE CONDITIONS, ICE PREVENTION, CHANNELS (WATERWAYS), WATER
TEMPERATURE, RIVER FLOW, ICE EDGE, AIR
TEMPERATURE, ICE MELTING.

Results are presented of a field study of the ice suppression caused by discharge of warm water at the side of the Mississippi River near Bettendorf, lowa Included in the results are measurements of lateral and longitudinal open water extents and lateral, longitudinal, and vertical water temperature profiles. Successive measurements were made on both very cold (-20C) and warm days (OC air temperature). The manner by which the ice cover extends during a change from warm to cold weather is described.

MP 1529 PERFORMANCE OF A POINT SOURCE BUB-BLER UNDER THICK ICE.

Haynes, F.D., et al. IAHR International Symposium on Ice, Québec, Canada, July 27-31, 1981. Proceedings, Vol.1, Québec, Canada, Université Laval, 1982, p.111-124, 10 refs. Includes discussions and replies. Ashton, G.D., Johnson, P.R.

JO-3020 ICE COVER THICKNESS, BUBBLING, ICE PRE-VENTION, ICE MELTING, STRUCTURES, DAM-AGE, TESTS, AIR TEMPERATURE, ANALYSIS (MATHEMATICS).

(MATIEMATICS).

Air bubbler systems are used to suppress ice formation and prevent ice damage to structures. Injection of air into the slightly more dense, warm water at the bottom of a body of fresh water raises the warm water to the surface. A bubbler system provides a simple and inexpensive means of suppressing ice if the body of water has the necessary thermal reserve. A study was conducted with a point source bubbler to examine its performance when installed under an existing layer of thick lake ice.

PORT HURON ICE CONTROL MODEL STUD-

Calkins, D.J., et al, IAHR International Symposium on Cic. Québec, Canada, July 27-31, 1981. Proceedings, Vol. I, Québec, Canada, Université Laval, 1982, p.361-373, 6 refs. Includes discussion and authors' reply. Sodhi, D.S., Deck, D.S. 36-3044

RIVER ICE, ICE CONTROL, ICE JAMS, FLOODS. ICE MECHANICS, LAKE ICE, ICE LOADS, LOADS (FORCES), ICE FLOES, WIND PRESSURE, STRUCTURES, MODELS, UNITED STATES—SAINT CLAIR RIVER.

The Corps of Engineers, in its study of year-round navigation on the Great Lakes, recognized the problem of see discharge into St. Clair River from Lake Huron. This study deals with the determination of force levels on, and the amount of see discharge through the opening in, an see control structure, using natural and synthetic see floes.

MP 1531 FORCE DISTRIBUTION IN A FRAGMENTED ICE COVER.

Daly, S.F., et al, IAHR International Symposium on Ice, Québec, Canada, July 27-31, 1981. Proceedings, Vol 1, Québec, Canada, Université Laval, 1982, p.374-387. 2 refs. Includes discussions and authors' replies. Stewart, D.M

FLOATING ICE, ICE FLOES, LOADS (FORCES). ICE BOOMS, SHEAR STRESS, CHANNELS (WATERWAYS), EXPERIMENTATION.

GLACIER MECHANICS.

Mellor, M., IAHR International Symposium on Ice, Québec, Canada, July 27-31, 1981. Proceedings, Vol.2, Québec, Canada, Université Laval, 1982, p. '55-474, Includes discussion. 36-3051

GLACIER FLOW, ICE CREEP, ICE MECHANICS, STRESS STRAIN DIAGRAMS, RHEOLOGY, EN-GINEERING.

MP 1533

FIELD INVESTIGATIONS OF A HANGING ICE DAM.

Beltaos, S., et al, IAHR International Symposium on Ice, Québec, Canada, July 27-31, 1981 Proceedings, Vol.2, Québec, Canada, Université Laval, 1982, p.475-488, 19 refs. Includes discussions and replies. Dean, A.M., Jr. 36-3052

RIVER ICE, ICE DAMS, ICE BREAKUP, FRAZIL ICE, SHEAR STRENGTH, UNDERWATER ICE, SLUSH, BEARING STRENGTH, ICE JAMS. DAMAGE, FLOW RATE, POROSITY.

A hanging ice dam that forms annually in the lower Smoky River, Alberta, has been the object of continued investigation during the period 1975-1979. The study aims at documenting physical dimensions and material properties of the dam; elucidating the mechanisms of its formation and removal; and assessing its effects on the progress of breakup in the river. This paper presents a summary of the results obtained

MP 1534 PROBABILISTIC-DETERMINISTIC ANALYSIS OF ONE-DIMENSIONAL ICE SEGREGATION IN A FREEZING SOIL COLUMN.

Guymon, G.L., et al, Nov. 1981, 5(2), p.127-140, 14

Harr, M.E., Berg, R.L., Hromadka, T.V., II. 36-3231

FROST HEAVE, SOIL FREEZING, HEAT TRANSFER, SOIL WATER MIGRATION, ICE FORMATION, WATER CONTENT, MATH-EMATICAL MODELS.

EMATICAL MODELS.

A deterministic model of frost heave based upon simultaneous analysis of coupled heat and moisture transport is cascaded with a probabilistic model of parameter variations. The multiperameter, deterministic model is based upon submodels of moisture transport, heat transport, and lumped isothermal freezing processes. The probabilistic model is based upon Rosenblueth's method which only requires knowledge of parameter means and their coefficients of variation.

MP 1535
APPLICATION OF A NUMERICAL SEA ICE
MODEL TO THE EAST GREENLAND AREA.
Tucker, W.B., Monterey, California, Naval Postgraduate School, Dec. 1981, 109p., M.S. thesis. Refs.

SEA ICE DISTRIBUTION, DRIFT, ICE GROWTH, THERMODYNAMICS, MATHEMATICAL MOD-ELS, GREENLAND.

ELS, OREENLAND.

A dynamic-thermodynamic sea see model which employs a viscous-plastic constitutive law has been applied to the Last Greenland area. The model is run on a 40-law spatial scale at 1/4-day time steps for a 40-day period with forcing data beginning on Oct 1, 1979. Results tend to verify that the model predicts reasonable theknesses and two-locaties within the ice margin. Thermodynamic ice growth produces excessive ice extent, however, probably due to madequate parameterization of oceanic heat flux.

WEDDELL-SCOTIA SEA MARGINAL ICE ZONE OBSERVATIONS FROM SPACE, OCTO-

Crasey, F.D., et al. Mar. 15, 1986, 91(C3), p.3920-3924, 12 refs.

SEA ICE, ICE EDGE, REMOTE SENSING, ANTARCTICA WEDDELL, SEA, SCOTIA SEA.

IARCTICA WEDDELL SEA, SCOTIA SEA.

Imagery from the shuttle imaging radar-R experiment as well as other satellite and meteorological data are examined to learn more about the open sea see marpo of the Weddell-Scotia Seas region. At the see edge, the see forms into bandilate aggregates of small see flows similar to those observed in the Bering Sea. The radar backscatter characteristics of these bands suggest that their super surface is wet. Further into the pack, the radar imagery shows a transition to large from. In the open sea, large seebergs and long surface gravity waves are discernable in the radar images (Auth.)

MP 1537 ICE CRYSTAL MORPHOLOGY AND GROWTH RATES AT LOW SUPERSATURATIONS AND HIGH TEMPERATURES.

Colbeck, S.C., May 1983, 54(5), p.2677-2682, 17 refs.

ICE CRYSTAL STRUCTURE, ICE CRYSTAL GROWTH, SUPERSATURATION, TEMPERATURE EFFECTS, VAPOR DIFFUSION, DENSITY (MASS/VOLUME), MATHEMATICAL MODELS (MASS/VOLUME), MATHEMATICAL MODELS.
At an excess vapor density (supersaturation of about 1/10,000) adjacent to the ice crystal surface of 50-60 billionth g/cc, there is a transition between the highly faceted kinetic growth form and the rounded equilibrium form at temperatures above -6C. At lover temperatures there is a transition in the equilibrium form to hexagonal prisms because of a reduction in the disordered surface layer. The growth rate of ice crystals from the vapor is analyzed by a simple model which accounts for vapor flow and surface processes separately The conditions for highly temperature sensitive growth are identified from the model.

ICE PILE-UP AND RIDE-UP ON ARCTIC AND

SUBARCTIC BEACHES.

Kovacs, A., et al. Oct. 1981, 5(2/3), p.247-273, For another source of the article and abstract see 33-4610 (MP 1230). 22 refs.

Sodhi D.S.

SEA ICE, PRESSURE RIDGES, ICE PUSH.

FORMATION OF ICE CRYSTALS AND DISSI-PATION OF SUPERCOOLED FOG BY ARTIFI-CIAL NUCLEATION, AND VARIATIONS OF CRYSTAL HABIT AT EARLY GROWTH STAGES. Kumai, M., Apr. 1982, 21(4), p.579-587, 14 refs.

FOG DISPERSAL, ICE CRYSTAL NUCLEI, ARTIFICIAL NUCLEATION, SUPERCOOLED FOG. MICROSTRUCTURE, ELECTRON MICROSCOPY, PLATES, ICE FORMATION, WATER VAPOR, TEMPERATURE EFFECTS.

POR, TEMPERATURE EFFECTS.

The early stages of see crystal formation in supercooled fogs were studied in detail by electron microscopy, and see nucleation experiments using liquid propone seeding were conducted in a thermostatically controlled coldroom. Ice crystals, formed by rapid cooling created by the evaporation of liquid propone from a fine nozife as temperatures from 0.1 to -40°C, were collected and replicated on filiated grids for electron microscope examinations. Most of the see crystals formed immediately after the Isquid personan seedings were spherical (although approx. 20°C were hexagonal) with diameters ranging from 0.3 to 3 micrometer and with a mean diameter of 1.5 micrometer. Electron microscopy revealed a grain boundary in some of the ice crystals.

MP 1540 RESISTANCE COEFFICIENTS FROM VELOCI-TY PROFILES IN ICE-COVERED SHALLOW STREAMS.

Calkins, D.J., et al, June 1982, 9(2), p.236-247, With French summary. 7 refs. French summary. 7 refs. Deck, D.S., Martinson, C.R.

36-3929

ICE COVER STRENGTH, STREAM FLOW, VELOCITY, SHEAR STRESS, ANALYSIS (MATHEMATICS).

MP 1541

NITROGENOUS CHEMICAL COMPOSITION OF ANTARCTIC ICE AND SNOW.
Parker, B.C., et al., 1981, 16(5), p.79-81, 10 refs.

Zeller, E.J., Gow, A.J. 36-3979

ICE COMPOSITION, SNOW COMPOSITION, FIRN, CHEMICAL ANALYSIS, ANTARCTICA-AMUNDSEN-SCOTT STATION, ANTARCTICA -VOSTOK STATION.

This report emphasizes nitrate ion (NO3) concentrations in antarctic snow and firn from pets and cores. Chemical analysis conducted or planned on antarctic snow, firn, and ice are outlined. Computer curves compare the variation in NO3 over the past L000 yr in firn cores from South Pole Station and Ventek and petent the NO3 concentration record for the entire Vostek core over the past L000 yr South Pole firn core dates have been calculated using data which date back to 1750. Fourier analysis of the NO3 data from both South Pole and Vostek cores reveals strong periodicities in the NO3 concentration occurring at approxi11, 22, and 66 yr intervals. Data have previously been reported supporting the hypothesis that the 11 yr floctuations in NO3 either coincide with the solar activity may or the autoral mar. A table losts 14 potential sources or much amissis for NO3 in antaretic some or firm. Solar-included phenomena appear to be the more klefty sources. The results of NO3 sampling in a 10-m-deep stompet are discussed. This report emphasizes astrate ion (NO3) concentrations

MP 1542
PHYSICAL AND STRUCTURAL CHARACTERISTICS OF SEA ICE IN MCMURDO SOUND.
Gow, A.J., et al. 1981. 16(5), p.94-95, 5 refs.
Weeks, W.F., Govon, J.W., Ackley, S.F.

36-3988

SEA ICE, ICE STRUCTURE, PHYSICAL PROPER-TIES, CALVING, ANTARCTICA-MCMURDO SOUND.

SOUND.

This season's study of the physical and structural properties of sea ice in McMurdo Sound was restricted to sea ice that had formed since Apr. 1980 Multipear ice was observed and sampled at only one location, near Cape Chocolate on the western edge of McMurdo Sound. The locations of the sample sites are shown. The sampling program included an over-ice traverse of the bay-fast ice in McMurdo Sound. Extensive recent calving of the Koettlitz Glacier see tongue was observed in the vicinity of the Dailey Is. Preliminary investigations of the crystal structure of samples from 28 locations revealed undespread formation of congelation ice but only minimal amounts of frazil ice. Formation of a sub-ice plattlet layer with individual plates measuring up to several cm in length was observed at the majority of sampling sites. Petrographic studies revealed crystalline structures and c-axis orientations that exhibited much ta common with shore-fast ice of the arctic coast of Alaska.

MP 1543

HIGH-RESOLUTION IMPULSE RADAR MEAS-UREMENTS FOR DETECTING SEA ICE A DOCURRENT ALINEMENT UNDER THE R S. ICE SHELF.

Morey, R.M., et al, 1981, 16(5), p.96-97, 5 refs. Kovacs, A.

SEA ICE, RADAR ECHOES, ICE SHELVES. ANTARCTICA—ROSS ICE SHELF.

TARCTICA—ROSS ICE SHELF.
The objectures of the Jan. 1981 field scason were (1) to evaluate the feasibility of using a high-resolution impulse radar profiling system to detect the existence of sea ice which coring had revealed on the bottom of the Ross lee which coring had revealed on the bottom of the Ross lee the feetered horizontal C-axis azimuthal direction of the sea ice crystals using the voltage amplitude of the radar reflection. The instrumentation used is described. A table lists the radar parameters used for calculating the cantinum radar range, and the maximum radar range for the two antennas used is plotted. The results obtained with the radar system were inconclusive, and several possible explanations are outlined.

Brine infiltration into the McMurdo lee Shelf was also investigated.

ROLE OF PLASTIC ICE INTERACTION IN MARGINAL ICE ZONE DYNAMIC

Leppăranta, M., et al. Nov. 20, 1985, 90(C6), p.11,899-11,909, 17 refs. Hibler, W.D., III.

40-4615

ICE EDGE, SEA ICE, ICE COVER THICKNESS, PLASTIC FLOW, WIND DIRECTION, WIND VELOCITY, ICE MODELS.

Under appropriate conditions, the nonlinear nature of plastic tee interaction together with a nonlinear coupling between tee thickness characteristics and ice theology can substantially modify the character of marginal ice zone dynamics. This paper examines the vendy state raunifications of these mountainers by using a one-dimensional simplification of a two-level viscous plastic sea see model. A series of identical simulation is carried out with the model formulated in a moving Lagrangian grid in order to remove diffusion effects. Analytic setutions for the equilibrium plastic adjustment case are also constituted in allowed to equilibrate in response to a constant wind field, the thickness strength coupling will yield a sharp ice edge, with the compactness dropping rapidly to zero near the see margin. (Auth. mod.) Under appropriate conditions, the nonlinear nature of plastic

MP 1545

GEOMETRY AND PERMITTIVITY OF SNOW AT HIGH FREQUENCIES.

Colbeck, S.C., June 1982, 53(6), p.4495-4500, 37 refs.

SNOW ELECTRICAL PROPERTIES. SNOW DENSITY, POROSITY, SNOW CRYSTAL STRUCTURE. SNOW PHYSICS. TEMPERATURE GRADIENTS, LIQUID PHASES. WET SNOW, DIELECTRIC PROPERTIES.

DIELECTRIC PROPERTIES.

The grownerity and pocourty of dry snow varies widely expending on the history of conditions. The permittenty of dry snow mercases with mercasing ace context but it not greatly affected by the shapes of the see particles. In wer snow the permittenty mercases with logical content and the geometry is very important. However, the biquidite layer has britle effect on permittenty. The permittenty is described using Polder and van Santen's muring formulas and approximations of the geometries at high and low layed contents. It is shown that the common assumption of liquid shells over ace spheres is both physically meeting and leads to large errors.

MP 1940
ENVIRONMENTAL AND SOCIETAL CONSE-QUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE: VOLUME 2, PART 3—IN-FLUENCE OF SHORT-TERM CLIMATE FLUC-TUATIONS ON PERMAFROST TERRAIN. Brown, J., et al, May 1982, Vol.2, 30p., Refs. p.25-28. Andrews, J.T. 36.4051

PERMAFROST DEPTH, VEGETATION, CAR-BON DIOXIDE, CLIMATIC CHANGES, GROUND THAWING, SOIL TEMPERATURE.

MP 1547 DIELECTRIC PROPERTIES OF THAWED AC-TIVE LAYERS OVERLYING PERMAFROST USING R.DAR AT VHF.

Arcone, S.A., et al, May-June 1982, 17(3), p.618-626,

Delaney, A.J.

DIELECTRIC PROPERTIES, ACTIVE LAYER, GROUND THAWING, PERMAFROST BASES, RADAR ECHOES.

RADAR ECHOES.
Field measurements of the dielectric constant of thawed active layers of up to 1 m in depth at four sites in Alaska have been made using short-pulse ground radar whose returns were received in the near-field radiation zone. Three sites consisted of saturated sitls with varying amounts of organic material, and the fourth site was a most sand. The reflector returning the radar signals was the active layer/permafrost interface. Analysis of the waveforms showed that all the materials were nondispersive over the radar pulse bandwidth (75-225 MHz), and this was confirmed by time domain reflectometry (TDR) studies of field samples The average dielectric constants were between 23 and 34 for the silts, which averaged between 45 and 50% water by volume, while the sandy site gave an average value of about 12 for a probable water content of about 23% by volume. These values are very smillar to the laboratory work of others and were also confirmed by TDR. The high dielectric constants of the saturated materials allowed ceurate profiling of active layer depth, and an example is presented. More detail would probably be achieved with a higher-frequency radar.

MP 1548 PHYSICAL AND STRUCTURAL CHARACTER-ISTICS OF ANTARCTIC SEA ICE. Gow, A.J., et al, 1982, Vol.3, International Symposium

on Antarctic Glaciology, 3rd, Columbus, Ohio, Sep. 7-12, 1981, p.113-117, 8 refs. Ackley, S.F., Weeks, W.F., Govoni, J.W.

ICE FLOES, PACK ICE, FRAZIL ICE, ANTARC-TICA—WEDDELL SEA.

TICA—WEDDELL SEA.

Observations during February and March 1980 of structures in 66 separate floes in Weddell Sea pack ice show widespread occurrence of fre'il ice in amounts not previously reported in sea ice of comparable age and thickness in the Arctic. It is estimated that as much as 50% of the total ice production in the Weddell Sea is generated as frazil Average floe salinities also appear higher than those of their Arctic counterparts. Comparative studies of fast ice at 28 locations in McMurdo Sound show this ice to be composed amost entirely of congelation ice that exhibits crystalline textures and orientations that are similar to those observed in Arctic and orientations that are similar to those observed in Arctic fast ice However, avere, e fast ice salimities in McMurdo Sound are higher than those reported for Arctic fast ice of comparable age and thickness (Auth)

MP 1549 ON MODELING THE WEDDELL SEA PACK

Hibler, W.D., III, et al, 1982, Vol.3, International Symposium on Antarctic Glaciology, 3rd, Columbus, Ohio, Sep. 7-12, 1981, p.125-130, 23 refs. Ackley, S.F. 37-259

SEA ICE, PACK ICE, THERMODYNAMIC PROP-ERTIES, ICE MODELS, ANTARCTICA—WED-DELL SEA.

DELL SEA.

Some results from a dynamic-thermodynamic simulation of the seasonal cycle of the Weddell Sea pack ice are described. The model used for the study is similar to that developed for a numerical investigation of the Arctic ice cover—It employs a plastic ice rheology coupled to a two-level ice thickness distribution—The thickness characteristics evolve in response to ice dynamics, and to ice growth and decay rates dictated by surface heat calculations and by heat storage in a fixed depth oceanic boundary layer—Observed timevarying wind, temperature, and humidity fields are used together with empirical radiation fields and fixed ocean currents to drive the model. to drive the model Employing these fields, the model is integrated over two seasonal cycles Overall, the results suggest that (1) ice dynamics are essential in describing the seasonal cycle, and (2) a feedback between the atmospheric temperature and the presence of ice may be a major cause of the rapid decay of the Antarctic ice cover during the spring-summer period. (Auth. mod.)

BRINE ZONE IN THE MCMURDO ICE SHELF. ANTARCTICA.

Kovacs, A., et al, 1982, Vol.3, International Symposium on Antarctic Glaciology, 3rd, Columbus, Ohio, Sep. 7-12, 1981, p.166-171, 21 refs

A.J., Cragin, J.H. 37-266

ICE SHELVES, BRINES, MIGRATION, ANTARC-TICA-MCMURDO ICE SHELF.

Infiltration of brine into the McMurdo Ice Shelf is dominated by wave-like intrusions of sea-water triggered by periodic break-outs of the ice front. Observations of a brine step 4.4 m in height in the McMurdo Ice Shelf show that it has migrated about 1.2 km in four years. The inland boundary of the brine percolation is probably controlled largely by the depth at which brine encounters the firm/sec resulting (4.3 m). However, this boundary, is not fixed. largely by the depth at which brine encounters the firn/ice transition (43 m). However, this boundary is not fixed by permeability considerations alone, since measurable movement of brine is still occurring at the inland boundary. Freeze-fractionation of the sea-water as it migrates through the ice shelf precipitates virtually all sodium sulfate, and preferentially concomitant removal of water by freezing in the pore spaces of the infiltrated firm produces residual brines approximately seven times more concentrated than the original sea-water. (Auth. mod.)

NITRATE FLUCTUATIONS IN ANTARCTIC SNOW AND FIRM: POTENTIAL SOURCES AND MECHANISMS OF FORMATION.

Parker, B.C., et al, 1982, Vol.3, International Symposium on Antarctic Glaciology, 3rd, Columbus, Ohio, Sep. 7-12, 1981, p.243-248, 33 refs.

Zeller, E.J., Gow, A.J.

SNOW COMPOSITION, SNOW IMPURITIES, PERIODIC VARIATIONS, NITRATE DEPOSITS, ANTARCTICA—EAST ANTARCTICA.

ANTARCTICA—EAST ANTARCTICA.

Data are summarized on in situ nitrate ion concentrations in snow pits and fire cores over the last 3,250 a. Nitrate fluctuations show seasonal, 11 and 22 a periodicities, and long-term changes both at South Pole station and Vostok. High nitrate levels conform to winter darkness and solar activity peaks Long-term lows and highs conform to solar activity minima and maxima. In data available support the hypothesis that nitrate is fixed in the upper atmosphere by some solar-mediated phenomenon causing a periodicity in East Antarctica snow. Background levels and non-periodic spikes in nitrate come from other sources, (Auth) (Auth)

SOME RECENT TRENDS IN THE PHYSICAL AND CHEMICAL CHARACTERIZATION AND MAPPING OF TUNDRA SOILS, ARCTIC SLOPE OF ALASKA.

Everett, K.R., et al, May 1982, 133(5), p.264-280, Refs. p.278-280.

Brown, J. 37-174

TUNDRA, SOIL SURVEYS, PERMAFROST PHYSICS, SLOPE ORIENTATION, SOIL CHEMISTRY, SOIL WATER, SOIL STRUCTURE, SOIL CLASSIFICATION, DISTRIBUTION, MAPPING, UNITED STATES—ALASKA—NORTH SLOPE

DEFORMATION AND FAILURE OF FROZEN SOILS AND ICE AT CONSTANT AND STEADI-LY INCREASING STRESSES.

Fish, A.M., Canadian Permafrost Conference, 4th, Calgary, Alberta, Mar. 2-6, 1981. Proceedings, Ottawa, National Research Council of Canada, 1982, p.419-428, With French summary. 16 refs.

PERMAFROST PHYSICS, FROZEN GROUND STRENGTH, FROZEN GROUND COMPRES-SIRENGIH, FROZEN GROUND COMPRES-SION, FROZEN GROUND MECHANICS, SOIL CREEP, ICE DEFORMATION, ICE STRENGTH, STRESSES, ICE CREEP, ANALYSIS (MATH-EMATICS), EXPERIMENTATION

Experimental and theoretical studies were made of the deformation and time-dependent failure of ice. Uniaxial compression tests were performed in the laboratory at constant and sion tests were performed in the laboratory at constant and steadily increasing stresses. Strength criteria and unified constitutive equations describing all three stages of creep at con.lant stress are presented. It is shown that regardless of the stress regime (constant stress or step loading) the equations describe deformation and time-dependent failure by five parameters. The form of the constitutive equations, which can be applied also to describe the mechanical properties of frozen and unfrozen soils, make it possible to obtain analytical solutions of the practical problems and to determine the creep parameters of frozen and unfrozen soils and ice in situ.

THEORY OF THERMAL CONTROL AND PRE-VENTION OF ICE IN RIVERS AND LAKES. Ashton, G.D., 1982, Vol.13, p.131-185, 38 refs. 37-684

37-684
ICE CONTROL, RIVER ICE, LAKE ICE, THERMAL REGIME, HEAT TRANSFER, WATER FLOW, WATER TEMPERATURE, BUBBLING, ICE FORMATION, ICE GROWTH, ICE MELT-ING, ANALYSIS (MATHEMATICS).

ING, ANALYSIS (MATHEMATICS).

The thermal control of ice in rivers and lakes is accomplished in most cases by modifying the energy budget of the ice cover. In most cases the modification is to increase the flow of heat to the underside of the ice cover, either by directing against it a flow of warm water obtained from other parts of the water body, as in the case of air bubbler systems, or by increasing the temperature of the existing flow of water, as in the case of rivers.

MP 1555

IN-SITU MEASUREMENTS OF THE ME-CHANICAL PROPERTIES OF ICE.

Tatinclaux, J.C., International Conference on Marine Research, Ship Technology and Ocean Engineering, Hamburg, Sep. 29-30, 1982. Proceedings. Inter-maritec '82, Hamburg, 1982, p.326-334, 7 refs.

ICE MECHANICS, ICE COVER STRENGTH, ICE ELASTICITY, FLEXURAL STRENGTH, FLOAT-ING ICE, ANALYSIS (MATHEMATICS).

Two methor's for in-situ determination of the bending strength and elastic modulus of ice are presented. The first method requires failure tests of a series of cantilever beams of various requires failure tests of a series of cantilever beams of various length over thickness ratios, while the second method is based on failure testing of a free-floating beam of length at least three times the ice characteristic length. Both methods avoid the need for measuring beam deflection in order to determine the elastic modulus. The analytical background of the methods is presented, and their advantages and disadvantages as compared to conventional methods are discussed together with their likely application to field or laboratory was sent as the second methods.

MP 1556 STANDARDIZED TESTING METHODS FOR MEASURING MECHANICAL PROPERTIES OF

Schwarz, J., et al, July 1981, 4(3), p.245-254, 18 refs. Frederking, R., Gavrilo, V.P., Petrov, I.G., Hirayama, K., Mellor, M., Tryde, P., Vaudrey, K.D.

ICE MECHANICS, COMPRESSIVE PROPER-TIES, TENSILE PROPERTIES, ICE ELASTICITY, STANDARDS, LOADS (FORCES), TESTS.

STANDARDS, LOADS (FORCES), TESTS.

The results of nominally similar tests vary greatly due to the fact that almost every ice research group uses different testing methods. This is of course a hindrance to the Ice Engineering field. In order to improve the quality, comparability and usefulness of the test data resulting from mechanical property investigations, the IAHR Section on Ice Problems considers it necessary to standardize ice testing methods. Herewith the Working Group of the IAHR Section on Ice Problems proposes its recommendation for "Standardized Testing Methods for Measuring Mechanical Properties of Ice." It should be noted that the suggested recommendations remain open to revision as the development of ice testing methods progresses

MP 1557 FROST SUSCEPTIBILITY OF SOIL; REVIEW OF INDEX TESTS.

Chamberlain, E.J., Aug. 1982, FHWA/RD-82/081, 110p., Refs p.83-88. 37-973

FROST HEAVE, SOIL MECHANICS, SOIL FREEZING, ICE WATER INTERFACE, ICE SOLID INTERFACE, TESTS, CLASSIFICATIONS, TEMPERATURE GRADIENTS, SOIL WATER, PARTICLE SIZE DISTRIBUTION, GRAIN SIZE.

Methods of determining the frost susceptibility of soils are identified and presented in this report. More than one Methods of determining the frost susceptibility of soils are identified and presented in this report. More than one hundred criteria were found, the most common based on particle size characteristics. These particle size criteria are frequently augmented by information such as grain size distribution, uniformity coefficients and Atterberg limits. Information on permeability, mineralogy and soil classification has also been used. More complex methods requiring pore size distribution, mosture-tension, hydraulic-conductivity, heave-stress, and frost-heave tests have also been proposed. However, none has proven to be the universal test for determining the frost susceptibility of soils. Based on this survey, four methods are proposed for further study. They are the U.S. Army Corps of Engineers Frost Susceptibility Classification System, the moisture-tension hydraulic-conductivity test, a new frost-heave test, and the CBR-after-thaw test.

DESIGNING WITH WOOD FOR A LIGHT-WEIGHT AIR-TRANSPORTABLE ARCTIC SHELTER: HOW THE MATERIALS WERE TESTED AND CHOSEN FOR DESIGN.

Flanders, S.N., et al, Structural use of wood in adverse environments. Edited by R.W. Meyer and R.M. Kel-logs. New York, Van Nostrand Reinhold Co., 1982, p.385-397.

Tobiasson, W.

37-1030 PORTABLE SHELTERS, WOODEN STRUCTURES, MILITARY TRANSPORTATION, COLD WEATHER TESTS, LCADS (FORCES), AIRPLANES, DESIGN, CONSTRUCTION MATERIANES, DESIGN, CONSTRUCTION M ALS

ALS.

Construction of a prototype shelter particularly suited to accommodate a party of four to six in the extreme cold at remote locations has been completed recently. To facultate transportation, the shelter doubles as an ISO shipping container and self-loads onto military aircraft. These modes endure severe loads. Wood was chosen as a suitable material for use in the cold. The requirement for light weight necessitated that the wood be used close to its strength limits. The limits for bonding wood and employing composite panels were tested and compared with calculated values Urethane-based adhesive was chosen to bound high-density overlay (HDO) plywood and redwood sections together. Fiberglass-reinforced plastic (FRP) mat was chosen as a material to strengthen webs against shear

MP 1559

SYNOPTIC WEATHER CONDITIONS DURING SELECTED SNOWFALL EVENTS BETWEEN DECEMBER 1981 AND FEBRUARY 1982.

Bilello, M.A., May 1982, 82-8, p.9-42. 37-1095

SYNOPTIC METEOROLOGY, SNOWFALL, SNOWSTORMS, WEATHER OBSERVATIONS, STATISTICAL ANALYSIS

MP 1560

METEOROLOGY.

Bates, R.E., May 1982, 82-8, p.43-180. 37-1096

METEOROLOGICAL DATA, SNOWSTORMS, SNOWFALL, STATISTICAL ANALYSIS, SNOW DEPTH, SNOW WATER EQUIVALENT, SNOW TEMPERATURE.

MP 1561

SNOW CRYSTAL HABIT.

Koh, G., et al, May 1982, 82-8, p.181-216, 5 refs. O'Brien, H.W. 37-1007

SNOWFLAKES, SNOW CRYSTAL STRUCTURE, SNOW OPTICS, SNOWFALL, PARTICLE SIZE DISTRIBUTION, SPECTRA.

MP 1562

AIRBORNE SNOW AND FOG DISTRIBU-

Berger, R.H., May 1982, 82-8, p.217-223. 37-1098

SNOWFLAKES, SNOWSTORMS, SNOW CRYS TAL STRUCTURE, FOG, UNFROZEN WATER CONTENT, PARTICLE SIZE DISTRIBUTION, CLASSIFICATIONS.

MP 1563

MEASUREMENTS CONCENTRATION. OF AIRBORNE-SNOW

Lacombe, J., May 1982, 82-8, p.225-281, 2 refs.

SNOWFALL, SNOWFLAKES, COMPUTER AP-PLICATIONS, MEASUREMENT.

MP 1564

SNOW COVER CHARACTERIZATION.

O'Brien, H.W., et al, May 1982, 82-8, p.559-577, 7 refs.

37-1106 SNOW COVER, SNOWFALL, SNOW DEPTH, SNOW HARDNESS, SNOW DENSITY, SNOW TEMPERATURE, UNFROZEN WATER CON-TENT.

PERMEABILITY OF A MELTING SNOW COV-FR.

Colbeck, S.C., et al, Aug. 1982, 18(4), p 904-908, 16

Anderson, E.A 37-1226

SNOW MELTING, SNOW PERMEABILITY, MELTWATER, SNOW DENSITY, SNOW COVER, SATURATION, RUNOFF.

Data from snow lysimeters in California and Vermont are used to find the saturated permeability of a melting snow cover in the range of 10-40x10/(10 sq m) depending on snow density. The unsaturated permeability increases as

about the third power of liquid saturation. The gravity flow theory is shown to be an accurate representation of meltwater drainage from snow covers in .wo diverse areas even though the snow covers are treated as homogeneous units. The variation of saturated permeability with snow density occurs about as predicted by Shimizu's formula for dry snow, although ice layers decrease the permeability somewhat.

MP 1566
PHYSICAL ASPECTS OF WATER FLOW
THROUGH SNOW.

Colbeck, S.C., Advances in hydroscience. Volume 11. Edited by V.T. Chow., New York, Academic Press, 1978, p.165-206, Refs. p.204-206. 37-1280

WET SNOW, SNOW HYDROLOGY, WATER FLOW, SNOW PERMEABILITY, SNOW COVER STRUCTURE, POROUS MATERIALS, THERMO-DYNAMICS, RAIN, MATHEMATICAL MOD-

MP 1567

SENSITIVITY OF A FROST HEAVE MODEL TO THE METHOD OF NUMERICAL SIMULA-TION.

Hromadka, TV., II, et al, Aug. 1982, 6(1), p.1-10, 10

Guymon, G.L., Berg, R.L. 37-1329 FROST HEAVE, SOII VE, SOIL FREEZING, HEAT MATHEMATICAL MODELS. TRANSFER. ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).

A unifying numerical method is developed for solution of frost heave in a vertical freezing column of soil. Within one general computer code a single unifying parameter can be preselected to employ the commonly used Galerkin finite elements, subdomain weighted residual, or finite difference methods as well as several other methods developed from the Alternation Theorem. Comparing results from the various numerical techniques in the computation of frost heave to measured frost heave in a laboratory column indicates there is little advantage of the numerical technique over another.

MP 1568 DETERMINATION DETERMINATION OF THE FLEXURAL STRENGTH AND ELASTIC MODULUS OF ICE FROM IN SITU CANTILEVER BEAM TESTS. Tatinclaux, J.C., et al, Aug. 1982, 6(1), p.37-47, 4 refs. Hirayama, K. 37-1333

ICE COVER STRENGTH, FLEXURAL STRENGTH, ICE ELASTICITY, ICE PHYSICS, LOADS (FORCES), ICE SHEETS, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

From the theory of cantilever beams on an elastic foundation, it is shown that the strength index and modulus index of ice can be determined from measurements of either the failure load or the tip deflection, or both, of in situ cantilever beams tested over a wide enough range of ratio of beam length to beam thickness. Four methods are proposed, two of which do not require the measurement of beam deflection during beam loading, an often difficult task to perform with sufficient reliability, especially in the field

MP 1569
ICE DISTRIBUTION AND WINTER SURFACE
PACHEMAK BAY. CIRCULATION PATTERNS, KACHEMAK BAY,

ALASKA.
Gatto, L.W., 1982, No.12, p.421-435, For more detailed article see 36-2432. 14 refs. 37-1440

SEA ICE DISTRIBUTION, ICE CONDITIONS, OCEAN CURRENTS, SUSPENDED SEDI-MENTS, OCEANOGRAPHY, REMOTE SENS-ING, UNITED STATES—ALASKA—KA-CHEMAK BAY

MP 1570

DETERMINING THE CHARACTERISTIC LENGTH OF MODEL ICE SHEETS.
Sodhi, D.S., et al, Nov. 1982, 6(2), p.99-104, 6 refs Kato, K., Haynes, F.D., Hirayama, K.

37-1582

FLOATING ICE, ICE STRENGTH, ICE SHEETS, LOADS (FORCES), FLEXURAL STRENGTH, ICE ELASTICITY, STRESSES, ICE CREEP, ICE MOD-

ELS.

For determining the characteristic length of a floating ice sheet, a vertical load is applied to the ice sheet either by placing dead weights in discrete increments or with a screw drive apparatus in series with a load cell, and the deflection of the ice sheet is monitored at the point of loading or near it. For a model ice sheet exhibiting loading or near it

For a model ice sheet exhibiting creep behavior, the experimental results with the screw apparatus show that the slope of the load-deflection curve decreaxes as the load increases, and one is not able to choose a unique value of the slope for the computation of characteristic length

This is attributed to relaxation of stress in ice.

FIRN QUAKE (A RARE AND POORLY EX-PLAINED PHENOMENON).

DenHartog, S.L., Nov. 1982, 6(2), p.173-174, 7 refs. 37-1589

FIRN, SNOW DEFORMATION, SNOW SURFACE, CRACKS.

A firn quake is a sudden collapse of a snow surface with a noise of increasing intensity. This description applies to firn quakes on large ice sheets, shuch as cover Greenland and Antarctica. There are many unknowns about firn quake phenomena.

MP 1572 ELECTRICAL PROPERTIES OF FROZEN GROUND AT VHF NEAR POINT BARROW, ALASKA.

Arcone, S.A., et al, Oct. 1982, GE-20(4), p.485-492, 16 refs.

Delaney, A.J. 37-1685

FROZEN GROUND PHYSICS, ELECTRICAL PROPERTIES, RADIO WAVES, GROUND ICE, MODELS, ORGANIC SOILS, SOIL WATER.

MODELS, ORGANIC SOILS, SOIL WATER. Electrical properties of frozen ground were measured using radio frequency interferometry (RFI) in the very high frequency (VHF) radiowave band. Ice-rich organic silts and sandy gravel of variable ice content were investigated during early April of both 1979 and 1980. Frequencies between 10 and 150 MHz were used but best results were obtained at VHF between 10 and 100 MHz. MP 1573

STATE OF THE ART OF SHIP MODEL TEST-ING IN ICE.

Vance, G.P., American Towing Tank Conference, General Meeting, 19th, Ann Arbor, Michigan, July 9-11, 1980 Proceedings, Vol.2. Edited by S.B. Co-hen, Ann Arbor, Science Publishers, [1981], p.693-706, 5 refs. 37-1692

ICE LOADS, ICE PRESSURE, SHIPS, STRENGTH, MODELS, LOADS (FORCES), TESTS, SNOW COVER EFFECT.

UNIFORM SNOW LOADS ON STRUCTURES. O'Rourke, M.J., et al, Dec. 1982, 108(ST12), p.2781-2798, 12 refs.

Redfield, R., Von Bradsky, P.

37-1756 SNOW LOADS, ROOFS, STRUCTURES, SLOPE ORIENTATION, EXPOSURE, SNOW ACCUMULATION, THERMAL EFFECTS, SURFACE PROPERTIES.

Data on ground and roof snow loads for 199 structures are analyzed. Relationship between ground-to-roof conversion factor for uniform roof loads and parameters such as roof slope, exposure and thermal characteristics are investigated. The conversion factor was found to be most strongly influenced by exposure

MP 1575 APPLICATION OF HEC-2 FOR ICE-COVERED WATERWAYS.

Calkins, D.J., et al, Nov. 1982, 108(TC2), p 241-248, 5 refs.

Hayes, R., Daly, S.F., Montalvo, A.

37-2018 CHANNELS (WATERWAYS), WATER FLOW, ICE COVER EFFECT, FLOATING ICE, FLOW RATE, RIVER FLOW, COMPUTER PROGRAMS. RATE, RIVER FLOW, COMPUTER PROGRAMS. HEC-2, the widely known open channel flow water surface profile computer program developed by the U.S. Army Corps of Engineers: Hydrologic Engineering Center, has been recently updated for the U.S. Army Cold Regions Research and Engineering Laboratory to account for the presence of a floating ice cover. It has been shown by many writers that at uniform flow the normal flow depth can be increased by as much as 30% by a floating ice cover. HEC-2 with the ice cover option will allow the Corps of Engineers and other users of the program to evaluate effectively the effect of an ice cover on the flow depth, flow velocity, unit discharge, etc., in a river system. This paper presents an overview of the modifications to the uniform flow equation, the required input data, and an analysis.

SOURCE MECHANISM OF VOLCANIC TREM-OR.

Ferrick, M.G., et al, Oct. 10, 1982, 87(B10), p.8675-8683, 27 rcfs

Qamar, A., St. Lawrence, W.F.

EARTHQUAKES, VOLCANOES, FLUID DY-NAMICS, FLUID FLOW, UNITED STATES— OREGON—HOOD, MOUNT.

Low-frequency (<10 Hz) solcanic earthquakes originate at a wide range of depths and occur before, during, and after magmatic cruptions. The characteristics of these earthquakes suggest that they are not typical tectonic events. Physically analogous processes occur in hydraulic fracturing of rock formations, low-frequency icequakes in temperate

glaciers, and autoresonance in hydroelectric power stations. We propose that unsteady fluid flow in volcanic conduits is the common source mechanism of low-frequency volcanic carthquakes (tremor). The fluid dynamic source mechanism explains low-frequency earthquakes of arbitrary duration, magnitude, and depth of origin, as unsteady flow is independent of physical properties of the fluid and conduit. Fluid transients occur in both low-viscosity gases and high-viscosity liquids. A fluid transient analysis can be formulated as generally as is warranted by knowledge of the composition and physical properties of the fluid, material properties, geometry and roughness of the conduit, and boundary conditions. (Auth. mod.)

MD 1877

MP 1577

COMMENT ON 'WATER DRAG COEFFICIENT OF FIRST-YEAR SEA ICE' BY M.P. LANGLEB-

Andreas, E.L., et al, Jan. 20, 1983, 88(C1), p.779-782, Includes the comment by Andreas and the reply by Langleben. For the article being discussed see 36-2494. 11 refs.

Langleben, M.P.

SEA ICE, SURFACE ROUGHNESS, FRICTION, ANALYSIS (MATHEMATICS).

MP 1578

MICROBIOLOGICAL AEROSOLS FROM A FIELD-SOURCE WASTEWATER IRRIGATION SYSTEM.

Bausum, H.T., et al, Jan. 1983, 55(1), p.65-75, 20 refs. Schaub, S.A., Bates, R.E., McKim, H.L., Schumacher, P.W., Brockett, B.E.

WASTE TREATMENT, WATER TREATMENT, BACTERIA, AEROSOLS, IRRIGATION, MICROBIOLOGY.

MP 1579

ON MODELING SEASONAL AND INTERAN-NUAL FLUCTUATIONS OF ARCTIC SEA ICE. Hibler, W.D., III, et al, Dec. 1982, 12(12), p.1514-1523, 20 refs.

Walsh, J.E.

37-2362 SEA ICE DISTRIBUTION, PERIODIC VARIA-TIONS, ICE MODELS.

Some results from a series of three-year aperiodic simulations of the Northern Hemisphere sea ice cover are reported. The simulations employ the dynamic-thermodynamic sea ice model developed by Hibber (1979) and use a one-day timestep on a 35 x 31 grid with a resolution of 222 km. Atmospheric data from the years 1973-75 are used to drive the simulations. The simulations yield as according to the control of the simulations will a seasonal cycle with executive amounts. data from the years 1973-75 are used to drive the simulations. The simulations yield a seasonal cycle with excessive amounts of ice in the North Atlantic during winter and with somewhat excessive amounts of open water in the central Arctic during summer. Despite the seasonal bias, the simulated and observed interannual fluctuations are similar in magnitude and are positively correlated. The correlations with observed data are noticeably smaller when dynamical processes are omitted from the model. The simulated outflow of ice through the Greenland-Spitsbergen passage undergoes large fluctuations both seasonally and on an interannual basis. The outflow correlates highly with the simulated fluctuations of ice coverage in the North Atlantic sector and positively with the observed fluctuations of ice coverage in the same sector.

ADHESION OF ICE TO POLYMERS AND OTHER SURFACES.

Itagaki, K., Physicochemical aspects of polymer surfaces, Vol 1 Edited by K L Mittal, Plenum Publishing Corporation, Mar. 1983, p 241-252, 15 refs.

ICE ADHESION, ICE SOLID INTERFACE, ICE STRENGTH, POLYMERS, PROTECTIVE COAT-

A set of simple experiments indicated that water drops A set of simple experiments indicated that water drops can penetrate through a grease layer and make "real" contact with the substrate, then spread over the surface, depending on the surface energy of the substrate, increasing the "real" contact rea. Furthermore the ice/substrate bond is stronger than ice itself. The complex problem of ice adhesion y be explainable by combination of these findings in that the "real" contact area multiplied by the strength of ice within the area constitute the apparent adhesive strength. Conceivable effects of various factors are discussed

MP 1581

PROCEEDINGS.

International Offshore Mechanics and Arctic Engineering Symposium, 2nd, Houston, Texas, Jan. 30-Feb. 3, 1983, New York, N.Y., American Society of Mechanical Engineers, 1983, 813p., Refs. passim For selected papers see 37-2389 through 37-2406 Chung, J.S., ed, Lunardini, V.J., ed.

37-2388
OFFSHORE DRILLING, OFFSHORE STRUCTURES, ICE CONDITIONS, DRIFT, PERMA-FROST, ARTIFICIAL ISLANDS, ICE LOADS, COMPUTER APPLICATIONS, ICE PHYSICS,

MP 1582

EFFECT OF STRESS APPLICATION RATE ON THE CREEP BEHAVIOR OF POLYCRYSTAL-LINE ICE.

Cole, D.M., International Offshore Mechanics and Arctic Engineering Symposium, 2nd, Houston, Texas, Jan. 30-Feb. 3, 1983. Proceedings. Edited by J.S. Chung and V.J. Lunardini, New York, N.Y., American Society of Mechanical Engineers, 1983, p.614-621, 14 refs.

ICE CREEP, ICE CRYSTAL STRUCTURE, ICE ACOUSTICS, STRESS STRAIN DIAGRAMS, MICROSTRUCTURE, ICE CRACKS, RHEOLOGY, CRACKING (FRACTURING), TIME FACTOR.

CRACKING (FRACTURING), TIME FACTOR.

This work examines the effect of the rate of stress application on the creep behavior of polycrystalline ice. Stress rates from 1/1000 to 1 84 MPa/s were used to achieve a creep stress of 36 MPa at test temperatures of -5 to -10C. The treatment emphasizes the effect of stress application rate on primary creep behavior and the accompanying microfracturing activity. Acoustic emission measurements taken in all tests indicate the onset and rate peak of the microfracturing activity.

MP 1583

FREEZING OF SEMI-INFINITE MEDIUM WITH INITIAL TEMPERATURE GRADIENT.

Lunardini, V.J., International Offshore Mechanics and Arctic Engineering Symposium, 2nd, Houston, Texas, Jan. 30-Feb. 3, 1983. Proceedings. Edited by J.S. Chung and V.J. Lunardini, New York, N.Y., American Society of Mechanical Engineers, 1983, p.649-652, 11 refs.

37-2397 SOIL FREEZING, HEAT TRANSFER, TEMPER-ATURE GRADIENTS, STEFAN PROBLEM, GEOTHERMY, HEAT BALANCE, ANALYSIS (MATHEMATICS), THERMAL CONDUCTIVITY. (MATHEMATICS), THERMAL CONDUCTIVITY.

Exact solutions to problems of conductive heat transfer with solidification are rare due to the non-linearity of the equations. The heat balance integral technique is used to obtain an approximate solution to the freezing of a semi-infinite region with a linear, initial temperature distribution. The results indicate that the constant temperature Neumann solution is acceptable for soil systems with a geothermal gradient unless extremely long freezing times are considered. The heat balance integral will yield good solutions, with simple numerical work, even for non-constant initial temperatures. MP 1584

SIMPLE FIXED MESH FINITE ELEMENT SO-LUTION OF TWO-DIMENSIONAL PHASE CHANGE PROBLEMS.

O'Neill, K., International Offshore Mechanics and Arctic Engineering Symposium, 2nd, Houston, Texas, Jan. 30-Feb. 3, 1983. Proceedings. Edited by J.S. Chung and V.J. Lunardini, New York, N.Y., American Society of Mechanical Engineers, 1983, p.653-658, 24 refs. 37-2398

FREEZE THAW CYCLES, HEAT TRANSFER, PHASE TRANSFORMATIONS, LATENT HEAT, THERMAL CONDUCTIVITY, MATHEMATICAL MODELS, ENTHALPY.

MODELS, ENTHALPY.

An algorithm has been developed for two-dimensional freezing and thawing problems, which may also be useful for some other phase change problems. It is designed to be implemented simply in standard finite element heat conduction computer codes which use linear interpolation within elements. Substances with discrete phase change temperatures such as water suffer a step change in enthalpy across a phase change isotherm, and hence feature a theoremaily infinite heat capacity there. The algorithm handles this potentially troublesome phenomenon in a natural way through usual finite element procedures, using simple closed form expressions.

MP 1585

ICE DYNAMICS IN THE CANADIAN AR-CHIPELAGO AND ADJACENT ARCTIC BASIN AS DETERMINED BY ERTS-1 OBSERVA-

Ramseier, R.O., et al. Canada's continental margins and offshore petroleum exploration. Edited by C.J. Yorath, E.R. Parker and D.J Glass, Calgary, Alberta, Canadian Society of Petroleum Geologists, May 1975,

p.853-877, 13 refs. Campbell, W.J., Weeks, W.F., Drapier-Arsenault, L., Wilson, K.L. 37-2463

37-2463
ICE MECHANICS, SEA ICE DISTRIBUTION, DRIFT, ICE CONDITIONS, REMOTE SENSING, ICE BREAKUP, FREEZEUP, ERTS IMAGERY.
ERTS-1 "Quicklook" imagery for the period March to Notember 1973 has been utilized to study sea ice in the Canadian archipelago and in the adjacent Arctic basin The imagery, which provides extensive coverage of the area of interest, contains detailed information on variations in sea ice dynamics and ice morphology on a time scale ranging from several days to seasons Because of the sidelap of the ERTS-1 orbits over the study area, recognizable ice floes could

be tracked on repetitive daily images for time periods as long as 6 days. Information on ice drift velocity, compactness, floe size, fast ice and ice melt patterns, and dates of breakup and freezeup were obtained.

MP 1586 SIMULATION OF THE ENRICHMENT OF AT-MOSPHERIC POLLUTANTS IN SNOW COVER RUNOFF.

Colbeck, S.C., 1981, 38th, p.1-10, 16 refs. For another version see 36-1887.

37-2768 SNOW 37-2768
SNOW COMPOSITION, SNOW IMPURITIES, AIR POLLUTION, RUNOFF, MELTWATER, ENVIRONMENTAL IMPACT, SNOW CRYSTAL NUCLEI, EXPERIMENTATION, SNOW COVER. NUCLEI, EXPERIMENTATION, SNOW COVER.
The soluble impurities contained in a snow cover can be concentrated as much as five fold in the first fractions of snow melt runoff. In addition, daily impurities in the lower portion of the snow cover hence prepare the impurities for tapid removal. Environmental damage can occur due to the concentration and rapid release of atmospheric pollutants from the snow, especially in areas of "each precipitation." The enrichment of the soluble impurities is explained and the results of laboratory experiments are given.

ARD 1867

MP 1587

STRESS/STRAIN/TIME RELATIONS FOR ICE UNDER UNIAXIAL COMPRESSION. Mellor, M., et al, Feb. 1983, 6(3), p.207-230, 9 refs.

Cole, D.M. 37-2878 ICE CREEP, ICE MECHANICS, STRESS STRAIN

DIAGRAMS, LOADS (FORCES), COMPRESSIVE PROPERTIES, STATIC LOADS, TIME FACTOR, ANALYSIS (MATHEMATICS), TESTS, RHEOLO-

GY.

Results of mechanical tests involving uniaxial compression of isotropic ice at -5C were analysed and interpreted Constant load (CL) creep tests were made for applied stresses in the range 0.8 to 3.8 MPa, and "strength" tests under constant displacement rate (CD) were made for applied strain rates in the range 1/10,000,000 to 1/1,000 1/s. Results from CL tests and CD tests corresponded closely, giving much the same information about failure strains, strength, creep rates, time to failure, stress/strain-rate relations, etc.

MP 1502

MP 1588 PHYSICS OF MATHEMATICAL FPOST HEAVE

MODELS: A REVIEW.
O'Neill, K., Feb. 1983, 6(3), p 275-291, Refs. p.289-

7-2883

FROST HEAVE, FROZEN GROUND PHYSICS, THERMODYNAMICS, PHYSICAL PROPERTIES, STRESSES, MATHEMATICAL MODELS, GROUND ICE

This paper is concerned with the physical and thermodynamical bases of frost heave modeling. An attempt is made to isolate and illuminate issues which all such models must address, at least by implication. Although numerous relevant publications are surveyed, emphasis is less on an enumeration of items in the literature, and more on the concepts themselves, and on their alternative mathematical expressions, approxima-tions, and manners of applications of specific mathematical models is discussed, in light of the points raised in the general discussion

MP 1589 PRELIMINARY INVESTIGATION OF THE ACOUSTIC EMISSION AND DEFORMATION RESPONSE OF FINITE ICE PLATES. Xirouchakis, P C, et al, Jan. 1982, No.134, p.129-139,

10 refs. St. Lawrence, W.F.

37-2905

ICE ACOUSTICS, ICE DEFORMATION, LOADS (FORCES), FRACTURING, PLATES, ICE CRACKS, ELASTIC WAVES, VISCOELASTICITY, GRAIN SIZE, EXPERIMENTATION.

GRAIN SIZE, EXPERIMENTATION.

A procedure is described for * utoring the microfracturing activity in ice plates subjected constant loads. Sample time records of fresh water ice plate deflections as well as corresponding total acoustic emission activities are presented. The linear elastic as well as visco-elastic response for a simple supported rectangular ice plate is obtained. Suggested future work using the above procedure is discussed.

MODELING PRESSURE RIDGE BUILDUP ON THE GEOPHYSICAL SCALE.

Hibler, W.D., III, Jan. 1982, No 134, p.141-155, 8 refs. 37-2906

PRESSURE RIDGES, ICE COVER THICKNESS, ICE PILEUP, ICE STRENGTH, ICE PHYSICS, SEA ICE DISTRIBUTION, SURFACE ROUGHNESS, STRESSES, ICE MODELS, PACK ICE.

In large scale sea ice models ridging is modeled by redistributing thin ice into thicker categories. The way in which this redistribution is carried out can significantly affect the geophysical stresses in pack ice. This paper compares ice strength characteristics of several different redistributors and discusses the relationship of these redistributors with observed ridge morphological data. In addition, simulated Arctic Basin ridge buildup results using one of these red-stributors are presented and compared to roughness observations reported

MP 1591

FIELD METHODS AND PRELIMINARY RE-SULTS FROM SUBSEA PERMAFROST INVES-TIGATIONS IN THE BEAUFORT SEA, ALASKA. Sellmann, P.V., et al, June 1979, No.124, p 207-213, 6 refs.

Chamberlain, E.J., Blouin, S.E., Iskandar, I.K., Lewellen, R.I. 37-2962

SUBSEA PERMAFROST, PERMAFROST THER-MAL PROPERTIES, PENETRATION TESTS, GEOPHYSICAL SURVEYS, TEMPERATURE GRADIENTS, GROUND WATER, WATER CHEMISTRY, ENGINEERING, BEAUFORT SEA.

NUMERICAL SIMULATION OF THE WEDDELL SEA PACK ICE.

Hibler, W.D., III, et al, Mar. 30, 1983, 88(C5), p.2873-2887, 29 refs.

Ackley, S.F. 37-2983

SEA ICE, ICE MECHANICS, DRIFT, ICE MOD-ELS, ICE COVER THICKNESS, ANTARCTICA— WEDDELL SEA.

WEDDELL SEA.

The simulations employ a dynamic thermodynamic model developed in 1979 and use a 1-day time step on an 18 x 15 grid with a resolution of 122 km. Daily atmospheric data from 1979 are used to drive the simulations, which yield a seasonal cycle of ice with maximum extents close to that observed. The advance of the ice is primarily thermodynamic in nature, while the rapid decay depends critically on the presence of both leads and lateral ice advection. The average fraction of open water is substantial and varies from 10% in September to 35% in March. These values are in general agreement with estimates from satellite microwave data. Mean ice thicknesses are consistent with observations and vary from about 3 m in the perennial ice in the western Weddell to 1 m in first-year ice in the eastern Weddell. Simulated ice drift results yield mean drift rates of about 5 km/day, in good agreement with buoy drift observations with slightly inadequate northward transport in the western Weddell. Near the ice edge the drift rates are relatively insensitive to the ice strength Near the coast, however, lower strengths are found to yield a decrease in northward drift rates. (Auth. mod.)

MP 1593

APPROXIMATE PHASE CHANGE SOLUTIONS FOR INSULATED BURIED CYLINDERS. Lunardini, V J, Feb. 1983, 105(1), p.25-32, 14 refs.

37-3169

FREEZE THAW CYCLES, UNDERGROUND PIPELINES, HEAT TRANSFER, PIPES (TUBES), PHASE TRANSFORMATIONS, THERMAL PROPERTIES, THERMAL INSULATION, TEMPERATURE EFFECTS, ANALYSIS (MATH-

The conduction problem for cylinders embedded in a medium The conduction problem for cylinders embedded in a medium with variable thermal properties cannot be solved exactly if phase change occurs. New, approximate solutions have been found using the quasi-steady method. These solutions consider heat flow from the entire pipe surface, rather than from a single point, as has been assumed in the past. The temperature field, phase change location, and pipe surface heat transfer can be evaluated using graphs presented for parametric range of temperature, thermal properties, burial depth, and insulation thickness

MP 1594

COMPARISON OF UNFROZEN WATER CON-TENTS MEASURED BY DSC AND NMR

Oliphant, J L., et al, International Symposium on Ground Freezing, 3rd, Hanover, N.H., June 22-24, 1982. Proceedings, [1982], p.115-121, 15 refs. Tice. A.R.

UNFROZEN WATER CONTENT, FROZEN GROUND STRENGTH, SPECIFIC HEAT, SOIL FREEZING, TEMPERATURE EFFECTS, CALO-RIMETRY.

Unfrozen water contents of various sands, silts and clay under partially frozen conditions have been measured using Nuclear Magnetic Resonance (NMR) Apparent specific heats for many of these soils have been measured as a function of temperature using Differential Scanning Calorimetry (DSC) Unfrozen water contents have been calculated from the DSC data and compared with those directly measured with NMR.

FREEZING OF SOIL WITH SURFACE CON-

VECTION.

Lunardini, V.J., International Symposium on Ground Freezing, 3rd, Hanover, N.H., June 22-24, 1982. Proceedings, (1982), p.205-212, 17 refs.

37-3079
PERMAFROST PHYSICS, PHASE TRANSFORMATIONS, FROZEN GROUND STRENGTH, SOIL FREEZING, SURFACE PROPERTIES, HEAT TRANSFER, ARTIFICIAL FREEZING, FROZEN GROUND TEMPERATURE, LATENT HEAT, SURFACE TEMPERATURE, TIME FACTOR, CONVECTION, ANALYSIS (MATHEMATICS) STORAGE ICS), STORAGE.

Phase change phenomena arise frequently in applications such as thermal design in permafrost regions, thermal storage of latent heat for solar systems, and the heat treatment of metals. These are problems of conductive heat transfer with solidification phase change. Exact solutions are sought for geometries and boundary conditions which are simple and yet representative of practical systems.

INITIAL STAGE OF THE FORMATION OF SOIL-LADEN ICE LENSES.

Takagı, S., International Symposium on Ground Freezing, 3rd, Hanover, NH, June 22-24, 1982 Proceedings, [1982], p.223-232, 8 refs.

GROUND ICE, FROZEN GROUND STRENGTH, ICE LENSES, SOIL FREEZING, ICE FORMATION, ARTIFICIAL FREEZING, FROST HEAVE, THERMAL CONDUCTIVITY, STEFAN PROBLEM, ANALYSIS (MATHEMATICS), FROST ACTION SOIL WATER TION, SOIL WATER.

O'Neill and Miller's equations for frost heave in saturated soil/water system, presented in the 2nd 1 S G.F.at Trondheim, reduce to heat conduction equations on introduction of two simplifying assumptions.

The reduced equations are solved by use of the recently developed analytical method that can solve the Stefan problem with arbitrary initial and boundary conditions.

MP 1597

FREEZING AND THAWING: HEAT BALANCE

INTEGRAL APPROXIMATIONS. Lunardini, V.J., Mar. 1983, 105(1), p.30-37, 17 refs.

FREEZE THAW CYCLES, PERMAFROST THER-MAL PROPERTIES. HEAT BALANCE, STEFAN PROBLEM, SOIL FREEZING, GROUND THAW-ING, LATENT HEAT, SURFACE PROPERTIES, HEAT TRANSFER, PHASE TRANSFORMA-TIONS CONVECTION ANALYSIS MATH TIONS, CONVECTION, ANALYSIS (MATH-EMATICS).

EMATICS).

The study of conductive heat transfer with phase change—often called the Stefan problem—includes some of the most intractable mathematical areas of heat transfer.

Exact solutions are extremely limited and approximate methods are widely used. This paper discusses the heat balance integral approximation using the collocation method. The method is applied to some standard problems of phase change.—Neumann's problem—and a new solution is presented for the case of a semi-infinite body with surface convection Numerical results are given for soil systems and also for materials of interest in latent heat thermal storage.

APPROXIMATE SOLUTION TO CONDUCTION FREEZING WITH DENSITY VARIATION. Lunardini, V.J., Mar 1983, 105(1), p 43-45, 5 refs

37-3207

HEAT TRANSFER, FREEZE THAW CYCLES, PERMAFROST THERMAL PROPERTIES, DEN-SITY (MASS/VOLUME), WATER, PHASE TRANSFORMATIONS, LATENT HEAT, ANAL-YSIS (MATHEMATICS).

MP 1599

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A., et al, Environmental assessment of the Alaskan continental shelf, Vol 7, Hazards. Principal investigators' annual reports for the year ending March 1981. Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, (1981).

p.125-135. Weeks, W.F.

37-3247

SEA ICE DISTRIBUTION, ICE MECHANICS. DRIFT, PRESSURE RIDGES, ICE PILEUP, ICE SCORING.

Revearch Unit No 88 investigates sea ice and ice induced gouges in the sea floor along the coasts of the Beaufort, Chukchi, and Bering Seas. New results reported during FY81 include further documentation of coastal ice pileup and over-defenses tudies of the block to distribute the season of the season of the season to the season of the season tudies of the block to distribute the season of the season of the season tudies of the block to distribute the season of the season o and over-ride events, studies of the block size distributions in first-year pressure ridges, investigations of additional laser profilometer observations on pressure ridges, radar studies of near-shore lakes on the North Slope that may serve as year-round sources of fresh water, and the preparation of a review paper on the physical environment of arctic Alaska as it relates to petroleum exploration and production.

DELINEATION AND ENGINEERING CHARAC-TERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA

Sellmann, P.V., et al, Environmental assessment of the Alaskan continental shelf, Vol.7, Hazards. Principal investigators' annual reports for the year ending March 1981, Boulder, Colora to, Outer Continental Shelf Environmental Assessment Program, (1981), p.137-156, 4 ress. Neave, K.G., Chamberlain, E.J., Delaney, A.J.

SUBSEA PERMAFROST, PERMAFROST DISTRIBUTION, SEISMIC VELOCITY, ENGINEERING, SEISMIC SURVEYS, NATURAL GAS, BEAU-FORT SEA.

Velocity data derived from the study of industry seismic records from lease area No.71 indicate that bonded permafrost is common Its distribution will likely be as variable as it is to the east near Prudhoe Bay. Bonded permafrost should extend many kilometers offshore of the islands in the eastern part of the lease area.

MP 1601

TRANSPORT OF WATER IN FROZEN SOIL. EFFECTS OF ICE ON THE TRANSPORT OF WATER UNDER ISOTHERMAL CONDITIONS. Nakano, Y., et al, Mar. 1983, 6(1), p.15-26, 16 refs. Tree, A.R., Oliphant, J.L., Jenkins, T F 37-3558

SOIL WATER MIGRATION, FROZEN GROUND PHYSICS, GROUND ICE, SOIL FREEZING, WATER TRANSPORT, TEMPERATURE EFFECTS, ANALYSIS (MATHEMATICS).

Effects of ice on the transport of water in frozen soil were investigated under isothermal conditions. Based on the experimental results obtained using a marine-deposited clay at 10°C, the presence of ice is shown to significantly affect the transport of water under centain circumstances. A theoretical analysis of the experimental results and a discussion of a possible mechanism for water transport in frozen soil are presented.

MP 1602

ICE ENGINEERING.

O'Steen, D.A., Spring 1980, 12(2), p.41-47.

DOCKS, ICE LOADS, PILE STRUCTURES, PILE EXTRACTION, ENGINEERING, OFFSHORE STRUCTURES, WATER LEVEL, PIERS, TESTS.

MP 1603

THEORY OF METAMORPHISM OF DRY SNOW.

Colbeck, S.C., June 20, 1983, 88(C9), p.5475-5482, 16 refs. 37-3571

METAMORPHISM (SNOW), SNOW CRYSTAL GROWTH, TEMPERATURE GRADIENTS, VAPOR DIFFUSION, ICE CRYSTAL GROWTH, TEMPERATURE EFFECTS, ANALYSIS (MATH EMATICS), THEORIES.

The growth of ice particles in dry seasonal snow is caused by vapor diffusion among particles due to temperature gradients imposed on the snow cover — The diffusion is calculated by using the potential field solutions for electrostatically charged particles — The stereography of snow is represented by using a log-normal distribution function for a geometric enhancement factor defired here rates and supersaturations are found.

RECENT ADVANCES IN UNDERSTANDING THE STRUCTURE, PROPERTIES, AND BEHAVIOR OF SEA ICE IN THE COASTAL ZONES OF THE POLAR OCEANS.

Weeks, W F., et al, International Conference on Port and Ocean Engineering under Arctic conditions, 7th, Helsinki, Finland, April 5-9, 1983 Proceedings, Espoo, Finland, Valtion teknillinen tutkimuskeskus, 1983, p 25-41, 32 refs.

Ackley, S.F. 37-3714 37-371

SEA ICE, ICE STRENGTH, PRESSURE RID'ES, ICE CRYSTAL STRUCTURE, ICE WATE, INTERFACE, FRAZIL ICE, ICE COVER THICKNESS, ICE FLOES, COMPRESSIVE PROPERTIES, STRAINS, GAS INCLUSIONS, BRINES, WENDELLER,

WEDDELL SEA

WEDDELL SEA
A review is given of recent field and laboratory studies that have 1) revealed vast areas of first-year severe that show strong directional c-axis alignments in the lore intal plane with the alignment directed parallel to the intended continued and the ice-water interface at the time the ice formed 2) Discovered unexpected large amounts of frazilice in the Weddell Sea pack with the largest amounts of frazil occurring in the thickest floes 3) Determined the strength

of multiyear pressure ridges to be comparable to that of first-year sea ice in the hard-fail direction.

4) Developed a rapid method of determining the relative volume of gas

MP 1605

PROTECTION OF OFFSHORE ARCTIC STRUC-TURES BY EXPLOSIVES.

Mellor, M., International Conference on Port and Ocean Engineering under Arctic conditions, 7th, Hel-sinki, Finland, April 5-9, 1983. Proceedings, Espoo, Finland, Valtion teknillinen tutkimuskeskus, 1983, p.310-322, 12 refs. 37-3740

37-37-40
ICE BLASTING, OFFSHORE STRUCTURES, ICE LOADS, ICE BREAKING, PROTECTION, ICE COVER THICKNESS, IMPACT STRENGTH, ICE MECHANICS, FLOATING STRUCTURES, ENVIRONMENTAL PROTECTION, DESIGN.

RONMENTAL PROTECTION, DESIGN.

New design curves for ice blasting relate crater radius with charge weight, charge depth, and ice thickness Singlecharge data can be used to design charge patterns for breaking ice in long channels or over broad areas. When charges are optimized to give maximum energetic efficiency, the specific energy is comparable to that for an ice-breaking ship, and significantly lower than the best attainable specific energy for ice-cutting machines. Shock attenuation curves for underwater explosions permit the calculation of safe distances for structures, fish and divers.

ICE FORCES ON MODEL MARINE STRUC-

Haynes, F.D., et al, International Conference on Port and Ocean Engineering under Arctic conditions, 7th, Helsinki, Finland, April 5-9, 1983. Proceedings, Espoo, Finland, Valtion teknillinen tutkimuskeskus, 1983, p.778-787, 7 refs.

ICE PRESSURE, OFFSHORE STRUCTURES, ICE SOLID INTERFACE, FLEXURAL STRENGTH, ICE COVER THICKNESS, ICE COVER STRENGTH, ICE ELASTICITY, VELOCITY, EX-PERIMENTATION.

PERIMENTATION.

Small-scale laboratory experiments were conducted on model marine structures in the CRREL test basin. The experiments were performed by pushing model ice sheets against structures and monitoring the ice forces during the ice-structure interaction. The parameters, varied during the test program, were the geometry of the marine structure and the velocity, thickness, and flexural strength of the ice. The results are presented in the form of ice forces on sloping and vertical structures with different geometries.

MP 1607 DYNAMIC BUCKLING OF FLOATING ICE SHEETS.

Sodhi, D.S., International Conference on Port and Ocean Engineering under Arctic conditions, 7th, Hel-sinki, Finland, April 5-9, 1983. Proceedings, Espoo, Finland, Valtion teknillinen tutkimuskeskus, 1983, p.822-833, 6 refs. 37-3780

FLOATING ICE, ICE PRESSURE, ICE LOADS, LOADS, ICE ADHESION, SHEETS, VELOCITY.

Experimental and analytical studies have been conducted to investigate the effect of ice velocity on the buckling loads of floating ice sheets. An analysis of dynamic buckling of a floating ice beam has been conducted for the case when one end of the beam moves at a constant velocity suddenly from rest Good agreement has been obtained between the results of analytical and experimental studies on the dynamic buckling of floating ice beams.

OBSERVATIONS OF PACK ICE PROPERTIES

IN THE WEDDELL SEA.

Ackley, S.F., et al. 1982, 17(5), p.105-106, 4 refs.

Smith, S.J., Clarke, D.B.

PACK ICE. ICE CONDITIONS, SEA ICE DISTRI-BUTION, WEDDELL SEA.

Observations of pack ice in the Weddell Sea during the Weddell Polynya expedition (WEPOLEX-81) culminated in a daily map of ice conditions and a narrative observation log. The narrative log contains information on ice concentration, ridging, amounts of thin ice and open water, and unusual ice features. On the basis of observations, the pack ice ice features. On the basis of observations, the pack ice zone has been divided into three regions ice edge region (within 0 to 60 naut mi. of the northern limit of pack ice), ice edge-pack ice transition zone (within 60 to 160 naut mi of the outer limit of pack ice), and deep pack (at distances greater than 160 naut. mi. from the outer limit). In most satellite microwave images the ice edge-pack ice transition zone appears as an area of lesser concentration. Observations did not confirm this. Also unexpected the abstraction of the pack ice transition zone of the pack ice transition zone appears as an area of lesser concentration. was the observation that noticeable swell propagation occurred at great distances from the outer pack limit

PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF WINTER SEA ICE IN THE PHYSICAL. WEDDELL SEA.

Clarke, D.B., et al, 1982, 17(5), p.107-109, 11 refs. Ackley, S.F. 37-3963

SEA ICE, ICE COMPOSITION, ICE STRUCTURE, ALGAE, WEDDELL SEA.

ALGAE, WEDDELL SEA.

Twenty of 27 ice cores and 13 surface ice samples taken between 59 deg 21 min S and 62 deg S have been analyzed for ice structure, salinity, nutrients, fluorescence, chlorophyll a, phaeo-pigment, diatom species enumeration, and bacteria. The primary physical feature is the dominance of frazil ice structure as opposed to congelation ice. The salinity range is 2.4 to 13.7% with the higher salinities within the upper 15 cm. Chemical analysis of nutrients in the cores indicates that they do not follow a dilution curve Silicate, phosphate, and nitrate are found in higher concentrations in the adjacent surface than in the ice cores. Natrite levels, however, are two to five times higher in the surface layer of the ice cores than in the adjacent surface water Chlorophyll a followed a pattern similar to that of nitrite. Phaeo-pigment ranged from 0.04 to 4.02 mg/cu m Meltwater fluorescence appears to scale with salinity. Diatoms are present at all sample levels in the ice cores, but in varying concentration and condition. Active growth occurs varying concentration and condition.
in the surface layers. Active growth occurs MP 1610

ATMOSPHERIC BOUNDARY LAYER MEAS-UREMENTS IN THE WEDDELL SEA. Andreas, E.L., 1982, 17(5), p.113-115, 4 refs.

37-3965

ICE CONDITIONS, SEA ICE, WEDDELL SEA. There was a very intensive atmospheric boundary layer sampling program carried out on the Mikhail Somov during the joint U.S.-U.S.R. Weddell Polynya Expedition. This program included upper-air soundings with two different radiosonde systems; surface-layer profiling with a boom instrumented at three levels, spectral measurements of surface-layer turbulence with fast responding velocity, temperature, and humidity sensors, and routine meteorological observations. This paper describes the instrumentation used for the measurements and presents some of the surface-layer temperature and dew-point profiles.

MP 1611 ARCTIC AND SUBARCTIC ENVIRONMENTAL ANALYSES UTILIZING ERTS-1 IMAGERY. Anderson, D.M., et al, Aug. 23, 1973, NASA-CR-

135523, 5p. McKim, H.L., Haugen, R.K., Gatto, L.W., Slaughter, C.W., Mariar, T. 28-2984

REMOTE SENSING, ENVIRONMENTS, ERTS IMAGERY.

MP 1612

HEAT AND MOISTURE FLOW IN FREEZING AND THAWING SOILS—A FIELD STUDY.

Berg, R.L., Conference on soil-water problems in cold regions, Calgary, Alberta, Canada, May 6-7, 1975, Proceedings, 1975, p.148-160, 14 refs.

ROADS, FROST HEAVE, FROZEN GROUND MECHANICS, MEASURING INSTRUMENTS, MATHEMATICAL MODELS.

MATHEMATICAL MODELS.

The USACRREL Pavements Research Group has recently initiated a project to more adequately model the mechanism of frost heaving in soil-water systems. The project has three primary objectives 1 Develop mathematical models incorporating heat flow, moisture flow and processes in the freezing zone, 2. Develop hie necessary laboratory equipment and procedures to evaluate the required factors and to refine the mathematical models, 3 Develop adequate instrumentation and optimize locations of sensors for full scale field tests, install this instrumentation in test sections and obtain . at a necessary to validate the mathematical models

ARD 1613.

MP 1613

STUDY OF CLIMATIC ELEMENTS OCCUR-RING CONCURRENTLY.
Bilello, M.A., International Geographical Congress, 23rd, Moscow, July-Aug. 1976, Proceedings. Vol.2, Moscow, 1976, p 23-30, In English.

CLIMATOLOGY, LONG RANGE FORECASTING, CLIMATIC CHANGES.

MP 1614

USE OF COMPRESSED AIR FOR SUPER-COOLED FOG DISPERSAL

Weinstein, A I. et al. Nov 1976, 15(11), p 1226-1231, For another version of this paper see 31-1494. 8 refs 31-1600

SUPERCOOLED FOG. FOG DISPERSAL WEATHER MODIFICATION, ICE FORMATION, COMPRESSED AIR.

Experiments have been performed under controlled and free environment conditions to determine the technical feasibility of using the cooling resulting from the adiabatic expansion of compressed air to initiate ice crystal production in a

supercooled fog. These experiments have shown that for most supercooled temperatures, approximately 1000 cc of air when compressed to 60 paig and released through a supersonic nozzle will produce the same number of ice crystals as does the evaporation of 1 cc of liquid propane. It is estimated that a compressed air supercooled fog dispersal system would consume approximately 6% of the hydrocarbon fuel presently consumed by operational systems using liquid propane. propane spray.

MP 1615

APPLICATION OF ICE ENGINEERING AND RESEARCH TO GREAT LAKES PROBLEMS. Freitag, D.R., Federal Conference on the Great Lakes, st, Ann Arbor, Mich., Dec. 13-15, 1972. Proceedings. (Washington?), Environmental Protection

ings. (Washington?), Envir Agency, (1972?), p.131-138. 31-1736

31-1756
ICE BOOMS, ICE COMPRESSION, PILES, ICE CONTROL, ICE DISTRIBUTION, FREEZING POINTS, ENGINEERING, RESEARCH PROJECTS, UNITED STATES—GREAT LAKES.

MP 1616

SOME ELEMENTS OF ICEBERG TECHNOLC

Weeks, W.F., et al, International Conference and Workshops on Iceberg Utilization for Fresh Water Production, Weather Modification, and Other Ap-plications, 1st, Iowa State University, Ames, October 2-6, 1977. Proceedings. Edited by A.A. Husseiny, New York, Pergamon Press, 1978, p.45-98, 51 refs. Mellor, M. 32-4714

ICEBERGS, ICE MECHANICS, ICE PHYSICS, ICE SHELVES, WATER SUPPLY, ICEBERG

TOWING.

Many of the technical questions relating to iceberg transport are given brief, but quantitative, consideration. These include inceberg genesis and properties, the mechanical stability of icebergs at sea, towing forces and tug characteristics, drag coefficients, ablation rates, and handling and processing the iceberg at both the pick-up site and at the final destination. In particular, the paper attempts to make technical information or glaciological and ice engineering aspects of the problem more readily available to the interested planner or engineer.

MP 1617

ICE AND SHIP EFFECTS ON THE ST. MARYS

RIVER ICE BOOMS.
Perham, R.E., June 1978, 5(2), p.222-230, 7 refs. See also 31-3424.

ICE BOOMS, ICE PRESSURE, ICE CONTROL, IMPACT STRENGTH, ICE LOADS, LOADS (FORCES), ICE NAVIGATION, RIVER ICE.

MP 1618 NUMERICAL SIMULATION OF AIR BUBBLER SYSTEMS.

Ashton, G.D., June 1978, 5(2), p.231-238, 8 refs. See also 31-3438.

BUBBLING, ICE PREVENTION, ICE CONTROL HEAT TRANSFER, MECHANICAL ICE PRE-VENTION, ANALYSIS (MATHEMATICS), EQUIPMENT.

MP 1619

DYNAMICS OF NEAR-SHORE ICE.

Kovacs, A, et al, Environmental assessment of 'he Alaskan continental shelf, Vol 2 Principal investigators' reports July-Sep. 1978. Boulder, Colorado, Envi-ronmental Research Laboratories. 1978, p.230-233. Weeks, W.F. 33-3095

SEA ICE. FAST ICE.

The authors report briefly on a new ice pile-up southeast of Pt Barrow and the status of various reports connected with their current studies

MP 1620

ANISOTROPIC PROPERTIES OF SEA ICE IN THE 50-150 MHZ RANGE.

Kovacs, A., et al. Environmental assessment of the Alaskan continental shelf, Vol. 8, Transport. Principal investigators' annual reports for the year ending March 1979. Boulder, Colorado, Outer Continental Shelf Environmental Assessment Program, Oct. 1979, p.324-353, For another source see 34-963. 4 refs. Morey. R.M

SEA ICE, ICE ELECTRICAL PROPERTIES, ANISOTROPY, ICE CRYSTAL STRUCTURE, ELECTROMAGNETIC PROPERTIES, OCEAN CURRENTS, REMOTE SENSING.

Results of impulse radar studies of sea ice near Prudhoe Bay. Alaska, show that where there is a preferred current direction under the ice cover the crystal structure of the ice becomes highly ordered. This includes a crystal structure

with a preferred horizontal coaxis that is oriented parallel with a preferred horizontal c-axis that is oriented parallel with the local current. The radar studies show that this structure behaves as an anisotropic dielectric. The result is that when electromagnetic energy is radiated from a dipole antenna in which the E-field is oriented perpendicular with the c-axis azimuth, no bottom reflection is detected. It was also found that the frequency dispersion of anisotropic sea ice varies in the horizontal plane and is related to the average bulk brine volume of the ice. The bulk delectric constant of the ice, as determined from impulse travel time, shows little correlation with the coefficient of anisotropy.

MP 1621 SOUTH POLE ICE CORE DRILLING, 1981-1982. Kuivinen, K.C., et al, 1982, 17(5), p.89-91, 7 refs. Koci, B.R., Holdsworth, G.W., Gow, A.J. 37_3955

DRILLING, ICE CORING DRILLS, ICE CORES, ANTARCTICA—AMUNDSEN-SCOTT STA-TION.

TION.

A cooperative ice core drilling, core processing, and stratigraphic logging program was conducted at Amundsen-Scott Station during the 1981-82 season by investigators from the Polar Ice Coring Office (PICO), the National Hydrology Research Institute/Environment Canada (NHRI), and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREJ). A 202.4-m ice core was collected, logged and packaged in the field, and then shipped to the CRREL ice core storage facility, where it will be made available to the NSF-sponsored glaciologists for further analysis. In addition to work with the ice core, PICO team members collected three gas samples for the Physics Inst., Univ. of Bern, Switzerland and prepared the Geathard-Owen logging winch for use by Univ. of Wisconsin-Madison geophysicists in their some logging of the 900-m borehole at Dome C.

MP 1622 CONTINUUM SEA ICE MODEL FOR A GLO-BAL CLIMATE MODEL.

Ling, C.H., et al, Sea ice processes and models. Edited by R.S. Pritchard, Seattle, University of Washington Press, 1980, p.187-196, 20 refs.
Rasmusen, L.A., Campbell, W.J.

SEA ICE. DRIFT, ICE CONDITIONS, MATH-SEA ICE, DRIFT, ICE CONDITIONS, MAIN-EMATICAL MODELS, REMOTE SENSING, ICE MELTING, FREEZING, MICROWAVES, CLI-MATE, MAPPING, RADIOMETRY, WEDDELL

The model developed by Campbell (1965) has been extended The model developed by Campbell (1965) has been extended to a time-dependent, quasi-steady-state model that uses both the equation of continuity and the equation of momentum it also incorporates an equation of state that relates the pressure of ice to its convergence. The constitutive equation is of a fluid type The freezing and melting of sea ice is parameterized in terms of ice thickness, location, and season. For the 1974 austral winter twice-daily surface wind stress fields were generated from synoptic pressure data. For every third day of this period the boundaries and concentration of the Antarctic sea ice were mapped using ESMR (Electronically Scanning Microwave Radiometer) images acquired by the Nimbus-5 satellite. These data are used both as initial conditions and to compare the model results for various time periods. results for various time periods.

MP 1623 MF 1023
REVIEW OF ELECTRICAL RESISTIVITY OF
FROZEN GROUND AND SOME ELECTROMAGNETIC METHODS FOR ITS MEASURE-

Arcone, S.A., 1979, 18(5), p.32-37, 16 refs.

33-4231 FROZEN GROUND PHYSICS. FROZEN GROUND PHYSICS, ELECTRICAL RESISTIVITY, ELECTROMAGNETIC PROSPECTING, GEOPHYSICAL SURVEYS, RADIO WAVES, SOIL MOISTURE CONTENT, SOIL TEMPER, TURE, GRAIN SIZE, AIRBORNE RADAR, MEASURING INSTRUMENTS.

Results of extensive studies of earth resistivities of low tempera Results of extensive studies of earth resistivities of low temperature soils are presented. Ground measurements of the electromagnetic field components of radio waves propagated at low frequencies from distant transmitters and of the inductive coupling between two loop antennas are described. Results of measurements by these methods are compared with each other and with actual findings from excavations and borings at permafrost sites. The measurements are shown to provide data on locations of lens ice, indicate zones of thawing, give indications which permit estimating resistivities of layers and permit construction of a map of Alayka identifying major resistivity zones. Airborne evaluation of remotely propagated waves permits construction of resistivity contour maps. Reasons for variations in resistivity among various categories of frozen soils are discussed.

THERMAL AND RHEOLOGICAL COMPUTA-TIONS FOR ARTIFICIALLY GROUND CONSTRUCTION. FROZEN

Sanger, F.J., et al, International Symposium on Ground Freezing, 1st, Bochum, Mar. 8-10, 1978, Vol.2. Edited by H.L. Jessberger, Bochum, Ruhr University, 1978, p.95-117, 32 refs.
Sayles, F.H.

33-4283
SOIL FREEZING, THERMAL PROPERTIES, ARTIFICIAL FREEZING, FROZEN GROUND MECHANICS, FROZEN GROUND THERMODYNAMICS, CREEP PROPERTIES, RHEOLOGY,
CONSTRUCTION, ANALYSIS (MATHEMATICS), FROST HEAVE.

ON FORECASTING MESOSCALE ICE DYNAM-ICS AND BUILD-UP. Hibler, W.D., III, et al, 1983, Vol.4, p.110-115, 10 refs. Udin, I., Ullerstig, A.

37-4089
ICE PILEUP, ICE MECHANICS, ICE LOADS, ICE SOLID INTERFACE, WAVE PROPAGATION, OFFSHORE STRUCTURES, SHORES, ICE FORE-CASTING, SEA ICE, ICE COVER STRENGTH, ICE COVER THICKNESS, MATHEMATICAL MODELS.

MODELS.

Due to the nonlinear nature of the ice interaction, seasce build-up against coasts and structures is a complex process.

This build-up significantly affects mesoscale (10 to 100 km)
ice motions over typical forecast time scales of several days.

To examine the ramifications of assuming a non-linear ice
interaction in ice forecast models, we have carried out a
series of idealized simulations employing a viscous plastic
sea-ice rheology. These simulations employ constant wind
fields at a gnd resolution of 18.5 km and allow the ice
to build up and strengthen

With the plastic ice interaction
the ice build-up is found to take place by means of a
ridging front Depending on the nature of the strengththickness coupling, this build-up is accompanied by kinematic
wave propagation effects.

EXPERIMENTAL DETERMINATION OF THE BUCKLING LOADS OF FLOATING ICE

Sodhi, D.S., et al, 1983, Vol.4, p.260-265, 12 refs. Haynes, F.D., Kato, K., Hirayama, K.

FLOATING ICE, ICE LOADS, STRUCTURES, ICE SOLID INTERFACE, ICE SHEETS, ICE PRESSURE, EXPERIMENTATION, PHOTOGRAPHY. Experiments were performed to determine the forces required to buckle a floating ice sheet pushing against structures of different widths sheet was determined to enable a comparison to be made between the theoretical and experimental results.

MP 1627 EXPERIMENTS ON ICE RIDE-UP AND PILE-

Sodhi, D.S., et al, 1983, Vol.4, p.266-270, 48 refs. Hirayama, K., Haynes, F.D., Kato, K.

37-4115
ICE PILEUP, FLOATING ICE, STRUCTURES, ICE SOLID INTERFACE, ICE OVERRIDE, SHORES, BEACHES, SLOPE ORIENTATION, EXPERIMENTATION.

EXPERIMENTATION.

lee pile-up and ride-up are common occurrences along beaches in the sub-Arctic and Arctic. An understanding of the factors which lead to pile-up is important for design of a defensive strategy to prevent damage to coastal installations. Since ice action on a sloping beach is complex, an experimental model study was undertaken to determine the factors which promote ice pile-up. The factors varied in this study were the freeboard, slope, and roughness of the beach. One experiment was performed to observe the effectiveness of a shore defense structure against ice ride-up.

ROOF MOISTURE SURVEYS: CURRENT STATE OF THE TECHN JLOGY.
Tobiasson, W., 1983, Vol.371, 2.24-31, 7 refs.

ROOFS, MOISTURE DETECTION, INFRARED RECONNAISSANCE, MEASURING INSTRU-

MENTS

Mosture is the big enemy of compact roofing systems Nondestructive nuclear, capacitance and infrared methods can
all find wet insulation in such roofs but a few core samples
are needed for verification Nuclear and capacitance surveys
generate quantitative results at grid points but examine only
a small portion of the roof Quantitative results are not
usually provided by infrared scanners but they can rapidly
examine every square inch of the roof Being able to
find wet areas when they are small is an important advantage.

TRANSPORT OF WATER IN FROZEN SOIL. EXPERIMENTAL DETERMINATION OF SOIL-WATER DIFFUSIVITY UNDER ISOTHERMAL

Nakano, Y., et al, Dec. 1982, 5(4), p.221-226, For Part 2 of this study (MP 1601), see 37-3558. 13 refs. Tice, A.R., Oliphant, J L., Jenkins, T.F. 37-4218.

SOIL WATER MIGRATION, FROZEN GROUND PHYSICS, GROUND ICE, SOIL FREEZING.

A new experimental method for measuring the soil-water

A new experimental metanod for measuring the soft-water duffusivity of frozen soil under isothermal conditions is introduced. The theoretical justification of the method is presented and the feasibility of the method is demonstrated by experiments conducted using marine deposited clay. The measured values of the soil-water diffusivity are found comparable to reported experimental data. (Auth.)

ACOUSTIC EMISSIONS IN THE INVESTIGA-TION OF AVALANCHES.
St. Lawrence, W.F., Canadian Geotechnical Confer-ence, 29th, Vancouver, B.C., 1976. Proceedings, Canadian Geotechnical Society, 1977, p.VII/24-VII/33, In English with French summary. 4 refs. 33.1508

SNOW DEFORMATION, ULTRASONIC TESTS, AVALANCHE MECHANICS, SNOW ACOUSTICS, SNOW COVER STABILITY.

NOTES AND QUOTES FROM SNOW AND ICE OBSERVERS IN ALASKA.

Bilello, M.A., 1979, 47th, p.116-118. 38-104

SNOW SURVEYS, ICE SURVEYS, COST ANALYSIS, ORGANIZATIONS, UNITED STATES—ALASKA.

MP 1632 RELATIONSHIP BETWEEN THE ICE AND UN-FROZEN WATER PHASES IN FROZEN SOILS AS DETERMINED BY PULSED NUCLEAR RESONANCE AND PHYSICAL DESORPTION

Tice, A.R., et al, 1983, 5(2), p.37-46, In Chinese with English summary. For another version see 37-48, 14

Oliphant, J.L., Zhu, Y., Nakano, Y., Jenkins, T.F.

38-180
UNFROZEN WATER CONTENT, SOIL WATER, ICE WATER INTERFACE, GROUND ICE, FROZEN GROUND TEMPERATURE, FROZEN GROUND PHYSICS, NUCLEAR MAGNETIC RESONANCE, CLAY SOILS.
An experiment is described that demonstrates the balance between the ice and the unfrozen water in a frozen soil as water is removed Nuclear magnetic resonance (NMR) is used to monitor the unfrozen water content as the soil is dehydrated by a molecular sieve material. Our results show that the unfrozen water content of a Motric clay soil remains constant until the total water content has been reduced to the point where no ice remains in the system.

MP 1633 MECHANISMS FOR ICE BONDING IN WET SNOW ACCRETIONS ON POWER LINES. Colbeck, S.C., ct al, June 1983, 83-17, p.25-30, 9 refs.

Ackley, S.F. 38-427

POWER LINE ICING, ICE ADHESION, WET SNOW, ICE FORMATION, SNOW ACCUMULATION. PHASE TRANSFORMATIONS, GRAIN SIZE, TEMPERATURE EFFECTS

MP 1634 HOW EFFECTIVE ARE ICEPHOBIC COAT-INGS.

Minsk, L.D., June 1983, 83-17, p 93-95, 2 refs

PROTECTIVE COATINGS, ICE CONTROL, ICE PREVENTION, ICING, SHEAR STRENGTH, ICE STRENGTH, SURFACE PROPERTIES, ICE ADHESION, COUNTERMEASURES, TESTS.

ADHESION, COUNTERMEASURES, TESTS.

Much effort over many years has gone into the search
for an effective, durable, eavily applied and incepensive material
to eliminate the force of adhesion between the and a substrate.
The objective of zero the adhesion on an unheated surface
which would either prevent the formation of the or ensure
self-shedding of very thin accretions has not yet been achieved.
Many commercially available coatings do succeed in reducing
the force of adhesion below 15 psi (1034 kPa) and survive
at least five freeze release cycles, two arbitrarily established
criteria. Laposure for rain crossion, however, increases the
force of adhesion beyond this value for most materials.

As part of a continuing project at CRRLL, a test procedure
for measuring the shear strength of rice at failure has been
developed and a large number of candidate materials have
been tested.

STUDIES OF HIGH-SPEED ROTOR ICING

UNDER NATURAL CONDITIONS.

Itagaki, K., et al, June 1983, 83-17, p.117-123, 2 refs.

Lemieux, G.E., Bosworth, H.W., O'Keefe, J., Hogan,

38-438

AIRCRAFT ICING, FREEZING NUCLEI, PRO-PELLERS, HELICOPTERS, TESTS.

leing on his-speed rotors was studied under natural conditions on the summit of Mt Washington Differences in the growth conditions from those of laboratory tests, such as rapidly variable water supplies and abundant freezing nuclei, seem to have contributed to raising the temperature of the wet growth regime and producing finer crystals than in laboratory experiments.

MP 1636

APPLICATION OF A BLOCK COPOLYMER SO-LUTION TO ICE-PRONE STRUCTURES.

Hanamoto, B., June 1983, 83-17, p.155-158, 1 ref.

ICING, CHANNELS (WATERWAYS), LOCKS (WATERWAYS), PROTECTIVE COATINGS, ICE PREVENTION, POLYMERS, ICE NAVIGATION, ICE ADHESION, COUNTERMEASURES

MP 1637

FIELD MEASUREMENTS OF COMBINED ICING AND WIND LOADS ON WIRES.

Govoni, J.W., et al, June 1983, 83-17, p.205-215, 8

Ackley, S.F.

38-449 POWER LINE ICING, ICE ACCRETION, ICE LOADS, WIND PRESSURE, WIND DIRECTION, WIND VELOCITY, POWER LINE SUPPORTS.

WIND VELOCITY, POWER LINE SUPPORTS.

Four winter field seasons of simulated power line icing data were obtained during the years 1977-1981.

Measurements were obtained of the icing characteristics, loads on the wire, and wind conditions simultaneously.

Loads were measured using a single-axis load cell in line with the wire during the first three seasons, and a tri-axial load cell (resolving three perpendicular force components) in the 1980-81 winter season.

Winds were measured using a vaned pitot-static tube located near one end of the wire

MP 1638

LANDSAT DIGITAL ANALYSIS OF THE INI-TIAL RECOVERY OF THE KOKOLIK RIVER TUNDRA FIRE AREA, ALASKA. Hall, D.K., et al, Dec. 1979, No.80602, 15p., 7 refs.

Ormsby, J.P., Johnson, L., Brown, J.

TUNDRA, FIRES, REVEGETATION, REMOTE SENSING, LANDSAT, UNITED STATES—ALAS-KA—KOKOLIK RIVER.

MP 1639

SURVEY OF METHODS FOR SOIL MOISTURE DETERMINATION.

Schmugge, T.J., et al, Nov. 1979, No.80658, 74p., Refs. p 45-60.

Jackson, T.J., McKim, H.L.

35-484
SOIL WATER, REMOTE SENSING, GRAVIMET-RIC PROSPECTING, ELECTROMAGNETIC PROSPECTING, EVAPOTRANSPIRATION, VEGETATION FACTORS, PRECIPITATION (METEOROLOGY).

GUIDEBOOK TO PERMAFROST AND RELAT-ED PEATURES ALONG THE ELLIOTT AND DALTON HIGHWAYS, FOX TO PRUDHOE BAY, ALASKA.

Brown, J., ed, International Conference on Permafrost, 4th, July 18-22, 1983, Fairbanks, University of Alaska, (1983), 230p., Guidebook No.4. Refs. p.213-225. Kreig, R.A., ed.

PERMAFROST PHYSICS, MANUALS, ROADS. ECOLOGY, CLIMATOLOGY, HYDROLOGY, VEGETATION, GEOLOGY, GROUND ICE, UNITED STATES—ALASKA.

MEASUREMENT OF ICE FORCES ON STRUC-TURES.

Sodhi, D.S., et al, Design for ice forces. Edited by S.R. Caldwell and R.D. Crissman, New York, N.Y., American Society of Civil Engineers, 1983, p.139-155.

Haynes, F.D.

Jo-399 ICE LOADS, ICE PRESSURE, OFFSHORE STRUCTURES. IMPACT STRENGTH, ICE STRENGTH, RIVER ICE, LAKE ICE, ICE ME-CHANICS, STRAINS, TIME FACTOR, MEASUR-ING INSTRUMENTS.

Methodologies and techniques are discussed for measuring ice forces on fixed structures situated in rivers and lakes. The usual method of measuring ice forces is to place a load frame between the moving ice and the structure and to measure the reactive forces with load cells or strain gages. Another method is to measure the acceleration, displacement or strain at a few points on the test structure and relate the measurements to ice forces. The size and anu relate the measurements to ice forces. The size and shape of the force measuring system depend upon the mode of ice failure, the distribution of the ice forces and the logistics associated with each site. The variations of ice force with respect to time are generally very high during crushing and impact, and the response of the force-measuring system should be sufficiently fast.

METHODS OF ICE CONTROL

Frankenstein, G.E., et al, Design for ice forces. Edited by S.R. Caldwell and R.D. Crissman, New York, N.Y., American Society of Civil Engineers, 1983, p.204-215, 7 refs.

Hanamoto, B.

38-602

JOS-002
ICE LOADS, ICE CONTROL, ICE NAVIGATION,
LOCKS (WATERWAYS), CHANNELS (WATERWAYS), ICEBREAKERS, CHEMICAL ICE PREVENTION, ICE REMOVAL, ELECTRICAL
MEASUREMENT, AIR CUSHION VEHICLES,
PROTECTIVE COATINGS.

Methods of ice control in navigable waters including locks are presented. Ice carried downstream by ship traffic causes operational problems in and around the lock preas as well as in restricted channels. The paper discusses chemical, electrical, and mechanical methods of ice control. The use of air cushion vehicles and ice breaking ships for ice control is also discussed.

ICE ACTION ON TWO CYLINDRICAL STRUC-

Kato, K., et al, Offshore Technology Conference, 15th, Houston, Texas, May 2-5, 1983. Proceedings. Vol.1, 1983, p.159-166, 17 refs. Sodhi, D.S.

38-641

ICE LOADS, STRUCTURES, ICE PRESSURE, ICE SOLID INTERFACE, EXPERIMENTATION, PIPES (TUBES).

PIPES (TUBES).

Ice action on two cylindrical structures, located side by side, has been investigated in a small-scale experimental study to determine the interference effects on the ice forces generated during ice structure interaction. The proximity of the two structures changes the mode of ice failure, the magnitude and direction of ice forces on the individual structure, and the dominant frequency of ice force variations. Interference effects were determined by comparing the experimental results of tests at different structure spacings.

MP 1644

ICE JAMS IN SHALLOW RIVERS WITH FLOODPLAIN FLOW.

Calkins, D.J., Sep. 1983, 10(3), p.538-548, 14 refs.

ICE JAMS, RIVER ICE, RIVER FLOW, ICE CON-DITIONS, ICE COVER THICKNESS, FLOATING ICE, HYDRAULICS, FLOODS, PLAINS, COMPUTER APPLICATIONS.

PUTER APPLICATIONS.

The equilibrium ice jam thickness given by Pariset et al, is modified to yield a clearer, consistent relationship between the flow hydraulics and thickness in the modified equations are analyzed with respect to a floating ice jam in the main channel with flow also occurring in the floodplain. The final derivation allows the expected ice jam thickness to be computed, given the bed and ice cover thickness. The analytical computation for the ice jam thicknesses is compared with prototype data on ice jam thincknesses from four shallow rivers which had significant floodplain flow with the ice jam event.

ASYMMETRIC PLANE FLOW WITH APPLICA-TION TO ICE JAMS.

Tatinclaux, J.C., et al, Nov. 1983, 109(11), p.1540-1556, 17 refs.

Gögüs, M. 38-1629

ICE JAMS, WATER FLOW, FLOW RATE, SHEAR STRESS, FRICTION, SURFACE ROUGHNESS, VELOCITY, ANALYSIS (MATHEMATICS), TURBULENT FLOW.

An available turbulence method is used to prove that in plane flows between two boundaries with asymmetric roughness the plane of maximum velocity is not the plane of zero shear stress. By dividing the flow at the plane of zero shear stress, laboratory and field data on flows below simulated shear stress, laboratory and field data on flows below simulated and actual ice jams are analyzed to derive equations for the boundaries friction factors in terms of mean flow velocity, depth of flow zone, and boundary roughness for smooth and fully rough boundaries. These equations are applied to the calculations of ice jam characteristics. For the jams studied, the present method gives a variation of about 10% in the jam characteristics with a method based on dividing the flow at the plane of maximum velocity.

MP 1646 OPTICAL ENGINEERING FOR COLD ENVI-RONMENTS.

Aitken, G.W., e.J., 1983, Vol.414, Meeting on Optical Engineering for Cold Environments, Arlington, VA, April 7-8, 1983. Proceedings, 225p., Refs. passim. For selected papers see 38-1032 through 38-1057.

COLD WEATHER PERFORMANCE, SPECTROS-COPY, LOW TEMPERATURE RESEARCH, REMOTE SENSING, WAVE PROPAGATION, MEASURING INSTRUMENTS, ENGINEERING, SNOWFALL.

MP 1647

TECHNIQUE FOR MEASURING THE MASS CONCENTRATION OF FALLING SNOW. Lacombe, J., 1983, Vol.414, p.17-28, 14 refs.

SNOWFALL, MEASURING INSTRUMENTS, PRECIPITATION GAGES, VELOCITY, ELECTROMAGNETIC PROPERTIES, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

A system has been developed by the U.S. Army Cold Regions Research and Engineering Laboratory to measure the mass concentration of falling snow crystals. It is known as ASCME (Airborne Snow Concentration Measuring Equipment) and is described in this paper. ASCME's general performance has been evaluated based on concurrent measurements of precipitation rate. A strong correlation between airborne-snow mass concentration and precipitation rate yields an estimate of particle fall velocity close to that observed by other researchers. Factors affecting system accuracy have been investigated and are discussed. Examples are given of the utilization of ASCME data in analyses of electromagnetic energy propagation in falling snow. (Auth.) agnetic energy propagation in falling snow.

MP 1648 MP 1048
CHARACTERIZATION OF SNOW FOR
EVALUATION OF ITS EFFECT ON ELECTROMAGNETIC WAVE PROPAGATION.
Berger, R.H., 1983, Vol.414, p 35-42, 9 refs.

38-1037 38-1037 SNOWFALL, SNOWFLAKES, ELECTROMAGNETIC PROPERTIES, PARTICLE SIZE DISTRIBUTION, SPECTROSCOPY, MEASURING INSTRUMENTS, SNOW CRYSTALS, TURBULENT

BOUNDARY LAYER.

BOUNDARY LAYER.

Show as an obscurant presents some interesting challenges to those attempting to characterize it. The wide range of particle sizes which can be present at any instant, and the intricate and varied particle geometry, which makes particle orientation an important consideration in snow characterization and extinction measurements, both call for the use of special measurement techniques. The application of particle size spectrometer probes to the measurement of distributions and area concentrations for snow crystals and flakes in the 12.5-to 6200-micron size range is described (Auth.)

PROGRESS IN METHODS OF MEASURING THE FREE WATER CONTENT OF SNOW. Fisk, D.J., 1983, Vol.414, p 48-51, 3 refs.

38-1039 38-1039
SNOW WATER CONTENT, SNOW ELECTRICAL PROPERTIES, MEASURING INSTRUMENTS, SNOW COVER EFFECT, ELECTROMAGNETIC PROPERTIES, SNOW MELTING, BACKSCATTERING, ABSORPTION, WAVE PROPAGATION, FREEZE THAW CYCLES.

PROPAGATION, FREEZE THAW CYCLES.
Providing ground truth for the backscatter and absorption effects of a snow cover on electromagnetic waves has long been a problem One characteristic of the snow cover which has been particularly difficult to measure is its free, or liquid, water content—the fraction of the snow's volume which exists in the liquid state. Five methods which have been used for measuring this parameter are described and their merits and deficiencies are discussed. Two of the methods are calorimetric, measuring the free water content as a function of the heat added to or removed from a snow sample while completely melting or freezing it. The third uses the freezing point depression observed on adding a salt solution to a snow sample to calculate the snow's free water content. In the fourth procedure, a snow sample is completely dissolved in ethyl or methyl alcohol The corresponding decrease in temperature is inversely related to the free water content of the snow The final technique is electronic above a certain frequency, the electrical capacitance of snow is related to its density and free water content. With accurate calibration, devices which measure snow capacitance are likely to be the simplest and fastest means of providing free water measurements (Auth.)

COMMENTS ON THE METAMORPHISM OF SNOW.

Colbeck, S.C., 1983, Vol.414, p 149-151.

METAMORPHISM (SNOW), SNOWFALL, SNOW CRYSTAL GROWTH, GRAIN SIZE, TEMPERATURE GRADIENTS, CLIMATIC FACTORS, WET SNOW.

Snow precipitation takes a variety of forms depending on the conditions in the atmosphere at the time of the snowfall. Regardless of what particular conditions prevail at that time, once the snow particles reach the ground they immediately begin changing. This is not surprising since the snow cover is at or close to its melting temperature, has a very large specific surface area, and has ever changing boundary conditions. They snow and dry snow are very different. They have different properties and even looked different. They have different properties and even looked they because they snowfall followed some time later by melting is the normal sequence of events. (Auth.) MP 1651 MP 1651

LANDSAT-4 THEMATIC MAPPER (TM) FOR

COLD ENVIRONMENTS.
Gervin, J.C., et al, 1983, Vol.414, p.179-186, 28 refs.
McKim, H.L., Salomonson, V.V. 38-1054

38-1034
REMOTE SENSING, SPECTROSCOPY, SNOW
COVER, ICE CONDITIONS, SNOW WATER
CONTENT, TOPOGRAPHIC SURVEYS, LANDSAT, CLOUD COVER, MAPPING.

SAT, CLOUD COVER, MAPPING.

The TM aboard Landsat-4 launched on July 16, 1982, represents a major advance in Earth resources sensors. Its seven spectral bands record surface radiation in blue, green, red, near infrared, middle infrared and thermal wavelengths. The spatial resolution of approximately 30 meters represents a sevenfold increase over the previous Landsat sensor, the multispectral scanner subsystem (MSS). In addition, TM has greater radiometric sensitivity, distinguishing 256 quantization levels, compared with 64 for the MSS. These potential improvements have significant implications for satellite remote sensing in cold environments. The addition of the middle infrared bands will permit clouds to be distinguished from snow. It may also be possible to relate spectral response in this range to snow condition and hence water content. The thermal band responds to differences in surface temperature, which may be related to variations in soil moisture and drainage. These are important considerations for cold region construction. (Auth.)

MP 1652

MP 1652 EFFECT OF COLOR AND TEXTURE ON THE SURFACE TEMPERATURE OF ASPHALT CON-

CRETE PAVEMENTS. Berg, K.L., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington. D.C., National Academy Press, 1983, p.57-61, 11 refs Esch. D.C. Berg, R.L., et al, International Conference on Perma-

38-1110

38-11:0
PERMAFROST BENEATH ROADS, PAVE-MENTS. BITUMINOUS CONCRETES, SURFACE TEMPERATURE, WIND VELOCITY, PROTEC-TIVE COATINGS, TESTS.

TIVE COATINGS, TESTS.

During the fall of 1981 and the spring of 1982, eight test items were established on an asphalt pavement in Fairbanks, Alaska. The test items were two sections of untreated pavement, yellow-painted pavement, white-painted pavement, "standard" chip seal, fine-grained "standard" chip seal, chip seal with dark brown aggregate, and chip seal with white marble aggregate. The test items were located on a main road. Surface temperatures were monitored hourly by thermocouples attached to an automatic data collection system. The ambient air temperature, wind suced and direction, amount thermocouples attached to an automatic data collection system. The ambient air temperature, wind speed and direction, amount of precipitation, and radiation balance were continuously recorded at an untrafficked pavement approximately 100 m from the test items. Incident and reflected shortwave radiation measurements were made nearly every week-lay over each test item using a hand-held radiometer. Neatcors, ratios of surface thawing indexes to air thawing indexes varied from about 1.2-1 3 for the white- and yellow-painted surfaces, respectively, to about 1.4-1 5 for the other surfaces.

OBSERVATIONS ON ICE-CORED MOUNDS AT SUKAKPAK MOUNTAIN, SOUTH CENTRAL BROOKS RANGE, ALASKA.

Brown, J., et al, International Conference on Perma-frost, 4th, Fairbanks, Alaska, July 17-22, 1983 Pro-ceedings. Washington, D.C., National Academy Press, 1983, p.91-96.

Nelson, F., Brockett, B.E., Outcalt, S.I., Everett, K.R.

FROST MOUNDS, TOPOGRAPHIC FEATURES, FROST MOUNDS, TOPOGRAPHIC FEATURES, GROUND ICE, UNFROZEN WATER CONTENT. GEOMORPHOLOGY, PERMAFROST DISTRIBUTION, PERMAFROST HYDROLOGY, SLOPES, MOUNTAINS, UNITED STATES—ALASKA—SUKAKPAK MOUNTAIN.

ALASKA—SUKAKPAK MOUNTAIN.
Several hundred mounds occur on the lower slope of Sukakpak Mountain. The mean mound height is approximately I m and most are elliptical or circular in plan. Clear, massive ice can be found within, below, and adjacent to some mounds. Within and adjacent to one mound, free water under low pressure was of the control of the mounds of the mounds were found below the water lens. Trees with smooth trunk curvature on top of the mounds suggest long period of stability. Most mounds are found in active drainings channels that develop thick surface icings each winter. As a tentative hypothesis, it is suggested that the mounds form by closed-system freezing at sites with higher moviture contents.

than their surroundings. The causes and frequency of occurrence and annual magnitude of this upheaving are under

MP 1654 RUNOFF FROM A SMALL SUBARCTIC WA-

RUNOFF FROM A SMALL SUBARCTIC WA-TERSHED, ALASKA.

Chacho, E.F., et al, International Conference on Per-mafrost, 4th, Fairbanks, Alaska, July 17-22, 1983.

Proceedings, Washington, D.C., National Academy Press, 1983, p.115-120, 17 refs.

Bredthauer, S.
28, 1102.

38-1120

PERMAFROST BENEATH RIVERS, RUNOFF, STREAM FLOW, WATERSHEDS, DISCONTINU-OUS PERMAFROST, SNOWMELT, PRECIPITA-TION (METEOROLOGY), MOSSES, SLOPES, EVAPOTRANSPIRATION.

EVAPOTRANSPIRATION.
Precipitation-runoff ratios were measured on Glenn Creek, a small, second-order, subarctic stream located near Fairbanks, Alaska, in the Yukon, Tanana Upland physiographic province Glenn Creek drains a watershed of 2.25 sq km, of which 70% is underlain by permafrost. A Parshall flume was used to measure streamflow, and a pair of 1.22 m by 2.44 m lysimeters were used to measure precipitation and runoff from the moss-covered permafrost slope. The data from one summer season (1979) and one snowmelt season (1980) indicate the sloping surfaces of the watershed have a very fast response time, long recession, and subsurface runoff prior to complete saturation of the overlying organic material Glenn Creek streamflow is comparable to the lysimeter runoff with regard to response time and runoff recession, however the watershed precipitation-runoff ratio is much lower. This is attributed to longer travel distances in the watershed, which result in greater evaportanspiration losses, little contribuwhich result in greater evapotranspiration losses, little contribu-tion from the non-permafrost areas, and only partial areas of the watershed contributing to the streamflow.

MP 1655 FROST HEAVE OF SALINE SOILS.

Chamberlain, E.J., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.121-126, 8 refs. 38-1121

38-1121
SALINE SOILS, FROST HEAVE, SOIL CHEMISTRY, SOIL FREEZING, ICE LENSES, BRINES, SHEAR STRESS, TESTS.
Theories of ice segregation and frost heave processes in saline soils are briefly examined and modified to explain observations made on clay and sand soils frozen under laboratory conditions. Seawater was observed to reduce the rate of frost heave by more than 50% for both soil types and to dramatically reduce the size of ice lenses. The effect of seawater is to cause the formation of a thick active freezing zone with many ice lens growth sites, each with its own brine concentration. Unbounded brine-rich soil zones between ice lenses are identified as potential zones of low shear strength

MP 1656 LONG-TERM ACTIVE LAYER EFFECTS OF CRUDE OIL SPILLED IN INTERIOR ALASKA. Collins, C.M., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p 175-179, 19 refs.

38-1131
OIL SPILLS, ACTIVE LAYER, ENVIRONMENTAL IMPACT, THAW DEPTH, ALBEDO, SEASONAL VARIATIONS, TEMPERATURE EFFECTS, UNITED STATES—ALASKA.

Two experimental oil spills of 7570 liters each were conducted at a black-spruce-forested site in February and July of 1976. The long-term effects of the spills on the active layer were directly related to the method of oil movement. The winter spill moved beneath the snow, within the surface moss layer, and the summer spill moved primarily below the moss, in the organic soil. The summer spill affected an area rearly one and one-half times that of the winter spill. Only 10% of the 303 sq m summer spill area and one-half times that of the winter spill area increased from 1977 to 1980 average thaw depth was 72 cm ss. 48 cm in the control and remained essentially the same in 1981 and 1982. Thaw depths in the winter spill area continued to increase until 1982 to an average of 92 cm. Summer temperatures 5 cm under the blackened surface. Presumably the change in albedo due to the surface oil accounts for the increased thaw in the winter spill area. Two experimental oil spills of 7570 liters each were conducted

MP 1657

FIELD TESTS OF A FROST-HEAVE MODEL Guymon, G.L., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.409-414, 9 refs. Berg, R.L., Hromadka, T.V., II. 38-1175

38-11/3
FROST HEAVE, FROST PENETRATION, FREEZE THAW CYCLES, SOIL CREEP, SOIL TEMPERATURE, GROUND WATER, WATER PRESSURE, WATHER LEVEL, MATHEMATICAL MODELS, ICE LENSES, ICE MELTING.

MODELS, ICE LENSES, ICE MELTING.

A one-dimensional mathematical model of frost heave based upon a nodal domain integration analog is compared to data collected from a Winchendon, Mass., field site. Air and soil temperatures, pore water pressures, and groundwater level data were collected on test sections containing six different soils during the winters of 1978-1979 and 1979-1980. The soil samples were evaluated in the laboratory to determine soil moisture characteristics, hydraulic conductivity as a function of pore water tensions, density, and other parameters. The parameters were used together with assumed thermal parameters in a one-dimensional model that calculates the distributions of temperature and moisture content as well as the amount of ice segregation (vertically lumped as well as the amount of ice segregation (vertically lumped frost heave) and thaw consolidation. Using measured air and soil surface temperatures as input data, the simulated frost heave and thaw consolidation agreed well with measured ground surface displacements that resulted from ice segregation ice lens melting.

MP 1658 RELATIONSHIPS BETWEEN ESTIMATED MEAN ANNUAL AIR AND PERMAFROST TEM-PERATURES IN NORTH-CENTRAL ALASKA.

Haugen, R.K., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.462-467, 13 refs.

Outcalt, S.I., Harle, J.C.

38-1184

PERMAFROST THERMAL PROPERTIES, TEMPERATURE, FROZEN GROUND TEMPER-ATURE, PERMAFROST DISTRIBUTION, SOIL TEMPERATURE, UNITED STATES—ALASKA.

TEMPERATURE, UNITED STATES—ALÁSKA. Mean annual air temperatures (MAAT) are estimated for a transect from central to northern Alaska. The estimated MAAT are compared to mean annual ground temperatures (MAGT) representative of upper permafors temperatures. The estimation of MAAT for the remote and topographically complex transect area was based on trend surface estimates of numerous short-term (1-7) years) temperature records obtained from climatic stations operated by research projects and longer records from existing National Weather Service stations. The standard error of the estimated MAAT falls within a degree (C) of observed MAAT for stations with long-term records. The MAGT are based on subsurface thermistor measurements made at construction sites and are therefore from disturbed terrain, but data were selected to therefore from disturbed terrain, but data were selected to minimize the effects of disturbance ranged from -7.5 C, in the north to -0.7 C near Fairbanks. Predicted MAAT ranged from -115 C at Prudhoe Bay to -4.5 C in the Fairbanks area

MP 1659 MP 1039
COMPARISON OF TWO-DIMENSIONAL DOMAIN AND BOUNDARY INTEGRAL GEOTHERMAL MODELS WITH EMBANKMENT
FREEZE-THAW FIELD DATA.
Hromadka, T.V., II, et al, International Conference on

Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings. Washington, D.C., National Academy

Press, 1983, p.509-513. Guymon, G.L., Berg, R.L.

38-1192
EMBANKMENTS, FREEZE THAW CYCLES,
THERMAL PROPERTIES, THAW DEPTH,
FROST PENETRATION, PAVEMENTS, RUNWAYS, MATHEMATICAL MODELS, TEMPERATURE VARIATIONS, COMPUTERIZED SIMU-LATION.

LATION.

The time- and position-dependent locations of the 0 C isotherm were calculated using two modelling strategies a domain method and a boundary integral method. Simulations were made for the runway embankment at Deadhorse Airport mear Prudhoe Bay. Alaska The same thermal properties, initial conditions, and boundary conditions were used in both models. Simusoidal surface temperature variations, dependent upon surface type and exposure, were used in the simulations rather than measured surface temperatures. The positions of the 0 C isotherm determined by the boundary integral method near the time of maximum thaw penetration were essentially the same as those determined by the finite element method, and results from both models agreed closely, within a few centimeters over a total freezing depth of about 2.5 m, with the measured positions. The largest differences between measured and computed positions occurred early in the freezing and thawing seasons. The primary advantage of using the boundary integral method for problems specifically of the type considered herein is that it requires only a few nodal points, so computer simulations

can be completed rapidly on a micro computer. If the two-dimensional thermal regime is necessary, the finite element method is most suitable

MP 1660 RECOVERY AND ACTIVE LAYER CHANGES FOLLOWING A TUNDRA FIRE IN NORTH-WESTERN ALASKA.

Johnson, L., et al, International Conference on Perma-frost, 4th, Fairbanks, Alaska, July 17-22, 1983. Pro-ceedings. Washington, D.C., National Academy Press, 1983, p.543-547.

Viereck, L.

TUNDRA, FIRES, REVEGETATION, PERMA-FROST, ACTIVE LAYER, THAW DEPTH, GROUND ICE, HUMMOCKS, SOIL TEMPERA-

GROUND ICE, HUMMOCKS, SOIL TEMPERATURE.

An upland tundra fire, started by lightning, burned 48 sq km near the Kokolik River in northwestern Alaska during late July and early August 1977. Permanent plots were established to monitor recovery of severely, moderately, and lightly burned areas as well as unburned tundra. During the following 5 years the original permanent plots and other portions of the burn were observed annually. Vegetative recovery was most rapid and active layer effects were least on the moist sedge-shrub tundra. Recovery was slower on a high-entered polygonal area and on severely burned tussock tundra. By August 1979 the sedge-shrub tvegetation had largely recovered while both the polygonal ground and the tussock tundra were still readily recognizable as burned areas. Accelerated hydraulic and thermal crossion had occurred on some slopes, resulting in exposures of massive bodies of ground ice. Active layer thicknesses averaged 27 cm in the unburned areas and 35 cm within severely burned areas in August 1979 and reached a maximum at all but one site in August 1979. Depth of thaw decreased between 1979 and 1982 in the sedge-shrub tundra and in the lightly burned shrub tundra and remained at the same increased level through 1982 at all other sites.

MP 1661

MP 1661
GROUND ICE IN PERENNIALLY FROZEN
SEDIMENTS, NORTHERN ALASKA.
Lawson, D.E., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press,
1983, p.695-700, 23 refs.
38-1225
CROUND, ICE, PERMA EROSET, HYDROLOGY,

GROUND ICE, PERMAFROST HYDROLOGY. PERMAFROST THERMAL PROPERTIES, SEDI-MENTS, ICE VOLUME, GROUND THAWING, GRAIN SIZE, LANDFORMS, FREEZE THAW CYCLES, AERIAL SURVEYS.

CYCLES, AERIAL SURVEYS.

The distribution and volume of ice in perennially frozen sediments beneath three unglaciated sites in northern Alaska vary with the grain size and depositional origins of the sediment, thermal history (permafrost aggradation and degradation), and age of the terrain and deposits. Substantial lateral variation in near-surface ice volume exists between and within each site, but reasonably consistent trends in ice content with depth were measured beneath individual landforms. Primary deposits, those deposited and frozen without postdepositional thermal or sedimentologic modification, contain the highest volume of ice at each locality. Sediments that have undergone thawing or resedimentation uon, contain the nignest volume of ice at each locality. Sediments that have undergone thawing or resedimentation typically contain much less excess see Thaw lake, slope, or fluvial processes modify ice contents and produce sedimentary sequences with a spatial distribution of ice determined by these depositional processes and the subsequent thermal history.

MP 1662 THAWING BENEATH INSULATED STRUC-

TURES ON PERMAFROST.
Lunardini, V.J., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. ceedings, Washington, D.C., National Academy Press, 1983, p.750-755, 20 refs.

38-1235
PERMAFROST BENEATH STRUCTURES,
GROUND THAWING, THERMAL INSULATION, HEAT TRANSFER. PHASE TRANSFORMATIONS, DESIGN, ANALYSIS (MATHEMAT-

The problem of thawing beneath heated structures on perma The problem of thawing beneath heated structures on perma-frost (or cooled structures in nonpermafrost zones) must be addressed if safe engineering designs are to be conceived in general there are no exact solutions to the problem of conduction heat transfer with phase change for practical geometries. The quasi-steady approximation is used to solve the phase-change problem for insulated geometries, including infinite strips, rectangular buildings, and circular storage tanks. Analytical solutions are presented and graphed for a range of parameters with practical importance

MP 1663

INVESTIGATION OF TRANSIENT PROCESSES IN AN ADVANCING ZONE OF FREEZING. McGaw, R., et al, International Conference on Perma-

McCuw, R., et al, international conference on Ferma-frost, 4th, Fairbanks, Alaska, July 17-22, 1983. Pro-ceedings, Washington, D.C., National Academy Press, 1983, p.821-825, 9 refs. Berg, R.L., Ingersoll, J.W. 38-1248

SOIL FREEZING, GROUND WATER, WATER PRESSURE, UNFROZEN WATER CONTENT, ICE LENSES, TEMPERATURE EFFECTS, TEN-SILE PROPERTIES, LIQUID PHASES, WATER TABLE, TESTS.

Studies have indicated a relation between subfreezing temperature in a fine-grained soil and pressure (moisture tension) in the film water adjacent to an ice lens. During the experiments reported here, concurrent measurements were obtained of temperature and pressure in the liquid water phase of a freezing silt soil. Freezing was from the top down utilizing an open system, with the water table held at the base of a specimen 30 cm long. The freezing front advanced into the specimen at a generally decreasing rate from 20 mm/day to 5 mm/day. The tests utilized a special tensiometer developed at CRREL that continues to measure moisture tension below a temperature of 0 C Studies have indicated a relation between subfreezing temperaa species tensioneter developed at CRREL that continues to measure moisture tension below a temperature of 0 C as long as continuity with the unifozen water is maintained. Moisture tensions were registered continuously up to 75 kPa (0.75 atm), after which the tension remained constant or decreased slightly.

MP 1664

SOIL-WATER DIFFUSIVITY OF UNSATURAT-ED FROZEN SOILS AT SUBZERO TEMPERA-

ryakano, r., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.889-893, 26 refs.
Tice, A.R., Oliphant, J.L., Jenkins, T.F.
38-1260

JOSTANDA WATER CONTENT, SOIL WATER, DIFFUSION, WATER TRANSPORT, TEMPERATURE EFFECTS, WATER CONTENT, GROUND

ICE. The soil-water diffusivities of soils containing no ice were determined at -1 C by an experimental method recently introduced. The theoretical basis of the method is presented. The measured diffusivities of three kinds of soils are found to have a common feature in that the diffusivity increases with increasing water content, attains a peak, and increases again as the water content increases. This common feature of the soils at the subzero temperature is discussed in comparison with unfrozen soils. The experimental data appear to indicate that the basic transport mechanism of water in soils containing no ice at the subzero temperature is essentially the same as that in unfrozen soils containing a small amount of water.

MP 1665 SEISMIC VELOCITIES AND SUBSEA PERMA-FROST IN THE BEAUFORT SEA, ALASKA.

Neave, K.G., et al, International Conference on Perrveave, K.O., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.894-898, 17 refs. Sellmann, P.V.

38-1261

SUBSEA PERMAFROST, PERMAFROST DISTRI-BUTION, SEISMIC REFRACTION, GROUND ICE, PERMAFROST DEPTH, SEISMIC VELOCI-TY, BEAUFORT SEA.

TY, BEAUFORT SEA.

The distribution of high-velocity material was used as an indicator of ice-bonded permafrost. Observations from ice survey and marine seismic records, coupled with control from a small number of drill holes, suggest that ice-bonded permafrost is extremely widespread in the Beaufort Sea. Large areas of high-velocity material at shallow depths, 10-40 m below the seabed, were observed near Prudhoe and Harrison Bays. In some cases these zones extended up to 35 km from shore. It was also common to find that depths to the high-velocity material increased with distance from the shore. Observed depths were as great as 150-230 m below the seabed.

WATER MIGRATION DUE TO A TEMPERA-TURE GRADIENT IN FROZEN SOIL.

Oliphant, J.L., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.951-956, 10 refs.
Tice, A.R., Nakano, Y.

PERMAFROST HYDROLOGY, FROZEN GROUND PHYSICS, SOIL WATER MIGRATION, UNFROZEN WATER CONTENT, BOUNDARY LAYER, TEMPERATURE GRADIENTS, EX-LAYER, TEMPERAPERIMENTATION.

Closed soil columns at an initially uniform total water content were subjected to a nearly linear and constant temperature

gradient along their length. At various times, the columns were sectioned and water content as a function of position was determined gravimetrically. Unfrozen water content vs. temperature curves were also determined with a nuclear magnetic resonance technique on separate samples of the same soil at the same dry density. It was found that the water migrated from the warm to the cold end and two zones developed in each of the tubes, one that contained only liquid water and the other containing ice and water. The boundary between the two zones also migrated toward the cold end as the experiment progressed, and the water content of the zone containing only water fell while that of the zone containing ice and water increased.

MP 1667

ATMOSPHERIC BOUNDARY-LAYER MODIFI-CATION, DRAG COEFFICIENT, AND SURFACE HEAT FLUX IN THE ANTARCTIC MARGINAL ICE ZONE.

Andreas, E.L., et al, Jan. 20, 1984, 89(C1), p.649-661, 71 refs.

Tucker, W.B., Ackley, S.F.

38.181Q

BOUNDARY LAYER, METEOROLOGICAL IN-STRUMENTS, HEAT FLUX, ICE EDGE.

SUNDANT LAYER, METEURICAL INSTRUMENTS, HEAT FLUX, ICE EDGE.

During a traverse of the Antarctic marginal ice zone (MIZ) near the Greenwich Mendian in October 1981, we launched a series of radiosondes along a 150-km track starting at the ice edge. Since the the wind was from the north, off the ocean, these radiosonde profiles showed profound modification of the atmospheric boundary layer (ABL), as the increasing surface roughness decelerated the flow. The primary manifestation of this modification was a lifting of the inversion layer with increasing distance from the ice edge by the induced vertical velocity. But there was also a cooling of the stably stratified mixed layer below the inversion and a consequent flux of sensible heat to the surface that averaged over 200 W/sq m. The magnitude of this flux suggests that atmospheric heat transport plays a significant role in the destruction of ice in the Antarctic MIZ. (Jsing the rising of the inversion and ABL similarity theory, we estimated the neutral stability drag coefficient across the MIZ increased from its open ocean value, 2012, at the ice cdge to .004 at 80-90% ice concentration. The present an equation for this dependence of drag on ice concentration that should be useful for modeling the surface stress in marginal ice zones. (Auth.)

MP 1668

ANTARCTIC SEA ICE MICROWAVE SIGNATURES AND THEIR CORRELATION WITH IN SITU ICE OBSERVATIONS.

Comiso, J.C., et al, Jan. 20, 1984, 89(C1), p.662-672, 24 refs.

Ackley, S.F., Gordon, A.L. 38-1820

SEA ICE DISTRIBUTION, MICROWAVES, REMOTE SENSING, SPACEBORNE PHOTOGRAPHY, ANTARCTICA—WEDDELL SEA.

RAPHY, ANTARCTICA—WEDDELL SEA.

The general charac , ristics and microwave radiative properties of sea ice in the Weddell Sea region during the onset of , pring are studied by using the NIMBUS 7 Scanning Multichannel Microwave Radiometer (SMMR) and other satellite sensors in conjunction with in situ observations. The position of the ice edge, the gradient of ice concentration, and the width of the Marghall lee Zone are inferred from the microwave data and are found to be consistent with ship observations especially at 18 GHz. The sensitivities of the various SMMR frequencies to surface and other effects are investigated by using multi-spectral cluster analysis. The results show considerable variability in emissivity, especially at 17 GHz, likely associated with varying degrees of surface wetness, ice concentrations are derived by using two methods: one that assumes fixed emissivities for consolidated ice and an iterative procedure that accounts for the variable emissivities to be variable gives ice concentrations that are more consistent with qualitative field observations (Auth)

POSSIBILITY OF ANOMALOUS RELAXATION DUE TO THE CHARGED DISLOCATION PROC-

Itagaki, K., Oct. 13, 1983, 87(21), p.4261-4264, 12 refs. 38-1613

ICE PHYSICS, ICE ELECTRICAL PROPERTIES, ICE RELAXATION. CHARGE TRANSFER, ELECTRIC CHARGE, DIELECTRIC PROPERTIES, SPECTRA.

THEO, SPECIAL.

The possible contribution of electrically charged dislocations to dielectric relaxation and the consequent effects were examined and compared with experimental results. A catastrophe caused by the positive feedback was found to be possible under normally attainable conditions.

EFFECT OF X-RAY IRRADIATION ON INTER-NAL FRICTION AND DIELECTRIC RELAXA-TION OF ICE.

Itagaki, K., et al, Oct. 13, 1983, 87(21), p.4314-4317,

Ackley, S.F., VanDevender, J.P. 38-1623

38-1623 ICE PHYSICS, ICE ELECTRICAL PROPERTIES, ICE RELAXATION, INTERNAL FRICTION, X RAY DIFFRACTION, DIELECTRIC PROPER-TIES, RADIATION.

TIES, RADIATION.

Studies of X-ray irradiation effects on dielectric relaxation and internal friction of ice indicated that relaxation times were shortened in both cases, but the corresponding quantities (the imaginary part of the dielectric constant and loss tangent in internal friction) behave differently Of the two mechanisms discussed in an attempt to explain the results, a charged dislocation process seems to provide the better fit.

MP 1671 EFFECT OF STRESS APPLICATION RATE ON THE CREEP BEHAVIOR OF POLYCRYSTAL-LINE ICE.

Cole, D.M., Dec. 1983, 105(4), p.454-459, 14 refs. 38-2084

ICE CREEP, STRESSES, STRAINS, LOADS (FORCES), TEMPERATURE EFFECTS, ICE ACOUSTICS, RHEOLOGY, TESTS.

ACOUSTICS, RHEOLOGY, TESTS.

This work examines the effect of the rate of stress application on the creep behavior of polycrystalline ice. Stress rates from 1/1000 to 1.84 MPa/s were used to achieve a creep stress of 3.6 MPa at test temperatures of -5 and -10C. The treatment emphasizes the effect of stress application rate on primary behavior and the accompanying microfracturing activity. Acoustic emission measurements taken in all tests indicate the onset and rate peak of the microfracturing activity. The stress application rate has little effect on the minimum strain rate, the strain at which it occurs, or the characteristics of tertiary erren provided that the the minimum strain rate, the strain at which it occurs, or the characteristics of tertiary creep provided that the loading ramp ends prior to reaching the nominal failure strain of 1.0 percent. Primary creep behavior is significantly affected only at rates below about 1/100 MPa/s Results indicate that when the loading ramp continues through the failure strain, no minimum strain rate occurs, but rather the strain rate increases monotonically thoughts the strain. the strain rate increases monotonically throughout the entire test.

IMPLICATIONS OF SURFACE ENERGY IN ICE ADHESION.

Itagaki, K., 1983, 16(1), p.41-48, 2 refs.

38-2090 ICE ADHESION, ICE SOLID INTERFACE, SUR-

PROPERTIES, ICE STRENGTH, STRESSES, COATINGS.

MP 1673

MARGINAL ICE ZONES: A DESCRIPTION OF AIR-ICE-OCEAN INTERACTIVE PROCESSES. MODELS AND PLANNED EXPERIMENTS.

Johannessen, O.M., et al. Arctic technology and poli-cy. Edited by I. Dyer and C. Chryssostomidis, Wash-ington, D.C., Hemisphere Publishing Co., 1984, p.133-

146, Refs. p. 139-140. Hibler, W.D., III, Wadhams, P., Campbell, W.J., Hasselmann, K., Dyer, I. 38-1994

ICE CONDITIONS, ICE EDGE, ICE WATER IN-TERFACE, ICE AIR INTERFACE, ICE WATER IN-TION, ICE MECHANICS, OCEANOGRAPHY, METEOROLOGY, AIR WATER INTERAC-TIONS, CLIMATE, ICE ACOUSTICS.

TIONS, CLIMATE, ICE ACOUSTICS.

The marginal uce zones (MIZ) are regions where temperate and polar climate systems interact, resulting in strong horizontal and vertical gradients in the atmosphere and the ocean These gradients lead to mesoscale processes which affect the heat, salt, and momentum fluxes at the ice margin. It is therefore important to increase our understanding of these processes in order to model the air-ice-ocean system in the MIZ, and to build up a predictive capability of the ice margin. Parameterization of these processes is also necessary in large scale modeling of the sea ice influence on the global climate system. This paper reviews our knowledge of physical processes occurring in the marginal ice zones, points out problem areas and describes Marginal lee Zone Program (MIZEX) to be initiated in 1983

MP 1674

MECHANICAL PROPERTIES OF ICE IN THE

ARCTIC SEAS.
Weeks, W.F., et al, Arctic technology and policy.
Edited by I Dyer and C Chryssostomidis, Washington, D.C., Hemisphere Publishing Co., 1984, p 235-259, 109 refs.

Mellor, M.

JB-1999
ICE MECHANICS, SEA ICE, ICE LOADS, ICE-BERGS, ICE ISLANDS, ICE STRENGTH, STRESS STRAIN DIAGRAMS. ICE STRUCTURE. ICE COMPOSITION, SCANNING ELECTRON MICROSCOPY, ARCTIC OCEAN.

The mechanical properties are reviewed for the main types the mechanical properties are reviewed for the main typic of ice in arctic seas (glacial (icebergs), shelf (ice islands), sea ice; and representative values are given. Each ice type possesses a characteristic range of structures and compositype possesses a characteristic range of structures and composi-tions that differentiate it from other varieties of ice and to a considerable extent, these produce large variations in mechanical properties. Factors affecting mechanical proper-ties (temperature, brine and gas volume, crystal orientation and size, strain rate) are discussed, as are gaps, contradictions, and inadequacies in available data.

MP 1675

PROCEEDINGS

International Offshore Mechanics and Arctic Engiinternational crisnore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984, New York, NY, American Society of Mechanical Engineers, 1984, 3 vols., Refs. passim. For selected papers see from Vol.1: 38-2979; from Vol.2: 38-2980; from Vol.3: 38-2017 through 38-2068. Lunardini, V.J., ed. 38-2016

J8-2010 PERMAFROST PHYSICS, FROZEN GROUND PHYSICS, SEA ICE, FROST HEAVE, ICE CONDI-TIONS, OFFSHORE STRUCTURES, ICE SOLID INTERFACE, HEAT TRANSFER, ENGINEER-ING, STEEL STRUCTURES.

MP 1676

DETERIORATION OF FLOATING ICE COV.

Ashton, G.D., International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.26-33, 18 refs. 38-2020

ICE DETERIORATION, FLOATING ICE, HEAT TRANSFER, ICE MELTING, ICE COVER STRENGTH, SOLAR RADIATION, ALBEDO, THERMAL REGIME.

THERMAL REGIME.

The deterioration of floating ice covers is analyzed to determine under what conditions the ice cover loses strength due to internal melting. The analysis considers the interaction between sensible heat transfer and long wave radiation loss at the surface, the surface albedo, the short wave radiation penetration and absorption and the unsteady heat conduction within the ice. The thermal analysis then leads to a determination of the porosity of the ice that allows strength analysis to be made using beam-type analyses. The results provide criteria to determine when and how rapidly the ice cover loses strength and under what conditions it will regain the original strength associated with an ice cover of full integrity.

AED 1677

MP 1677 PERFORMANCE OF A THERMOSYPHON WITH AN INCLINED EVAPORATOR AND VER-TICAL CONDENSER.

Zarling, J.P., et al. International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.64-68,

Haynes, F.D.

38-2026

COOLING, SOIL STABILIZATION, PIPELINE SUPPORTS, EQUIPMENT, AIR TEMPERATURE, WIND VELOCITY.

WIND VELOCITY.

Therriosyphons are presently being installed at inclined angles for various subgrade cooling applications in the Arctic However, the thermal performance characteristics of a thermosphon installed at these inclined angles is unknown. The performance of a standard CO2 filled, two-phase thermosphon was determined experimentally. Heat removal effectivenesses were measured over a wide range of inclined angles from the horizontal Empirical expressions were obtained for the heat removal rates as a function of wind speed and ambient any temperature. speed and ambient air temperature

MP 1678 TWO-DIMENSIONAL MODEL OF COUPLED HEAT AND MOISTURE TRANSPORT IN FROST HEAVING SOILS.
Guymon, G.L., et al. International Offshore Mechan-

ics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.91-98, 30 refs.

Hromadka, T.V., II, Berg. R.L.

FROST HEAVE. FROZEN GROUND PHYSICS, HEAT TRANSFER. GROUND ICE, MOISTURE TRANSFER. SOIL WATER MIGRATION. MATHEMATICAL MODELS, FREEZE THAW CYCLES, EMBANKMENTS, WATER PRESSURE. TEMPERATURE EFFECTS

A two-dimensional model of coupled heat and moisture flow in frost-heaving soils is developed based upon well known equations of heat and moisture flow in soils. Numerical solution is by the nodal domain integration method which

includes the integrated finite difference and the Galerkin finite element methods. Solution of the phase change process is approximated by an isothermal approach and phenomenological equations are assumed for processes occurring in freezing or thawing zones. The model has been verified against experimental one-dimensional soil thawing tank data as well as two-dimensional soil seepage data. The model has been applied to several simple but useful field problems such as roadway embankment freezing and frost heaving.

MP 1679

SUMMARY OF THE STRENGTH AND MODU-LUS OF ICE SAMPLES FROM MULTI-YEAR PRESSURE RIDGES.

Cox, G.F.N., et al, International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.126-123 133, 14 refs.

Richter, J.A., Weeks, W.F., Mellor, M.

38-2035 PRESSURE RIDGES, ICE STRENGTH, COM-PRESSIVE PROPERTIES, TEMPERATURE EF-FECTS, STRAIN TESTS, ICE SAMPLING, MEA-INSTRUMENTS, POROSITY, BEAU-

Over two hundred unconfined compression tests were performed on vertical ice samples obtained from ten multi-year pressure ridges in the Beaufort Sea. The tests were performed on a closed-loop electrohydraulic testing machine at two strain rates (17100,000 and 171000/s) and two temperatures (-20 and -5C). This paper summarizes the sample preparation and testing techniques used in the investigation and presents data on the compressive strength and initial tangent modulus of the ice. Over two hundred unconfined compression tests were per-

VARIATION OF ICE STRENGTH WITHIN AND BETWEEN MULTIYEAR PRESSURE RIDGES IN THE BEAUFORT SEA.

Weeks, W.F., International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.134-139, 6 refs. 38-2036

ICE STRENGTH, PRESSURE RIDGES, COM-PRESSIVE PROPERTIES, ICE STRUCTURE, ICE COVER STRENGTH, STRAINS, TEMPERATURE EFFECTS, POROSITY, SEA ICE, BEAUFORT

SEA.

A recent series of tests on the uniaxial compressive strength of ice samples taken from multiyear pressure ridges allows the testing of several hypotheses concerning the variation in strength within and between ridges. The data set consists of 218 strength tests performed at two temperatures (-5 and -20C) and two strain rates (1'1000 and 1'100,000/s). There was no significant difference between the strength of the ice from the ridge sails and the ice from the ridge keels when tested under identical conditions. As the total porosity of the ice from the sails is higher by 40% that the ice from the keels, the lack of a significant difference is believed to result from the large variations in the structure of the ice which occur randomly throughout the cores. A is believed to result from the large variations in the structure of the ice which occur randomly throughout the cores. A three-level analysis of variance model was used to study the variations in strength between 10 different ridges, between cores located side by side in a given ridge, and between samples from the same core. In all cases the main factor contributing to the observed variance was the differences within cores. This is not surprising considering the rather extreme local variability in the structure of ice in such ridges. There was no reason at the 5% level of significance to doubt the hypothesis that the different cores at the same site and the different ridges have equal strength means

RELATIONSHIP BETWEEN CREEP AND STRENGTH BEHAVIOR OF ICE AT FAILURE. Cole, D.M., Oct. 1983, 8(2), p.189-197, 4 refs

ICE STRENGTH, ICE CREEP, ICE MECHANICS, STRESSES, STRAINS,

This work explores the correspondence between the results of creep and strength tests performed on isotrope polycrystal-incide. A unique experimental procedure, termed a two-mode test in the present work, allows the testing of a single specimen under conditions of constant deformation rate up to failure and constant load thereafter. Using this procedure, the prevailing values of stress, strain and strain rate can be compared at the failure point under the two test modes without the influence of specimen variation. The effect of the stress path prior to failure on the creep behavior after failure can also be investigated. Results indicate coincidence of the failure points from creep and strength tests in stress strain rate strain space. Further more, it appears that within the range of satishles tested, the creep behavior after the mode which at failure is independent of the stress path experienced before failure. (Auth.) This work explores the correspondence between the results

COMPARISON OF U.S.S.R. CODES AND U.S. ARMY MANUAL FOR DESIGN OF FOUNDA-TIONS ON PERMAFROST.

Fish, A.M., Aug. 1983, 8(1), p.3-24, 27 refs.

FOUNDATIONS, CLASSIFICATION STRUCTURES, CODES, SOIL PERMAFROST FOUNDATIONS, BUILDING CODES, SOIL CLASSIFICATION, SETTLEMENT (STRUCTUR-AL), SOIL CREEP, SAFETY.

AL), SOIL CREEP, SAFETY.

A comparative study was made of design criteria and analytical methods for footings and pile foundations on permafrost employed in U.S.S.R. Design Code SNiP 11-8-76 (1977) and U.S. Army CRREL SR 80-34 developed in the early 1970s by the U.S. Army Corps of Engineers and published in 1980. The absence of adequate constitutive equations for frozen soils and of rigorous solutions of the boundary problems has made it necessary to incorporate (explicitly or implicitly) various safety factors in the foundation analyses. or implicitly) various safety factors in the foundation analyses. From the review it is concluded that the principal difference between these practices is in the assessment and application of appropriate values of safety factors, which leads to a substantial discrepancy in the dimensions and costs of footings and pile foundations in permafrost. (Auth)

MP 1683 STRAIN MEASUREMENTS ON DUMBBELL SPECIMENS.

Mellor, M., Aug. 1983, 8(1), p.75-77, 3 refs. 38-1501

STRAIN TESTS, TENSILE PROPERTIES.

MP 1684

LAKE ICE DECAY.

Ashton, G.D., Aug. 1983, 8(1), p.83-86, 4 refs. 38-1503

AKE ICE, ICE COVER THICKNESS, ICE MELT-ING.

MP 1685
PRELIMINARY EXAMINATION OF THE EF-FECT OF STRUCTURE ON THE COMPRES-SIVE STRENGTH OF ICE SAMPLES FROM MULTI-YEAR PRESSURE RIDGES.

Richter, J.A., et al, International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.140-144. 9 refs

Cox, G.F.N. 38-2037

ICE STRENGTH, PRESSURE RIDGES, COM-PRESSIVE PROPERTIES, STRAIN TESTS, ICE STRUCTURE, TEMPERATURE EFFECTS, SEA ICE, LOADS (FORCES), POROSITY.

A series of 222 uniaxial constant-strain-rate compression tests were performed on vertical multi-year pressure ridge sea ice samples. A preliminary analysis of the effect of structure on the compressive strength of the ice was performed on 78 of these tests. Test parameters included a temperature of -5C (23F) and strain rates of 1 100,000 and 1/1000/s. Columnar ice loaded parallel to the elongated crystal axes and perpendicular to the crystal c-axis was consistently the strongest type of ice. The strength of the elongated crystals approached the plane of maximum shear. Samples containing granular ice or a mixture of granular and columnar ice resulted in intermediate and low strength values. No clear relationship could be established between structure and strength for these ice types. However, in general, their strength decreased with an increase in porosity A series of 222 uniaxial constant-strain-rate compress

MP 1686 INFLUENCE OF GRAIN SIZE ON THE DUC-

TILITY OF ICE.
Cole, D.M., International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.150-157, 21 refs. 38-2039

GRAIN SIZE, POROSITY, COMPRESSIVE PROP-ERTIES, ICE CRYSTAL STRUCTURE, LOADS (FORCES), BRITTLENESS, TESTS

(FORCES), BRITTLENESS, TESTS

This paper presents observations made regarding the influence of grain size on the catent of internal cracking and creep behavior of polycrystalline ice. The test material was infinally isotropic, laboratory prepared polycrystalline ice oran size ranged from 152 to 5.65 mm. Specimens were tested under constant load in uniaval compression with an initial stress of 2MPa and at a temperature of -5C. Optical positiest analysis showed that the estimated crack density varied over nearly three orders of magnitude as the grain size increased by a factor of three. The smallest-grained specimen exhibited no visible fractures the strain at the minimum ereep rate decreased significantly as the grain size, and hence the fracturing activity increased. These observations indicate that under the prevailing test conditions, the stated variations in grain size alone can initiate the duetile-to-brittle transition.

on a micro-mechanical explanation of the test results as well as the implications of the findings to areas of practical

EXPERIMENTAL DETERMINATION BUCKLING LOADS OF CRACKED ICE SHEETS.

Sodhi, D.S., et al, International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.183-186, 13 refs.

Adley, M.D.

38-2044

FLOATING ICE, ICE CRACKS, ICE SHEETS, LOADS (FORCES), ICE SOLID INTERFACE, ICE LOADS, ICE DEFORMATION, EXPERIMENTA-

An experimental study was undertaken to determine the buckling loads of cracked, floating ice sheets. The configurations of the cracks considered in this study were symmetrical tions of the cracks considered in this study were symmetrical and unsymmetrical with respect to the structure and the direction of loading. The results of this study are compared with those of a theoretical study using a finite element method. The comparison between the two results is good although there is some scatter in the experimental data.

MP 1688 SNOW PARTICLE MORPHOLOGY IN THE SEASONAL SNOW COVER.

Colbeck, S.C., June 1983, 64(6), p.602-609, 14 refs. 38-2095

SNOWFLAKES, SNOW MORPHOLOGY, SNOW CRYSTAL STRUCTURE, SNOW WATER CON-TENT, SNOW COVER, FREEZE THAW CYCLES. PARTICLES, DEPTH HOAR, METEOROLOGI-CAL FACTORS.

Snow precipitation degenerates rapidly once it reaches the Snow precipitation degenerates rapidly once it reaches the ground. A wide variety of particle types develop in seasonal snow covers, thus leading to a wide range of snow properties. The most common varieties of particles are shown here. The physical processes responsible for the growth and development of these particles are described in general terms, althout these processes are not understood as well as the processes of crystal growth in the atmosphere. The heat and mass ws associated with the development of these crystals in snow cover are complicated because of snow's complex ecometry.

MP 1689 USE OF RADIO FREQUENCY SENSOR FOR SNOW/SOIL MOISTURE WATER CONTENT MEASUREMENT.

MEASUREMENT:
McKim, H.L., et al, Aug. 1983, SR 83-31, Snow symposium, 3rd, Hanover, NH, Aug. 9-10, 1983. Proceedings, Vol.1, p.33-42, ADB-079 265, 16 refs.
Pangburn, T., Walsh, J.E.

38-2122 SNOW WATER CONTENT, SOIL WATER, SNOW ELECTRICAL PROPERTIES, SOIL PHYSICS, UNFROZEN WATER CONTENT, MEASURING INSTRUMENTS, DIELECTRIC PROPERTIES, TESTS, TEMPERATURE EFFECTS

A solid-state, durable, inexpensive radio frequency sensor (RFS) has been developed and laboratory-tested. The RFS uses a Wien bridge circuit to measure a change in soil impedance when changes in soil moisture occur. Both electrical conductance and capacitance are measured at differing moisture contents. The delectric constant of the soil moisture is proportional to the measured capacitance and is approximately linear with festored to execut moisture. is approximately linear with respect to percent mosture. Due to the simple readout system, the RFS has the potential to be interfaced to a data collection system for data acquisition. to be interfaced to a data collection system for data acquisition from remote areas. Preliminary tests on the temperature effect of the RFS accuracy have shown that volumetric water content can be obtained by the RFS over a wide range of temperatures. In addition to the soil moisture measurement, preliminary tests on the measurement of the liquid water-content of snow have been made. Comparison of the results with the calorimetric method indicate that the RF sensor can be used to measure snow water content. Since the RFS is soild state, it can be placed in remote areas and can monitor volumetric soil water content to within 0.5% by volume.

MP 1690 COMPARATIVE NEAR-MILLIMETER WAVE PROPAGATION PROPERTIES OF SNOW OR

Normarch, J., et al, Aug. 1983, SR 83-31, Snow symposium, 3rd, Hanover, NH, Aug. 9-10, 1983. Proceedings, Vol.1, p.115-129, ADB-079, 265, 8 refs. Wellman, R.J., Gordon, B.E., Hutchins, D.R., McDaniel, J., Lacombe, J., Olsen, R.O.

SNOW PHYSICS, SNOW ACOUSTICS, SNOW-FALL, WAVE PROPAGATION, ATTENLATION, BACKSCATTERING. RAIN, SNOW WATER CONTENT. FLECTROMAGNETIC PROPER-TIES, SNOWFLAKES, FALLING BODIES, MOD-

Measurements are reported of attenuation and backscatter for rain and falling snow at near-millimeter wave frequencies of 96, 140, and 225 GHz. Comparisons are made between of 96, 140, and 225 GHz. Comparisons are made between levels and frequency dependences of the attenuations for rain and snow. Backscatter coefficients as a function of time for several rain and snow events are presented. The relationship of the attenuation data obtained to calculations for spherical and spheroidal particles is discussed. It is shown that attenuation values calculated for an empirical distribution of ice spheres agree with measured values over a wavelength range from visible to 3.1 mm

MP 1691 HYDROLOGIC FORECASTING USING LAND-SAT DATA.

Merry, C.J., et al, Aug. 1983, SR 83-31, Snow symposium, 3rd, Hanover, NH, Aug. 9-10, 1983. Proceedings, Vol.1, p.159-168, ADB-079 265, 12 refs. Pangburn, T., McKim, H.L. 38-2132

SNOW WATER EQUIVALENT, REMOTE SENS-ING, HYDROLOGY, FORECASTING, LAND-SAT, SNOW DEPTH.

SAT, SNOW DEPTH.

Measurements of snow depth and its water equivalent were obtained at 11 snow courses in the Allagash, Maine, are in conjunction with acquisition of five Landsat-2 and -3 images during the 1977-78 and 1978-79 winters. Digital imagery data acquired on 31 May 1978, when the land was snow-free, was used to classify land cover categories. Ground truth water equivalent measurements of snow were area-weighted using the land cover classification to derive regional mean water equivalent values for snow cover on each of the five Landsat scenes. The 1 March 1978 snow measurement of 19.46 cm of water equivalent was used as an input value to the SSARR (Streamflow Synthesis and Reservoir Regulation) model. The SSARR prediction for the 1 March-31 May 1978 time period was within 78% of the measured runoff for the initial baseflow period and within 67% for the spring melt recession period. However, the timing of six observed runoff peaks was off by 2 to 9 days. The magnitude of five of the predicted runoff peaks was within 75% of the recorded streamflow. Additional work on calibrating the basin peak timing and melt rate factors is underway. factors is underway.

MP 1692 UTILIZATION OF THE SNOW FIELD TEST SERIES RESULTS FOR DEVELOPMENT OF A SNOW OBSCURATION PRIMER.

Ebersole, J.F., et al, Aug. 19. SR 83-31, Snow symposium, 3rd, Hanover, NH, Aug. 9-10, 1983. Proceedings, Vol.1, p.209-217, ADB-079 265, 21 refs. Aitken, G.W. 38-2137

58-2137 SNOW OPTICS, ATTENUATION, SNOWFALL, BLOWING SNOW, SNOW DENSITY, ICE CRYS-TAL STRUCTURE, WAVE PROPAGATION, VISI-BILITY, MILITARY OPERATION, NAVIGA-TION, SNOWDRIFTS, METEOROLOGICAL FACTORS.

The attenuation of electro-optical (EO), infrared (IR), and millimeter wave (MMW) energy through the atmosphere in conditions of low visibility due to the presence of falling or blowing snow can present serious problems for the effective use of surveillance and target acquisition systems. This paper discusses development of a snow obscuration primer for use by the Smoke and Aerosol Working Group (SAWG) of the Joint Technical Coordinating Group for Munitions for use by the Smoke and Acrosol Working Group (SAWG) of the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME). A key part of this primer is incorporation of test results obtained in the SNOW-ONE. -ONE-A, and ONE-B field trials. This includes measurements of falling and blowing sinow obscuration effects on EO IR MMW systems, both active and passive. An important aspect of this work, reported in this paper, is the evolution of a basis for developing "rules-of-thumb" for operation in air-borne-snow environments.

MP 1693 INCREASED HEAT FLOW DUE TO SNOW COMPACTION: THE SIMPLISTIC APPROACH. Colbeck, S.C., Aug. 1983, SR 83-31, Snow symposium, 3rd, Hanover, NH, Aug. 9-10, 1983. Proceedings, Vol.1, p. 227-229, ADB-079, 265, Extended summary. 2 38-2138 2 refs.

SNOW COMPACTION. HEAT TRANSFER. SNOW HEAT FLUX, SNOW COVER STRUCTURE. SURFACE TEMPERATURE. MATH-EMATICAL MODELS

When snow is compacted by foot or vehicle traffic, the compacted areas are visible on infrared images for some time. A simple model is used to calculate the temperature difference between the compacted and uncompacted snows The results are given as temperature difference sersus snow

MP 1594 USE OF LANDSAT DATA FOR PREDICTING SNOWMELT RUNOFF IN THE UPPER SAINT JOHN RIVER RASIN.

Merry, C.J., et al, International Symposium on Remote Sensing of Environment, 17th, Ann Arbor, Mf, May 9-13, 1983. Proceedings, Ann Arbor, Environmental Research Institute of Michigan, 1983, p.519-533, 16 refs. p.519-555, 10 1011. Miller, M.S., Pangburn, T.

RUNOFF FORECASTING, SNOWMELT, REMOTE SENSING, SNOW WATER EQUIVA-LENT, SNOW DEPTH, LANDSAT, REFLECTIVI-TY, FOREST LAND, MODELS, VEGETATION FACTORS, UNITED STATES—MAINE—ST. JOHN RIVER.

JOHN RIVER.

To test a hypothesis that Landsat reflected radiance values on a regional scale do change, histograms of the Landsat MSS band 7 reflected radiance values for a 300 x 300 pixel (420 sq km) area near Allagash, Maine, were evaluated to quantify the change. A statistical description (skewness and kurtosis) of the histogram for each scene was developed and then correlated with ground measurements of snow depth. A snow index based on skewness and modal population was found to correlate well with snow depth. Following these initial results, the Landsat data were reexamined and corrections were made for solar elevation and MSS sensor. these initial results, the Landsat data were reexamined and corrections were made for solar elevation and MSS sensor calibration. The reflected radiance from open areas showed a consistent increase in intensity with increasing snow depth. The forested land cover classes did not change with snow depth. The ground truth measurements of water equivalent were area-weighted by the May land cover classification to derive mean regional water equivalent values for each of the five Landsat winter scenes. The 1 March 1978 estimate of 7.66 inches for snow water equivalent was used as input to the SSARR model for prediction of runoff during the 1 March through 31 May 1978 time period

MP 1695

EXTRACTION OF TOPOGRAPHY FROM SIDE-LOOKING SATELLITE SYSTEMS—A C STUDY WITH SPOT SIMULATION DATA.

Ungar, S.G., et al, International Symposium on Remote Sensing of Environment, 17th, Ann Arbor, MI, May 9-13, 1983. Proceedings, Ann Arbor, Environmental Research Institute of Michigan, 1983,

p.535-550, 3 refs. Irish, R., Merry, C.J., Strahler, A.H., McKim, H.L., Gauthier, B., Weill, G., Miller, M.S.

38-2167

TOPOGRAPHIC FEATURES, SIDE LOOKING RADAR, REMOTE SENSING, RADIOMETRY, COMPUTER APPLICATIONS, MAPPING.

A test site in the Cape Flattery area of northwest Washington state was selected for constructing a simulated data set to evaluate techniques for extracting topography from side-lookevaluate techniques for extracting topography from side-looking satellite systems. A negative transparency orthophotoquad was digitized at a spacing of 85 micron, resulting in an equivalent ground distance of 986 m between pixels and a radiometric resolution of 256 levels. A bilinear interpolation was performed on U.S. Geological Survey digital elevation model (DEVI) data to generate elevation data at a 9.86 m resolution. The nominal orbital characteristics and geometry of the SPOT (Système Probatoire d'Observation de la Terre) satellite were convoluted with the data files to produce simulated panchromatic HRV (High Resolution Visible) digital stereo imagery for three different orbital paths. Techniques were developed for reconstructing topographic data. Essentially, these techniques coalign a nadir and offnadir pass to calculate the stereo displacement for each pixel in the nadir view by correlating a small subarea to a corresponding the nadir view by correlating a small subarea to a corresponding subarea in the off-nadir pass—Preliminary analyses with the simulated HRV data and "test pattern" data verify the efficacy of this technique

MP 1696

LIME STABILIZATION AND LAND DISPOSAL OF COLD REGION WASTEWATER LAGOON SLUDGE.

Schneiter, R.W., et al. 1982, 7(3), p.207-213, 30 refs. Middlebrooks, E.J., Sletten, R.S.

WASTE TREATMENT, WATER TREATMENT, LIMING, SLUDGES, RECLAMATION.

LIMING, SLUDGES, RECLAMATION.

Effects of lime (Ca(OH)2) stabilization upon the pathogenic population in accumulated solids associated with the operation of two acrated wastewater lagoons in Alaska and two facultative wastewater lagoons in northern Utah were evaluated. The subsequent drying, at a temperature of 12C, of the lime stabilized sludges on sand and soil beds was also investigated by dosing the sludges with lime and applying sludges to bench scale drying beds. Lime addition produced high feeal coliform reduction, and the limed sludges readily dewatered on both sand and soil beds.

MP 1697 CALCULATION OF ADVECTIVE MASS TRANS-

PORT IN HETEROGENEOUS MEDIA.
Daly, C.J., U.S. Army Research Office, Report No.83-1, Conference of Army Mathematicians, 28th, (1983). Transactions, (1983), p.73-89, 12 refs. 38-2506

POROUS MATERIALS, MASS TRANSFER, GROUND WATER, FLUID DYNAMICS, ANALYSIS (MATHEMATICS).

A coupled analytical/numerical procedure for prediction of solute transport in heterogeneous media is described. The procedure consists of an analytic solution of the hydraulic equations, followed by a numerical solution for solute transport using the method of characteristics. The characteristics are determined by fourth-order Runge-Kutta and predictor-corrector algorithms. Accuracy of solute transport calculation is enhanced by the fact that fluid velocity can be directly obtained at a priori undetermined points in the flow field. The solute transport process is considered to be entirely advective, neglecting the effects of mechanical dispersion and molecular diffusion. Evidence is presented to demonstrate that purely advective processes in both heterogeneous and homogeneous media; can produce large "apparent dispersion." Such dispersion is shown to be easily capable of overwhelming any reasonable estimates of dispersion or diffusion based upon laboratory analyses of homogeneous media. For groundwater contamination problems, it is concluded that precise definition of the spatial variability of hydraulic properties is crucial to the accurate determination of the trajectory of contaminated waters.

MP 1698 A coupled analytical/numerical procedure for prediction of

MP 1698

CHARACTERISTICS OF MULTI-YEAR PRES-SURE RIDGES.

Koyacs, A., International Conference on Port and Ocean Engineering under Arctic Conditions, 7th, Hel-sinki, Finland, April 5-9, 1983. Proceedings, Vol.3, Espoo, Valtion teknillinen tutkimuskeskus, 1983, p.173-182, 13 refs. 38.2727

PRESSURE RIDGES, ICE FLOES, ICE FORMA-TION, OFFSHORE STRUCTURES, ICE PRESSURE, ICE STRENGTH, HUMMOCKS, COMPRESSIVE PROPERTIES, SEA ICE.

PRESSIVE PROPERTIES, SEA ICE.

Multi-year pressure ridges and thick hummock floes are the most severe ree formations that offshore structures will probably have to resist in the Beaufort and Chukchi Seas. Multi-year hummock fields 30 m thick have been measured near Prudhoe Bay, Alaska This paper presents information on 11 multi-year pressure ridges

The ridges were found to be voidless, and contained ice with a mean brine-free density of about 0.84 mg/cu m.

The apparent unconfined compressive strength was about 7 to 8 MPa at -10 C. The strength increased with depth below sea level, and, as expected, varied inversely with ice prossity. The sail-height-to-keel-depth ratios of these ridges are compared with observations made in the Beaufort and Chukchi Seas to show that the multi-year ridges in these areas have a relatively constant sail-height-to-keel-depth ratio of about 1 to 3.3.

ABD 1400

MP 1699 SEA ICE ON THE NORTON SOUND AND AD-JACENT BERING SEA COAST.

Kovacs, A., International Conference on Port and Ocean Engineering under Arctic Conditions, 7th, Helsinki, Finland, April 5-9, 1983. Proceedings, Vol.4, Valtion teknillinen tutkimuskeskus, 1983. p.654-666, 17 refs. 38-2757

ICE MECHANICS, SEA ICE DISTRIBUTION, ICE OVERRIDE, ICE PILEUP, SHORES, OFFSHORE STRUCTURES.

Recent observations and historical accounts of sea ice on Recent observations and historical accounts of sea ice on the shores of Norton Sound and the adjacent Bering Sea are presented. The movement and accumulation of sea ice on the shore was found to be a common event, as were massive icings on island surfaces. Sea ice was found to have been pushed inland over 150 m and to have moved over 15 km inland during high storm seas.

MP 1700

OCEAN CIRCULATION: ITS EFFECT ON SEA-SONAL SEA-ICE SIMULATIONS.

Hibler, W.D., III, et al. May 4, 1984, 224(4648), p 489-492, 13 refs

Bryan, K. 38-2846

SEA ICE, SEASONAL VARIATIONS, ICE WATER INTERFACE, ICF EDGE, MODELS, EN-SEA VIRONMENT SIMULATION, OCEAN RENTS.

A diagnostic see-ocean model of the Arctic, Greenland, and Norwegian seas is constructed and used to examine the role of ocean circulation in seasonal seasee simulations. The model includes lateral ice motion and three-dimensional weakly forced by observed temperature and salimity data Simulation. The ocean portion of the model is weakly forced by observed temperature and salimity data Simulation results show that including modeled ocean circula tion in seasonal sea ce simulations substantially improves the predicted ice drift and ice margin location. Simulations that do not include lateral ocean movement predict a much less realistic ice edge

MP 1701

SEA ICE STRUCTURE AND BIOLOGICAL AC-TIVITY IN THE ANTARCTIC MARGINAL ICE ZONE.

Clarke, D.B., et al. Mar. 20, 1984, 89(C2), p.2087-2095, 30 refs.

Ackley, S.F. 38-2917

SEA ICE, ICE CORES, ICE COMPOSITION, ALGAE, CRYOBIOLOGY, FRAZIL ICE, ANTARCTICA—WEDDELL SEA.

GAE, CRYOBIOLOGY, FRAZIL ICE, ANTARC-TICA.—WEDDELL SEA.

Ice cores obtained during October-November 1981 from Weddell Sea pack ice were analyzed for physical, chemical, and biological parameters.

Frazil ice, which is associated with dynamic, turbulent conditions in the water column, predominated (70%). Both floe thickness and salinity indicate ice which is less than 1 year old. Chemical analyses, particularly with regard to the nutrents, revealed a complex picture. Phosphate values are cattered relative to the dilution curve.

Nitrate and silicate values are lower than expected from simple scaling with salinity and suggest diatom growth within the ice. Nitrate values are higher in the ice than in adjacent waters. Frazil ice formation which probably concentrates algal cells from the water column into ice floes, esults in higher initial chlorophyll aby subsequent reproduction within the ice. Ice core chlorophyll ranged from 0.09 to 3.8 mg/cu m, comparable to values previously reported for this area but significantly lower than values for Antarctic coastal fast ice. The dominance of frazil ice in the Weddell is one of the major differences between this are and others. Consequently, we believe that ice structural conditions significantly influence the biological cummunities in the ice. (Auth)

FIXED MESH FINITE ELEMENT SOLUTION FOR CARTESIAN TWO-DIMENSIONAL PHASE CHANGE.

O'Neill, K., Dec. 1983, 105(4), p.436-441, 28 refs.

FREEZE THAW CYCLES, HEAT TRANSFER, PHASE TRANSFORMATIONS, HEAT CAPACITY, TEMPERATURE EFFECTS.

MP 1703 TEMPERATURE AUTOMOTIVE EMIS-SIONS

Coutts, H.J., Nov. 1983, AK-RD-84-9, 2 vols 38-3041

COLD WEATHER OPERATION, AIR POLLU-TION, ENGLISES, FUELS, VEHICLES, WINTER MAINTENANCE, TESTS.

MP 1704

FROST ACTION AND ITS CONTROL.

Berg, R.L., ed, New York, American Society of Civil Engineers, 1984, 145p., Refs, passim. For individual papers see 38-3082 through 38-3085. Wright, E.A., ed.

38-3081

FROST ACTION, FROST HEAVE, FROST RE-SISTANCE, SOIL FREEZING, HEAT TRANS-FER, SOIL STRENGTH, PERMAFROST BENEATH STRUCTURES, ICE LENSES, DE-SIGN, COUNTERMEASURES, FOUNDATIONS, ROADS.

MP 1705

DESIGNING FOR FROST HEAVE CONDI-

Crory, F.E., et al, Frost action and its control. Edited by R.L. Berg and E.A. Wright, New York, American Society of Civil Engineers, 1984, p 22-44, 41 refs. Isaacs, R.M., Penner, E., Sanger, F.J., Shook, J.F. 38-3083

38-3033
FROST HEAVE, HEAT TRANSFER, FROST PENETRATION, SOIL FREEZING, FOUNDATIONS, ARTIFICIAL FREEZING, ROADBEDS, UNDERGROUND PIPELINES, COLD STOR-AGE, PAVEMENTS, DESIGN

DESIGN IMPLICATIONS OF SUBSOIL THAW-ING.

Johnson, T.C., et al. Frost action and its control. Edited by R. L. Berg and E. A. Wright, New York, American Society of Civil Engineers, 1984, p.45-103, 136

McRoberts, E.C., Nixon J.F.

38-3084

38-3084
GROUND THAWING, PLRMAFROST
BENEATH STRUCTURES, FROZEN GROUND
TEMPERATURE, FREEZE THAW CYCLES,
THERMAL REGIME, FROST HE VY, DESIGN
GEOTHERMY, SHEAR STRENGTH, SETTLEMENT (STRUCTURAL), SLOPE PROTECTION,
GOVERNERM STRENGTH, SETTLE-COUNTERMEASURES, SOIL STABILIZATION

SURVEY OF METHODS FOR CLASSIFYING FROST SUSCEPTIBILITY.

Chamberlain, E.J., et al, Frost action and its control. Edited by R.L. Berg and E.A. Wright, New York, American Society of Civil Engineers, 1984, p.104-141,

Gaskin, P.N., Esch, D., Berg, R.L.

38-3085

SOIL FREEZING, FROST RESISTANCE, FROST HEAVE, SOIL STRENGTH, ROADS, AIRPORTS, CLASSIFICATIONS, GRAIN SIZE, SEASONAL FREEZE THAW.

MP 1708

DEPENDENCE OF CRUSHING SPECIFIC EN-ERGY ON THE ASPECT RATIO AND THE STRUCTURE VELOCITY.

Sodhi, D.S., et al, Offshore Technology Conference, 16th, Houston, Texas, May 7-9, 1984. Proceedings. Vol.1, 1984, p.363-374, 18 refs.

Morris, C.E.

38-3229
ICE PRESSURE, OFFSHORE STRUCTURES, ICE
CRACKS, ICE COVER THICKNESS, ICE
STRENGTH, DYNAMIC LOADS, ICE SHEET,
VELOCITY, EXPERIMENTATION, COMPRESSIVE PROPERTIES, SPECIFIC HEAT, ARTIFI-

An experimental study was undertaken to determine the dependence of crushing specific energy of urea ice on the aspect ratio (structure diameter/ice thickness) and the structure aspect ratio (structure diameter lice thickness) and the structure velocity. The experiments were conducted by pushing an instrumented, vertical, cylindrical structure into ice sheets at different velocities. Two parameters were vaned during the experimental program: diameter (50 to 500 mm) and velocity (10 to 210 mm/s). The urea concentration was changed slightly from 0.84 to 0.93% by weight. The results are presented graphically to show the dependence of the ratio of specific energy to unconfined uniaxial compressive strength on the aspect ratio for different ratios of velocity to ice thickness.

MP 1709

COMPARISON OF AERIAL TO ON-THE-ROOF INFRARED MOISTURE SURVEYS.

Korhonen, C., et al, International Conference on Thermal Infrared Sensing for Diagnostics and Control (Thermosense 6), Oak Brook, IL, Oct. 2-5, 1983. Proceedings, Society of Photo-Optical Instrumentation Engineers. Proceedings, Vol.446, [1983], p.95-105, 6 refs. Tobiasson, W., Greatorex, A.

38-3274

MOISTURE DETECTION, ROOFS, INFRARED PHOTOGRAPHY, TEMPERATURE MEASURE-MENT, INSULATION.

MENT, INSULATION.

Prior research by the Corps of Engineers has shown aerial thermography to be useful as a reconnaissance tool for finding wet roof insulation. This conclusion was based on findings from thermal line scanners flown at about 1000 feet in military fixed-wing aircraft and from hand-held thermal imagers flown at about 500 feet in military helicopters. During the spring of 1983 a comprehensive aerial to on-the-roof infrared comparison study was conducted on several roofs at Fort Devens, Massachusetts. These recent studies confirm our earlier opinion that oblique thermography is generally of reconnaissance value only However, "straight-down thermography from either fixed-wing aircraft or from helicopters can be used to produce reasonably accurate maps were produced by thermal imaging systems in a helicopter hovering as close as 200 feet above a roof. This study suggests that some forms of airborne thermography can be of more value than just a reconnaissance tool in finding wet roof insulation of course, a visual examination of each roof along with a few core samples are still needed before recommendations for maintenance and repair can be made.

MP 1710 POTENTIAL RESPONSES OF PERMAFROST

TO CLIMATIC WARMING. Goodwin, C.W., et al, Potential effects of carbon diox-

ide-induced climatic changes in Alaska, The proceedings of a conference. Edited by J.H. McBeath, Fairbanks, University of Alaska, Mar 1984, p.92-105, 37 refs.

Brown, J., Outcalt, S I.

38-3881 PERMAFROST DISTRIBUTION, PERMAFROST THERMAL PROPERTIES. CLIMATIC
CHANGES, ACTIVE LAYER, CARBON DIOXIDE, TUNDRA, THERMOKARST DEVELOPMENT, THAW DEPTH, STEFAN PROBLEM,
HEAT TRANSFER. SOIL TEMPERATURE. SNOW DEPTH

Permafrost is generally divided into two tones from north to south continuous and discontinuous. At its southern limit, permafrost in Alaska exists in isolated masses under peat. In the northern portion of the continuous zone,

permafrost occurs everywhere near the surface of the entire permafrost occurs everywhere near the surface of the entire landscape with the exception of deep lakes and river channels. The presumed warming of the ground in the discontinuous zone due to CO2-induced climatic change will result in an areal reduction of permafrost. In the colder areas, continuous-zone permafrost temperatures will rise and summer action laws does how the contraction of the colder areas, active-layer depths will increase, but the spatial extent of permafrost will only be marginally affected. In both cases, where there is ground ice, thermal erosion and thaw consolidation will produce thermokarst terrain.

MODELING RAPIDLY VARIED FLOW IN TAIL

Ferrick, M.G., et al, Feb. 1984, 20(2), p.271-289, 22

Bilmes, J., Long, S.E. 38.3317

RIVER FLOW, WAVE PROPAGATION, CHAN-NELS (WATERWAYS), DAMS, MATHEMATI-CAL MODELS, ELECTRIC POWER.

CAL MODELS, ELECTRIC POWER.

An understanding of the downstream propagation of sharpfronted, large-amplitude waves of relatively short period is important for describing rapidly varying flows in tailwaters of hydroelectric plants and following the breach of a dam We developed a numerical model of these waves by first identifying the primary physical processes and then performing an analysis of the solution. A linear analysis of the dynamic open channel flow equations provides relationships describing flow wave advection, diffusion, and dispersion in rivers. A one-dimensional diffusion wave model modified for application to tailwaters simulates the important physical processes and is straightforward to apply. is straightforward to apply.

ICE-RELATED FLOOD FREQUENCY ANALYSIS: APPLICATION OF ANALYTICAL ESTI-

Gerard, R., et al, International Specialty Conference on Cold Regions Engineering, 3rd, Edmonton, Alber-ta, April 4-6, 1984. Proceedings, (Edmonton, Uni-versity of Alberta, 1984), p.85-101, 12 refs. Calkins, D.J.

FLOOD FORECASTING, RIVER ICE, ICE JAMS, ICE CONDITIONS, ANALYSIS (MATHEMAT-

ICS).

In cold regions ice-related floods can make a significant, and often dominant, contribution to the flood population. They should therefore be considered in a flood frequency analysis. However, in many instances, histonical data for this purpose is lacking. Resort must then be made to analytical estimates of ice-related flood stages. This paper describes the determination and application of such estimates for a site on the Missisquoi River near Richford, Vermont.

LAWRENCE RIVER FREEZE-UP FORE-CAST.

Shen, H.T., et al, International Specialty Conference on Cold Regions Engineering, 3rd, Edmonton, Alberta, April 4-6, 1984. Proceedings, (Edmonton, University of Alberta, 1984), p.177-190, 13 refs. Foltyn, E.P., Daly, S.F.

38-3476

ICE, FREEZEUP, ICE FORMATION. ANALYSIS (MATHEMATICS), FORECASTING, AIR TEMPERATURE, WATER TEMPERATURE, CANADA—SAINT LAWRENCE RIVER.

An important element of the ice management in northern rivers is forecasting water temperatures to predict the time of ice formation. The freeze-up forecast provides needed information for planning flow regulations and scheduling of the close of a navigation season. In this paper, the relationship between variations of air temperature and water relationship between variations of air temperature and water temperature is analyzed. An analytical expression for water temperature is obtained through the solution of a simplified convection-diffusion equation. The air temperature is repre-sented as a combination of a harmonic function and short term fluctuations. The short term fluctuations are deter-mined from National Weather Services forecasts.

MP 1714

WATER SUPPLY AND WASTE DISPOSAL ON PERMANENT SNOW FIELDS.

Reed, S.C., et al. International Specialty Conference Recd, S.C., et al, international Specialty Conference on Cold Regions Engineering, 3rd, Edmonton, Alber-ta, April 4-6, 1984. Proceedings, (Edmonton, Uni-versity of Alberta, 1984), p.401-413, 13 refs Bouzoun, J.R., Tobiasson, W.

38-3492

WATER SUPPLY, WASTE DISPOSAL, SNOW COVER, WATER TREATMENT, UTILITIES, SNOW MELTING, DESIGN, WATER CHEMIS-TRY.

This paper summarizes procedures and techniques for providing a water supply and for safe wastewater disposal at stations and camps on permanent snow fields. These range from temporary and transient field operations to large scale, perma-nently occupied facilities.

MP 1715

MODELING THE RESILIENT BEHAVIOR OF FROZEN SOILS USING UNFROZEN WATER CONTENT.

Cole, D.M., International Specialty Conference on Cold Regions Engineering, 3rd, Edmonton, Alberta, April 4-6, 1984. Proceedings, (Edmonton, University of Alberta, 1984), p.823-834, 14 refs. 38-3518

FROZEN GROUND MECHANICS, RHEOLOGY PROZEN GROUND MECHANICS, RHEULOGY, UNFROZEN WATER CONTENT, ICE SOLID INTERFACE, SURFACE PROPERTIES, PARTICLES, FROZEN GROUND TEMPERATURE, ICE CRYSTAL STRUCTURE, MODELS, SALINITY.

CRYSTAL STRUCTURE, MODELS, SALINITY.

A layer of unfrozen water exists between the soil particle surface and the solid ice phase in a frozen soil at temperatures of practical concern This layer owes its existence to the effect of field forces associated with the soil particle surfaces. Its thickness depends on factors such as temperature, solute concentration and specific surface area. Additional unfrozen water occurs within the polycrystalline pore ice as well. The thickness of the unfrozen water layer strongly affects the mechanical behavior of the soil-ice interface and, hence, the gross mechanical proporties of the frozen strongly arrects the mechanical behavior of the soil-ce interrace and, hence, the gross mechanical properties of the frozen soil The total unfrozen water content is particularly useful since it reflects the contributions from a number of sources to the unfrozen water layer thickness. As a consequence, the unfrozen water content provides an excellent means for temperature, salinity and specific surface area.

MP 1716

ICE RESISTANCE TESTS ON TWO MODELS OF THE WTGB ICEBREAKER.

Tatinclaux, J.C., et al. American Towing Tank Conference; General meeting, 20th, Hoboken, NJ, Aug. 2-4, 1983. Proceedings. Edited by D. Savitsky, J.F. Dalzell and M. Palazzo, [1984], p.627-638, 6 refs. Humphreys, D.H. 38-3421

ICEBREAKERS, ICE MODELS, ICE BREAKING, ICE STRENGTH, ICE LOADS, STRENGTH, MODELS, TESTS.

PHYSICAL MECHANISM FOR ESTABLISH-ING ALGAL POPULATIONS IN FRAZIL ICE. Garrison, D.L., et al, Nov. 24, 1983, 306(5941), p.363-365. 19 refs.

Ackley, S.F., Buck, K.R. 38-3424

ALGAE, FRAZIL ICE, MARINE BIOLOGY, ICE FORMATION, CRYOBIOLOGY, ANTARCTICA —WEDDELL SEA, ANTARCTICA—MCMURDO SOUND.

In polar regions ice algal communities are not only conspicuous but may also be important production sites and sources of seed populations for pelagic communities. Except for some studies near land-based stations, there are few long-term observations of ice algal populations, and few studies have considered how they form and develop until the mechanism for harvesting nor the effects on the composition of the see community has been clearly demonstrated. In the Weddell Sea, we have sampled young sea ice discoloured by algae, and we present evidence that he algae were concentrated by a physical rechanism. We explain how such a process may accumulate planktonic forms in ice communities. (Auth. mod.) In polar regions ice algal communities are not only co-

MP 1718

WATER QUALITY MONITORING USING AN AIRBORNE SPECTRORADIOMETER. McKim, H.L., et al. Mar. 1984, 50(3), p.353-360, 9

Merry, C.J., Layman, R.W.

38-3554

SUSPENDED SEDIMENTS, RADIOMETRY, SPECTRA, LAKE WATER, RESERVOIRS, RIVERS, AIRBORNE EQUIPMENT, SUNLIGHT.

ERS, AIRBORNE EQUIPMENT, SUNLIGHT.
An airborne 500-channel spectroradiometer developed and built by Chiu and Collins (1978) was tested to determine its usefulness to the U.S. Army Corps of Engineers for monitoring the suspended load in lakes, reservoirs, and watershaps. Field and laboratory experiments were run to test and evaluate the radiometer's response to various levels of suspended organic and inorganic materials. A procedure to separate the sun glint, which is often a large percentage of the recorded signal, from the total signal was investigated. Results indicated that the accuracy of the airborne water turbidity measurements was sufficient to meet certain monitoring requirements of the Corps of Engineers.

MP 1719

SELF-SHEDDING OF ACCRETED ICE FROM HIGH-SPEED ROTORS

Itagaki, K., 1983, 83 WA HT-68, p.1-6, 16 refs.

ICE REMOVAL AIRCRAFT ICING. PROPEL-LERS, ICE ACCRETION, SUPERCOOLED FOG, ICE ADHESION, ICE SOLID INTERFACE, SUR-FACE ENERGY, ICE CRACKS, ICE COVER THICKNESS, HELICOPTERS, ANALYSIS ANALYSIS (MATHEMATICS)

Ice accreted on high-speed rotors operating in supercooled fog can be thrown off by centrifugal force, causing severe unhalance and creating dangerous projectiles. A simple force balance analysis indicates that the strength of accreted ice (and its adhesive strength) can be obtained by measuring the thickness of the accretion, the location of the separation, and the density. Such an analysis was applied to field and laboratory observations of self-shedding events. The results agree reasonably well with other observations.

ASYMPTOTIC BEHAVIOUR OF SOLUTIONS TO THE PROBLEM OF WETTING FRONTS IN ONE-DIMENSIONAL, HORIZONTAL AND IN-FINITE POROUS MEDIA.
Nakano, Y., June 1983, 6(2), p.71-78, 26 refs.

POROUS MATERIALS, SOIL WATER, DIFFU-SION, WETTABILITY, ANALYSIS (MATH-EMATICS), WATER CONTENT, EXPERIMEN-TATION

TATION.

The rsymptotic behavior of solutions to the problem of writing frosts is studied in one-dimensional, horizontal and infinite porous media with the soil-water diffusivity proportional to sonce power of the water context. The uniqueness of the similarity solution for the problem is studied and the properties of this solution are presented. It is shown that the similarity solution is an asymptotic solution of a wide class of initial value problems of writing fronts in the media. The use of the similarity solution is discussed for the experimental determination of the soil-water diffusivity.

SIMILARITY SOLUTIONS TO THE SECOND BOUNDARY VALUE PROBLEM OF UN-SATURATED FLOW THROUGH POROUS MEDIA.

Nakano, Y., Dec. 1983, 6(4), p.205-213, 26 refs. 38-3568

POROUS MATERIALS, WATER FLOW, BOUND-ARY VALUE PROBLEMS, SOIL WATER, DIFFU-SION, WATER CONTENT, ANALYSIS (MATH-EMATICS).

EMATICAL
Similarity solutions to the second boundary value problem
of unsaturated flow are studied in one-dimensional, semiinfinite perous media with the solu-rater diffusivity proportionat a same moner of the water content. The existence al to some power of the water content. The existence and uniqueness of two types of similarity solutions to the problem are investigated and the properties of these solutions are presented. It is shown that these two types of similarity solutions exist and that they may not be unique for every parameter range studed. The use of the similarity solutions is documed for the experimental determination of soil-water distinctions.

MP 1722 PILING IN FROZEN GROUND. Crory, F.E., May 1982, 108(TC1), p.112-124, 30 refs. 36-3206
PILE STRUCTURES, FROZEN GROUND
STRENGTH, PERMAFROST THERMAL PROPERTIES, FREEZE THAW CYCLES, COLD
WEATHER CONSTRUCTION, LOADS
(FORCES), FOUNDATIONS, FROST HEAVE,
BEARING STRENGTH.

MP 1723 TEMPERATURE AND FLOW CONDITIONS DURING THE FORMATION OF RIVER ICE. Ashton, G.D., et al, Symposium on Ice and its Action on Hydraulic Structures. Reykjavík, Iceland, Sept. 7-10, 1970. Papers and discussions. Reykjavik, Iceland, International Association for Hydraulic Research, 1970, 12p., In English with French summary Session 2.4. 4 refs. Includes discussions. Kennedy, J.F.

23-3971 RIVER ICE, ICE FORMATION, FLOW RATE, THERMAL REGIME, WATER TEMPERATURE

MP 1724
RESILIENT MODULUS AND POISSON'S
RATIO FOR FROZEN AND THAWED SILT AND
CLAY SUBGRADE MATERIALS.

Chamberlain, E.J., et al. Preprints of papers presented at a specialty session of the ASCE Fall Convention and Exhibit, San Francisco, California, Oct. 17-21, 1977, American Society of Civil Engineers, 1977, p 229-281. 13 refs.

Cole, D.M., Johnson, T.C. 32-564

ROADS, SUBGRADE SOILS, SEASONAL FREEZE THAW, SOIL STRENGTH, LABORATO-RY TECHNIQUES

MP 1725 ELECTRON MICROSCOPE ANALYSIS OF AEROSOLS IN SNOW AND DEEP ICE CORES FROM GREENLAND.

Kumai, M., 1977, No.118, International Sympos on Isotopes and Impurities in Snow and Ice, Grenoble, Aug. 28-30, 1975, p.341-350, In English with French summary. 10 refs. 32-3852

ELECTRON MICROSCOPY, AEROSOLS, SNOW COVER, ICE CORES.

GENERAL REPORT SESSION 2: MECHANICAL PROPERTIES.

Ladanyi, B., et al. 1979, Vol.13, p.7-18, 5 refs. Sayles, F.H. 36-1421

36-1421
FROZEN GROUND MECHANICS, FROZEN
GROUND STRENGTH, CONSTRUCTION
MATERIALS, ARTIFICIAL FREEZING, ICE
LENSES, GROUND ICE, TEMPERATURE
GRADIENTS, DESIGN, PERMAFROST.

MP 1727 TEMPERATURE STRUCTURE AND INTER-FACE MORPHOLOGY IN A MELTING ICE-WATER SYSTEM.

Yen, Y.-C., Frontiers in hydrolegy, Littleton, CO, Water Resources Publications, 1984, p.305-325, 22 refs

38-3800 ICE MELTING, ICE WATER INTERFACE, MELTING POINTS, HEAT TRANSFER, TEMPERATURE DISTRIBUTION, WATER TEMPER-ATURE, BOUNDARY LAYER, CONVECTION, TURBULENT FLOW.

Nineteen tests were conducted with temperature measurements Nineten tests were conducted with temperature measurements at various stages of meiting experiments. Fourteen sets of photos were taken at various stages of the experiment for meiting from "sove. Formation of concentre ridges was observed only for higher warmer boundary temperatures. However, there were more sharp-edged cavities at lower warm boundary temperatures as compared to those at warmer temperatures. The seewater interface seemed to be much smoother at the junction of the cells in melting from below. These phenomena may be explained in that, in melting from above, the convective motions originate near the water-see interface and therefore, may possess a greater intensity.

MP 1728 EFFECTS OF VOLUME AVERAGING ON SPEC-TRA MEASURFD WITH A LYMAN-ALPHA HY-GROMETER.

Andreas, E.L., Apr. 1981, 20(4), p.467-475, 24 refs. 38-3865

HYGROMETERS, HUMIDITY, SPECTROS-COPY, MEASURING INSTRUMENTS, ANAL-YSIS (MATHEMATICS), VOLUME, ACCURACY YMM (MATHEMATICM), VOLUME, ACCURACY, Because the Lyman-siphs hygrometer averages turbulent fine-tuntions in himselfly over a right circular cylinder, the spectral response of the instrument degrades at higher wavenumbers. This paper contains a derivation of the three-dimensional spectral averaging function and uses this function, with a new model for the scalar spectrum, to numerically evaluate how this spatial averaging affects measured humidity spatial averaging affects measured humidity spraneter and humidity variance dissipation rates. In general, hygrometer parameters can be chosen that allow spectral measurements or moderately high wavenumbers, but with the use of security ever parameters can be consent that show spectral measurements to moderately high wavenumbers, but with the sure of source and detector tubes currently in the, an accurate measurement of the humidity variance descipation rate appears impossible

LOCATING WET CELLULAR PLASTIC INSU-LATION IN RECENTLY CONSTRUCTED ROOFS.

Korhonen, C., et al. 1983, Vol.371, p.168-173, 7 refs Tobiasson, W.

35-131 CELLULAR PLASTICS, ROOFS, INSULATION, MOISTURE DETECTION, WETTABILITY, TEM-PERATURE MEASUREMENT.

PERATURE MEASUREMENT. Infrared scanners are quite successful in finding wet roof installing, especially boards of rapidly absorbing insulations like perfire, wood liber and librors glass. But wet areas develop more thouly and noneurotemly in the cellular plastic insulations, such as uterhaine, which are commonly used in near roofs. These differences can affect the outcome of an infrared survey of new roofs. To determine the feasibility of detecting inception wet insulation, several recently constituted toofs were examined thermographically. It was usually more difficult to find measure in new roofs containing cellular relation to find in severations cellular relation insulations than in sew roofs with

was usually more deficult to find monthly in new roofs containing cellular plastic insulations than in new roofs with more absorbent invulations. This increased defficulty is due to the some; rate of neiting and to the nonunderm manner of weiting of some of the cellular plastics. Perhic, wood fiber and fibrous glass insulations tend to become uniformly weit throughout an entire board, whereas montion restrictly concentrates at the perimeters of boards of some cellular plastic insulations. However, eight to ten months after constitutions, enough montions can be commerte in months of the perimeters of some cellular plastic insulations.

Since this moisture is concentrated in a small portion of each insulation board, much of it would probably be overlooked by a nuclear or capacitance grid survey.

MP 1730 FOUNDATIONS IN PERMAPROST AND SEA-SONAL FROST; PROCEEDINGS.

Session (on) Foundations in Permafrost and Seasonal Frost, Denver, CO, Apr. 29, 1985, New York, American Society of Civil Engineers, 1985, 62p., Refs. passim. For individual papers see 39-3579 through 39-3582.

Wuori, A.F., ed, Sayles, F.H., ed. 39-3578

PERMAFROST STRUCTURES. RENEATH FOUNDATIONS, PILE STRUCTURES, RHEOLO-GY, FROZEN GROUND MECHANICS, LOADS (FORCES), SEASONAL FREEZE THAW, MEET-INGS, DESIGN, COLD WEATHER CONSTRUC-TION, SNOW COVER EFFECT, GROUND ICE.

MP 1731 CREEP OF A STRIP FOOTING ON ICE-RICH PERMAFROST.

Sayles, F.H., Session on Foundations in Permafrost and Seasonal Frost, Denver, CO, Apr. 29, 1985. Proceedings. Edited by A. Wuori and F.H. Sayles, New York, American Society of Civil Engineers, 1985, p.29-51, 41 refs. 39-3581 PERMAFROST

BENEATH STRUCTURES. CREEP, LOADS (FORCES), STRESSES, SETTLE-MENT (STRUCTURAL), RHEOLOGY, STRAINS, TESTS, COMPRESSIVE PROPERTIES

TESTS, COMPRESSIVÉ PROPERTIES
Creep settlement tests were performed on a strap footing
founded on the surface of scervich aeolism slit permafrost.
The tests consisted of applying four step leadings to a 10
in (25.4 cm) wide concrete footing. The step leadings to a 10
in (25.4 cm) wide concrete footing. The step leadings to a 10
in (25.4 cm) wide concrete footing.
The step leadings to a 10
in (25.4 cm) wide concrete footing of 28, 56, and
111 pss (0.19), 0.385, and 0.770 MPa) for test permole
was conducted at an ambient temperature of 28.4 F (2.0 C) in the controlled environment of the USAGREEL
Permafrost Tunnel Facility which is located near Fox. Alaska.
Settlement and settlement rates of the footing were measured.
These measured values are compared with those computed
by different proposed analytical methods that utilize results
from unconfined compression creep tests performed on undesterbed sed taken from the testing site. Preliminary results
indicate reasonable agreement between computed and measured values.

MP 1732 FROST HEAVE FORCES ON PILING. Esch, D.C., et al, May 1985, 4(11), 2p. Johnson, J.B.

FROST HEAVE, PILE EXTRACTION, PILE STRUCTURES, LOADS (FORCES), FROST PENETRATION, FROZEN GROUND MECHAN-ICS, SOIL CREEP, SOIL PHYSICS, DESIGN, TESTS.

MEAN CHARACTERISTICS OF ASYMMETRIC FLOWS: APPLICATION TO FLOW BELOW ICE JAMS.

Gögüs, M., et al. Sep. 1981, 8(3), p.342-350. With French summary. 13 refs. Tatinclaux, J.C.

36-1795 ICE JAMS, FLOATING ICE, WATER FLOW, SUB-SURFACE INVESTIGATIONS, SURFACE ROLGHNESS, SHEAR STRESS, RIVER ICE, HY-DRAULICS, ANALYSIS (MATHEMATICS). TESTS.

MP 1734 GROUND SNOW LOADS FOR STRUCTURAL DESIGN.

Ellingwood, B., et al., Apr. 1983, 109(4), p.950-964, 13 refs

Redfield, R. 37-3700

SNOW LOADS, ROOFS, SNOW WATER EQUIVALENT, STANDARDS, STATISTICAL ANALYSIS, STRUCTURES, DESIGN

MP 1735 SEWAGE SLUDGE AIDS REVEGETATION. Palarro, A.J., et al. July-Aug. 1982, 74(481), p.198-301 Gaskin, D.A., Wright, E.A.

SEWAGE DISPOSAL, SIUDGES, REVEGETA-TION, SOIL FORMATION, GRASSES, GROWTH

MP 1736 SOFT DRINK BUBBLES.

Cragin, J.H., Jan. 1983, Vol.60, p.71, 2 refs. 38-3798

ICE WATER INTERFACE, BUBBLES, ICE MELT-ING, AIR ENTRAINMENT, CARBON DIOXIDE, NUCLEATION, AIR WATER INTERACTIONS, SOLUBILITY.

COMPARISON OF DIFFERENT SEA LEVEL PRESSURE ANALYSIS FIELDS IN THE EAST GREENLAND SEA.

Tucker, W.B., June 1983, 13(6), p.1084-1088, 7 refs. 38-3799

ATMOSPHERIC PRESSURE, SEA LEVEL, SEA ICE, ICE MODELS, OCEANOGRAPHY, GREEN-LAND SEA.

OTTAUQUECHEE RIVE FREEZE-UP PROCESSES. RIVER—ANALYSIS

Calkins, D.J., et al, Workshop on Hydraulics of Ice-Covered Rivers, Edmonton, Alta., June 1 and 2, 1982. Proceedings, [1982], p.2-37, 3 refs.

Gooch, G.

Gooch, G.
38-4001
38-4001
38-4001
38-4001
GENERAL TRANSFER, ICE
MECHANICS, FLOW RATE, METEOROLOGICAL FACTORS, ICE COVER THICKNESS, ICE
VOLUME, TIME FACTOR, ANALYSIS (MATHEMATICS), DEGREE DAYS, UNITED STAFES—
VERMONT—OTTAUOUECHEE RIVER.

VERMONT—OTTAUQUECHEE RIVER.

The results of three winters of freeze-up measurements on the Ottauquechee River have shown that the ice production heat transfer coefficient calculated from the ice volume measurements is somewhat related to the severity of the freeze-up meteorological conditions. A very intense cold period of -22 C for two days just as the river water temperature reached 0.0 C produced much higher ice volumes for the same river reach than two other freeze-up periods, which had average air temperatures of -7 C over 10 to 12 days. The intense cold period created lighter ice discharges, which forced the leading edge to progress upstream at a faster rate than during other years. The lateral ice closure was found to be linearly related to the number of accumulated freezing degree-days. The data on lateral closure for this small river were also related to the freeze-up open channel flow velocity and, when combined with similar data from the Nelson River in Manitobs, produced a reasonable relationship. The slush ice also established an equilibrium flow area at several measured cross sections throughout the study reach.

MP 1739 FORCE MEASUREMENTS AND ANALYSIS OF

PORCE MEASUREMENTS AND ANALYSIS OF RIVER ICE BREAK UP.
Deck, D.S., Workshop on Hydraulics of Ice-Covered Rivers, Edmonton, Alta., June 1 and 2, 1982. Proceedings, [1982], p.303-336, 19 refs. 32-4015

ICE LOADS, ICE PRESSURE, STRUCTURES, ICE BREAKUP, RIVER ICE, ICE CONTROL, ICE BOOMS, ICE FORECASTING, ICE MECHANICS, FLOATING ICE, COUNTERMEASURES, FRA-ZIL ICE, DESIGN.

ZIL ICE, DESIGN.

Measurements were made near Oil City, Pennsylvania, diving February 1981 to evaluate the performance of a flow g ice control structure during an ice run on a shallow and steep stream, Oil Creek The primary objective of the structure was to assist in forming an early, stable ice cover upstream of Oil City that would prevent prolonged frazil ice generation. The control structure was a double timber ice boom. This paper focuses on the forces exerted on the structure during ice breakup. The forces transmitted to the ice co. in structure prior to breakup and during the ice run were monitored through a strain-gaged tension link, which had been incorporated into the design of the structure, and this ice force was recorded with respect to time.

MP 1/4U
FREEZING OF A SEMI-INFINITE MEDIUM
WITH INITIAL TEMPERATURE GRADIENT.
Lunardini, V.J., Mar 1984, 106(1), p.103-106, Revision of 37-2397. 12 refs.

38.4127 38-4127 SOIL FREEZING, STEFAN PROBLEM, HEAT TRANSFER, TEMPERATURE GRADIENTS, GEOTHERMY, HEAT BALANCE, THERMAL CONDUCTIVITY, ANALYSIS (MATHEMATICS). CONDUCTIVITY, ANALYSIS (MATHEMATICS). Exact solutions to problems of conductive heat transfer with solidification are rare due to the nonlinearity of the equations. The heat balance integral technique is used to obtain an approximate solution to the freezing of a semi-infinite region with a linear, initial temperature distribution. The results indicate that the constant temperature Neumann solution is acceptable for soil systems with a geothermal gradient unlers extremely long freezing times are considered. The heat balance integral will yield good solutions, with simple numerical work, even for nonconstant initial temperatures.

ICE ACTION ON TWO CYLINDRICAL STRUC-TURES.

Kato, K., et al, Mar. 1984, 106(1), p.107-112, 17 refs. For another source see 38-641 (MP 1643). Sodhi, D.S.

ICE LOADS, OFFSHORE STRUCTURES, ICE PRESSURE, ICE SOLID INTERFACE, EXPERIMENTATION.

PERIMENTATION.

Ice action on two cylindrical structures, located side by side, has been investigated in a small-scale experimental study to determine the interference effects on the ice forces generated during ice structure interaction. The proximity of the two structures changes the mode of ice failure, the magnitude and direction of ice forces on the individual structure, and the dominant frequency of ice force variations. Interference effects were determined by comparing the experimental results of tests at different structure spacings.

THERMAL PATTERNS IN ICE UNDER DY-

NAMIC LOADING. Fish, A.M., et al, 1983, Vol.430, p.240-243, 9 refs. Marshall, S.J., Munis, R.H.

38-4120 TRANSFER, ICE SPECTROSCOPY, ICE THER-MAL PROPERTIES, PLATES, TESTS.

MAL PROPERTIES, PLATES, TESTS.

Heat emission patterns in the infrared spectrum were discovered in ice subjected to cyclic loading. The ice plates used in the tests had a rectangular shape of 13 x 19 cm and a thickness of 2 cm. The plates were frozen to the platen of the testing apparatus to form a cantilever beam and were vibrated over a frequency range from 0.5 to 5 kHz at an ambient temperature of -4 C. The surface heat patterns were scanned by two thermal imaging systems with spectral band passes of 2-5.6 micron and 8-14 micron, and the heat patterns were recorded on Polarona tim and on videotape. The heat emission patterns first appeared at the fixed end of the ice plate and migrated gradually to the free end. The temperature difference between the ends was found to depend on the duration and frequency of excitation. The results of these tests indicate that vibrothermography can have wide areas of practical application in the study of the origin and growth of defects, recrystallization, fatigue, and failure processes in ice.

MP 1743

OFFSHORE OIL IN THE ALASKAN ARCTIC Weeks, W.F., et al, July 27, 1984, 225(4660), p.371-378, Numerous refs.

Weller, G. 38-4117

NATURAL RESOURCES, OFFSHORE DRILL-ING, OIL RECOVERY, SEA ICE, ICE LOADS, ICE SCORING.

SCORING.

Oil and gas deposits in the Alaskan Arctic are estimated to contain up to 40 percent of the remaining undiscovered crude oil and oil-equivalent natural gas within US jurisdiction Most (65 to 70 percent) of these estimated reserves are believed to occur offshore beneath the shallow, ice-covered seas of the Alaskan continental shelf. Offshore recovery operations for such areas are far from routine, with the primary problems associated with the presence of ice. Some problems that must be resolved if efficient, cost-effective, environmentally safe, year-round offshore production is to be achieved include the occurate estimation of ice forces on offshore structures, the proper placement of pipelines beneath ice-produced gouges in the sea floor, and the cleanup of oil spills in pack ice areas. (Auth)

MP 1744 POTENTIAL USE OF SPOT HRV IMAGERY FOR ANALYSIS OF COASTAL SEDIMENT PLUMES.

Band, L.E., et al, 1984 SPOT Symposium. Proceedings. SPOT simulation applications handbook, American Society of Photogrammetry, 1984, p.199-204, 5 refs

McKim, H.L., Merry, C.J.

40-3548
BOTTOM SEDIMENT, SEDIMENT TRANSPORT, REMOTE SENSING, WATER POLLUTION, SPECTROSCOPY, DISTRIBUTION.
Simulated SPOT (HVR) 20-m multispectral data were obtained on 7 July 1984 over the Hart-Miller Island diked spoil containment facility located in the upper Chesapeake Bay Sediment plumes were clearly visible and indicated the sediment transport direction at the time the image was taken. The portion of the image along the bay side of the island had strong specular reflection. The image was preprocessed to remove the majority of the specular reflection. The Sobel operator was applied to the enhanced simulated SPOT image. A set of edge segments were generated that follow the boundaries of the major sediment plumes. The strength of the edges was quite variable, reflecting the varying diffusion of the plume border. The Sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes. The sobel edge-enhanced image showed two sets of plumes were plotted. the plumes were pletted.

MP 1745 EFFECTS OF PHASE III CONSTRUCTION OF THE CHENA FLOOD CONTROL PROJECT ON THE TANANA RIVER NEAR FAIRBANKS. ALASKA—A PRELIMINARY ANALYSIS.

Buska, J.S., et al, Overview of Tanana River monitoring and research studies near Fairbanks, Alaska. Prepared by U.S. Army Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers, Jan. 1984, 11p. + figs Barrett, S., Chacho, E. 38-4207

38-4207
FLOOD CONTROL, JLD WEATHER CONSTRUCTION, SOIL EROSION, RIVER FLOW, BANKS (WATERWAYS), AERIAL SURVEYS, PHOTOGRAPHY, COUNTERMEASURES, UNITED STATES—ALASKA—TANANA RIVER.

ED STATES—ALASKA—TANANA RIVER.

The Alaska District, Corps of Engineers initiated a program called the Tanana River Monitoring and Research Program to determine if any adverse impacts are occurring or may occur as a result of Phase III construction of the Chena Flood Control Project. The results of the monitoring efforts and a preliminary analysis of the Phase III construction are presented in this report. Aerial photography and river cross-sections were used to document historical changes from 1961 to 1981. Riverbank erosion and channel changes before and after the Phase III construction are evaluated to determine the effects of the construction on the natural river process

MP 1746

MP 1746 RELATIONSHIPS AMONG BANK RECESSION, VEGETATION, SOILS, SEDIMENTS AND PER-MAFROST ON THE TANANA RIVER NEAR FAIRBANKS, ALASKA.

Gatto, L.W., Overview of Tanana River monitoring and research studies near Fairbanks, Alaska. Prepared by U.S. Army Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers, Jan. 1984, 59p., Appendix B. 30 refs.

BANKS (WATERWAYS), SOIL EROSION, FLOOD CONTROL, VEGETATION, PERMA-FROST BENEATH RIVERS, SEDIMENTS, UNIT-ED STATES—ALASKA—TANANA RIVER.

ED STATES—ALASKA—TANANA RIVER.

The objective of this analysis was to determine if available data are useful in identifying the characteristics that contribute to erodibility of the banks along two reaches of the Tanana River Existing data on bank vegetation, soils, sediments and permafrost were used. Because these data were general and not collected for the purpose of site-specific analysis, my analytical approach was simple and did not include any statistical tests. The data were visually compared to the locations and estimated amounts of historical recession to evaluate if any relationships were obvious

BANK RECESSION AND CHANNEL CHANGES IN THE AREA NEAR THE NORTH POLE AND FLOODWAY SILL GROITS, TANANA RIVER,

ALASKA.
Gatto, L W, et al, Overview of Tanana River monitoring and research studies near Fairbanks, Alaska. Prepared by U.S. Army Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers, Jan. 1984, 98p., Appendix C 5 refs Riley, K.W. 38-4209

BANKS (WATERWAYS), CHANNELS (WATERWAYS), SOIL EROSION, FLOOD CONTROL, PHOTOGRAPHY, AERIAL SURVEYS, UNITED STATES—ALASKA—TANANA RIVER.

STATES—ALASKA—IANANA RIVER.

Two diversion groins, one near North Pole, Alaska, and the other 7 miles upstream on the Tanana River near the floodway sill, were built in 1975 and 1979 along the flood control levee that protects Fairbanks from flooding of the Chena and Tanana rivers A flood control plan includes construction of new groins wherever it appears likely that bank crossion may threaten the levee The objectives of this analysis were to measure bank recession, to describe channel changes before and after construction of the two groins, and to evaluate relationships among crossion, channel changes and discharge Data from this analysis and future evaluations will be used in selecting sites for future groins evaluations will be used in selecting sites for future groins

MP 1748

EROSION ANALYSIS OF THE NORTH BANK OF THE TANANA RIVER, FIRST DEFERRED CONSTRUCTION AREA.

Collins, C.M., Overview of Tanana River monitoring and research studies near Fairbanks, Alaska Prepared by U.S. Army Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers, Jan. 1984, 8p. + figs., Appendix D. 1 ref. 28.4.210. 38-4210

BANKS (WATERWAYS), SOIL EROSION, FLOOD CONTROL, PROTECTION, AERIAL SURVEYS, UNITED STATES ALASKA— TANANA RIVER.

MP 1749 ROLE OF SEA ICE DYNAMICS IN MODELING

CO2 INCREASES. Hibler, W.D., 111, 1984, No.29, p.238-253, 21 refs.

38-429 CLIMATIC CHANGES, SEA ICE DISTRIBU-TION, ICE MECHANICS, ICE MODELS, ICE TEMPERATURE, DRIFT, THERMODYNAMICS, ALBEDO, SEA WATER.

ALBEDO, SEA WATER.

Sensitivity simulations of a hierarchy of Antarctic sea ice models to atmospheric warming are carried out and analyzed. The study includes models with only a thermodynamic ice cover, models with inisitu leads but no ice transport, and a fully coupled dynamic/thermodynamic model that includes transport, leads and strength-thickness coupling. All models employ a 60-m-thick oceanic mixed layer, together with a spatially and temporally varying heat flux into the mixed layer from the deep ocean. The heat flux was generated interactively by using a fixed fraction of the ice growth and cooling rates from the full dynamic/thermodynamic model the same spatially and temporally varying heat flux fields were used in all sensitivity simulations. Models including full ice dynamics effects are found to be less sensitive to atmospheric warming than thermodynamics-only models, while atmospheric warming than thermodynamics-only models, while models with specified lead fractions are more sensitive than thermodynamics-only models (Auth. mod.)

PROJECTILE AND FRAGMENT PENETRA-TION INTO ORDINARY SNOW.

Swinzow, G.K., Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, 1977, 30p., Unpublished manuscript. 10 refs.

PROJECTILE PENETRATION, SNOW COVER EFFECT, MILITARY OPERATION, SNOW DEN-SITY, MILITARY ENGINEERING, PROTEC-TION, PENETRATION TESTS, PHOTOGRAPHY. TION, PENETRATION TESTS, PHOTOGRAPHY. A soldier on the battlefield is told to "dig in" to protect imself against projectiles and fragments But in cold regions or seasons the ground may be hard, suitable only for deliberate field fortifications built using machines and explosives. However, a winter battlefield scenario often contains an excellent protective material: the snow cover Often neglected or considered a nuisance, snow can be an obstacle and a disadvantage for the ignorant and a decisive advantage for the properly trained and knowledgeable soldier. Construction of a protective structure made of ordinary snow requires an order of magnitude less effort in time, manpower and energy than is required to obtai, the same amount and energy than is required to obtain the same amount of protection by using sand bags or by "digging in" We have found that small arms projectiles penetrate only 2 m into a snowpile and that protection against recoilless rifle ammunition (HEAT) of the shaped charge type requires less than 4 m of ordinary snow Our findings indicate that energy to penetration depth relations are complex and that point detonating fuzes may present greater difficulties in snow covered terrain

STUDY OF A GROUNDED FLOEBERG NEAR

REINDEER ISLAND, ALASKA.
Kovacs, A., Hanover, NH, U.S. Army Cold Regions
Research and Engineering Laboratory, July 1977, 9p., Unpublished technical report. 38-4377

GR JUNDLD ICE, ICE SCORING, ICE FLOES, ICE PILETT PRESSURE RIDGES, DRIFT, UNITED CTAT S—ALASKA—PRUDHOE BAY.

SIMPLE BOOM ASSEMBLY FOR THE SHIP-BOARD DEPLOYMENT OF AIR-SEA INTERACTION INSTRUMENTS.

Andreas, E.L., et al, 1984, 11(3), p 227-237, For another source see 38-868 or 13G-28929 21 refs. Rand, J.H., Ackley, S.F.

MARINE METEOROLOGY, METEOROLOGI-CAL INSTRUMENTS, MEASURING INSTRU-MENTS, BOOMS (EQUIPMENT), SHIPS, AN-TARCTICA

TARCTICA
We have developed a simple boom for use in measuring meteorological variables from a ship. The main structural member of the boom, a triangular communications tower with rollers attached along its bottom side, is deployed horizontally from a long. flat deck, such as a helicopter deck, and will support a 100-kg payload at its outboard end. The boom is easy to deploy, requires minimal ship modifications, and provides ready access to the instruments mounted on it. And because it is designed for use with the ship crosswind, oceanographic work can go on at the same time as the air-sea interaction measurements. We describe our use of the boom on the Mikhail Somov during a cruse into the Antiarctic sea ice and present some representative measurements made with instruments mounted on it. Theory, experiment, and our data all imply that instrument seployed windward from a rear helicopter deck can reach air undisturbed by the ship. Such an instrument site has clear advantages over the more customary mast, bow, or buoy locations. or buoy locations (Auth)

MP 1753 SOIL MICROBIOLOGY.

SOIL MICROBIOLOGY.

Bosatta, E., et al, Simulation of nitrogen behaviour of soil-plant systems. Edited by M.J. Frissel and J.A. van Veen. Wageningen, the Netherlands, Pudoc, Centre for Documentation, 1981, p.38-44.

Iskandar, I.K., Juma, N.G., Kruh, G., Reuss, J.O., Tanji, K.K., Veen, J.A. van.

38-4435

SOIL MICROBIOLOGY, UREA, NUTRIENT CY-CLE, MATHEMATICAL MODELS.

ATMOSPHERIC CONDITIONS AND CONCUR-RENT SNOW CRYSTAL OBSERVATIONS DURING SNOW-ONE-A.

Bilello, M.A., et al, Mar. 1983, No.83-04, Snow Symposium 2, Vol.1, p.3-18, ADB-073 046, 14 refs. O'Brien, H.

38-4305 SNOWFALL SNOWFALL, SNOW CRYSTAL STRUCTURE, SNOW OPTICS, SYNOPTIC METEOROLOGY, AIR MASSES, AIR TEMPERATURE, HUMIDITY, WEATHER OBSERVATIONS, FALLING BO-DIES.

A survey of the synoptic weather patterns and vertical profiles A survey of the synoptic weather patterns and vertical profiles of temperature and humidity over northern Vermont was conducted during periods of snowfall between December 1981 and February 1982. The crystal habit of falling snow, discerned principally from on-site optical microscopy, was also observed during this period. This information was used to investigate the association between air mass characteristics and snow crystal types. The ultimate objective of the analysis is to link large-scale weather conditions with the observed physical features of falling frozen particles and with measurements recorded concurrently by electrooptical sensor systems. optical sensor systems.

MP 1755 NORTHWEST SNOWSTORM OF 15-16 DECEM-BER 1981.

Bates, R.E., Mar. 1983, No 83-04, Snow Symposium 2, Vol.1, p.19-34, ADB-073 046, 4 refs. 38.4306

SNOWSTORMS, SNOW DEPTH, SNOWFALL, SYNOPTIC METEOROLOGY, METEOROLOGI-CAL DATA.

This paper contains a detailed description of meteorological conditions (including upper air) of an intense Northeast snowstorm that occurred in mid-December 1981. The paper relates the on-site meteorology to the overall concurrent synoptic situation. Consideration is given to air mass, hydrometeor intensity, visibility and crystal habit along the SNOW-ONE-A primary line-of-site.

FALLING SNOW CHARACTERISTICS AND EX-

TINCTION.
Berger, R.H., Mar. 1983, No.83-04, Snow Symposium ol.1, p.61-69, ADB-073 046, 2 refs 38.4309

SNOWFALL, LIGHT TRANSMISSION, PARTI-CLE SIZE DISTRIBUTION, PRECIPITATION GAGES, LIGHT SCATTERING.

An examination of the literature shows that a single relationship An examination of the literature shows that a single relationship between the extinction and the precipitation rate does not exist for snow as it does for rain. This is due in part to the wide range of particle sizes and shaper which determine both the optical and mechanical properties of snow. The extinction measurements and extensive snow characterization made during the SNOW-ONE and SNOW-ONE-A field experiments provide the data for an examination of the dependence of the extinction on various snow characteristics. The correlations between the extinction and several snow characterization parameters are presented.

VISIBLE PROPAGATION IN FALLING SNOW AS A FUNCTION OF MASS CONCENTRATION AND CRYSTAL TYPE.

Lacombe, J., et al, Mar. 1983, No 83-04, Snow Symposium 2, Vol.1, p 103-111, ADB-073 046, 8 refs Koh, G., Curcio, J A

LIGHT TRANSMISSION, ATTENUATION, SNOWFALL, SNOW CRYSTAL STRUCTURE, SNOW OPTICS, OPTICAL PROPERTIES, DENSITY (MASS/VOLUME).

At SNOW-ONE-A mass concentration of falling snow was At SNOW-ONE-A mass concentration of failing snow was measured in conjunction with measurements of visible transmittance and observations of snow crystal type. An examination of a significant portion of the resulting data base reveals that a general correlation exists between visible attenuation and snow concentration. The data also indicate that crystal habit is a major factor affecting the relationship between afternishing and concentration. attenuation and concentration

MP 1758 FREE WATER MEASUREMENTS OF A SNOW-PACK

Fisk, D.J., Mar. 1983, No.83-04, Snow Symposium 2, Vol.1, p 173-176, ADB-073 046, 2 refs.

SNOW WATER CONTENT, TEMPERATURE MEASUREMENT, UNFROZEN WATER CONTENT, SNOW MELTING, CALORIMETERS.

A review is given of methods (melting and freezing calorimetry) previously used for measuring the free water content of snow on the ground. Their merits and faults are described A new method, developed by the author, based on the temperature depression observed when a snow sample is completely dissolved in ethanol, is described and compared to the meiting and freezing calorimetric methods.

PERFORMANCE AND OPTICAL SIGNATURE OF AN AN/VVS-1 LASER RANGEFINDER IN FALLING SNOW: PRELIMINARY TEST RE-SULTS.

Lacombe, J., Mar. 1983, No.83-04, Snow Symposium 2, Vol.1, p.253-266, ADB-073 046, 10 refs.

38.4374 38-4324 SNOW OPTICS, SNOWFALL, LIGHT TRANS-MISSION, ELECTROMAGNETIC PROPERTIES, BLOWING SNOW, PHOTOGRAPHY, LASERS, SNOWSTORMS, ATTENUATION, MEASURING INSTRUMENTS, VISIBILITY.

An AN/VVS-1 pulsed ruby laser rangefinder was operated during the February 9, 1982 snow storm at SNOW-ONE-A. The device's digital readout was monitored as the system ranged over known distances to several targets. System performance has been evaluated relative to detailed measurements of airborne-snow concentration, precipitation rate and visible transmittance. rate and visible transmittance Observations of the rangefinder's optical signature have been made using a video camera and still photography This work was accomplished during both clear-air and light-snowfall conditions

CHEMICAL OBSCURANT TESTS DURING WINTER: ENVIRONMENTAL FATE.
Cragin, J.H., Mar. 1983, No.83-04, Snow Symposium 2, Vol.1, p.267-272, ADB-073 046, 3 refs. 38-4325

SNOW OPTICS, INFRARED RECONNAIS-SANCE, AEROSOLS, CHEMICAL ANALYSIS, POLLUTION, TEMPERATURE EFFECTS, SAM-PLING, TESTS

PLING, TESTS

Concentrations of orthophosphate, IR1 and IR2 obscurants were measured in surface snow samples after a wintertime test of white phosphorus (WP) smoke and the two infrared exponentially downwind from the smoke release point. Orthophosphate concentrations were all less than the analytical detection limit of 0.15 mg/L. Quantities of smoke released pose no hazard to the public or environment. Snow was found to provide a clean non-contaminating surface upon which to collect the deposited aerosol.

ON SMALL-SCALE HORIZONTAL VARIA-TIONS OF SALINITY IN FIRST-YEAR SEA ICE. Tucker, W B, et al, July 20, 1984, 89(C4), p.6505-6514, 20 refs

Gow, AJ, Richter, J.A

SEA ICE, ICE SALINITY, BRINES, VARIATIONS. SEATCE, ICE SALINITY, BRINES, VARIATIONS.

Measurements of salinity over horizontal distances of 38 to 76 cm in a thick first-year ice sheet have revealed significant differences. A maximum salinity difference of 2 per mill was observed between ice core segments from the same depth. The mean standard deviation for 10-cm thickness increments through the 20-m ice sheet was 0.39 per mill between the five closely spaced cores. The most likely mechanisms for these significant differences in salinity over short distances is differential brine drainage in the ice sheet due to varying locations of brine drainage channels. A simple one-dimensional model which assumes a normally simple one-dimensional model which assumes a normally distributed arrangement of brine drainage channels provides results consistent with the horizontal differences observed (Auth.)

WASTEN: A MODEL FOR NITROGEN BEHAVI-OUR IN SOILS IRRIGATED WITH LIQUID

Sclim, H.M., et al, Simulation of nitrogen behaviour of soil-plant systems. Edited by M.J. Frissel and J.A. van Veen, Wageningen, Netherlands, Centre for Agricultural Publication. (1984), p 96-108, 19 refs Iskandar, I.K.

39-234
WASTE TREATMENT, WATER TREATMENT,
CHEMICAL ANALYSIS, LAND RECLAMATION, WASTE DISPOSAL, IRRIGATION,
MATHEMATICAL MODELS, SOIL WATER,
FORECASTING, COMPUTER APPLICATIONS.

ICE COVER MELTING IN A SHALLOW RIVER. Calkins, D.J., June 1984, 11(2), p.255-265, With French summary. 9 refs.

105-36-401 ICE MELTING, RIVER ICE, ICE JAMS, HEAT TRANSFER, FRAZIL ICE, WATER TEMPERATURE, RIVER FLOW, FREEZING POINTS, DIURNAL VARIATIONS, TEMPERATURE DISTRIBUTION. BUTION.

URNAL VARIATIONS, TEMPERATURE DISTRIBUTION.

The heat transfer coefficients computed from field data on both ice cover melting and water temperature attenuation are higher than the values one would compute based on extrapolation of previous laboratory flume data. The computed heat transfer coefficients were relatively consistent when calculated from the water temperature decay data. Consistent results were also obtained with one set of very detailed ice cover melting data. The diurnal fluctuation in water temperature from the freezing point to values of 0.4-0.6 C was associated with the incoming solar radiation and the open water surface area. The measured water temperature distribution beneath the ice cover at a particular cross section varied from 0.2 to 0.6 C due to the influence of frazil ice and flow distribution. In the open water reaches the water temperature was essentially fully mixed vertically but lateral variation across the river ranged from 0.1 to 0.3 C. The average daily melting of the ice cover often exceeded 5.0 cm and at some locations the rate was as high as 8 cm/d. The melt was not uniform scross the section but was highly dependent upon the flow conditions, velocity, and depth. The ice cover melting for this year only occurred during the daylight hours as the air temperature likewise decayed to its freezing point.

MP 1764

SURFACE ROUGHNESS OF ROSS SEA PACK TCE.

Govoni, J.W., et al, 1983, 18(5), p.123-124, 5 refs. Ackley, S.F., Holt, E.T. 39-16

SEA ICE, PACK ICE, ICE SURFACE, MEASUR-ING INSTRUMENTS, ANTARCTICA-SEA.

At the end of the 1980 austral winter, sea-ice surface roughness was assessed along selected tracks in the Ross Sea. The ice surveyed consisted mannly of first-year pack ice. Surface profiles were made using a Spectra-Physics Geodolite 3A laser profilometer which was mounted vertically in the camera bay of a National Science Foundation LC-130 aircraft. The profilometer, recording equipment and measurement technique are described. For the data analyzed to date, the Ross Sea region appears in general to have much less ridging than either the Weddell Sea or the Arctic Basin. The open nature of the boundaries here leads to generally divergent conditions and diminishes the stress transmitted through the pack ice resulting in fewer high ridges. Near costal boundaries, however, localized high stress may exist and ridging features develop accordingly. At the end of the 1980 austral winter, sea-ice surface roughness

MP 1765

TWO-DIMENSIONAL MODEL OF COUPLED HEAT AND MOISTURE TRANSPORT IN FROST-HEAVING SOILS.

Guymon, G.L., et al, Sep. 1984, 106(3), p.336-343, 30 refs.

Hromadka, T.V., II, Berg, R L

HEAT TRANSFER, MOISTURE TRANSFER, FROST HEAVE, SOIL FREEZING, MODELS.

The model is based upon well known equations of heat and moisture flow in soils. Numerical solution is by the nodal domain integration method which includes the integrated finite difference and the Galerkin finite element methods Solution of the phase change process is approximated by an isothermal approach and phenomenological equations are assumed for processes occurring in freezing or thawing zones. The model has been verified against experimental one-dimensional freezing soil column data and experimental two-dimensional soil thawing tank data as well as two-dimensional soil seepage data. The model has been applied to several simple but useful field problems such as roadway embankment freezing and frost heaving. (Auth.)

MP 1766
CREEP MODEL FOR CONSTANT STRESS AND
CONSTANT STRAIN RATE.
Fish, A.M., Engineering Mechanics Division Specialty
Conference, 5th, Laramic, WY, Aug. 1-3, 1984 Proceedings, Vol.2. Edited by A P. Boresi and K.P.
Chong, New York, American Society of Civil Engineers, 1984, p.1009-1012, 5 refs.
30.110

RHEOLOGY, STRESS STRAIN DIAGRAMS, CREEP, STRESSES, STRAINS, TESTS, THERMO-DYNAMICS.

MP 1767

MODEL SIMULATION OF 20 YEARS OF NORTHERN HEMISPHERE SEA-ICE FLUC-TUATIONS.

Walsh, J.E., et al, 1984, Vol.5, p.170-176, 20 refs. Hibler, W.D., III, Ross, B. 39-193

SEA ICE DISTRIBUTION, ICE CONDITIONS, ICE MODELS, DRIFT, SURFACE TEMPERA-FURE, WIND FACTORS, PERIODIC VARIA-TIONS, SNOW COVER EFFECT, ICE COVER THICKNESS, CLIMATIC FACTORS.

A dynamic-thermodynamic spaciec model (Hibler 1979) is used to simulate northern hemisphere sea ice for a 20-year period, 1961 to 1980. The model is driven by daily atmospheric grids of sea-level pressure (geostrophic wind) and by temperatures derived from the Russian surface temperature data set. Among the modifications to earlier formulations are the inclining and by temperatures derived from the Russian surface tempera-ture data set. Among the modifications to earlier formula-tions are the inclusion of snow cover and a multilevel ice-thickness distribution in the thermodynamic computations. The time series of the simulated anomalies show relatively large amounts of ice during the early 1960s and middle 1970s, and relatively small amounts during the late 1960s and early 1970s. The fluctuations of ice mass, both in the entire domain and in individual regions are more persustent. and early 1970s The fluctuations of ice mass, both in the entire domain and in individual regions, are more persistent than are the fluctuations of ice-covered area. The ice dynamics tend to introduce more high-frequency variability into the regional (and total) amounts of ice mass. The simulated annual ice export from the Arctic basin into the East Greenland. Sea varies interannually by factors of 3

THERMAL EXPANSION OF SALINE ICE. Cox, G.F.N., 1983, 29(103), p.425-432, With French and German summaries. 10 refs. 39-204

ICE SALINITY, SEA ICE, THERMAL EXPANSION, ANALYSIS (MATHEMATICS), BRINES, TEMPERATURE EFFECTS.

The coefficient of thermal expansion of NaCl ice and natural sea ice is theoretically shown to be equal to the coefficient of thermal expansion of pure ice.

SNOW CONCENTRATION AND EFFECTIVE AIR DENSITY DURING SNOW-PALLS.
Mellor, M., 1983, 29(103), p.505-507, With French and German summaries. 1 ref.

SNOWFALL, ATMOSPHERIC DENSITY, SNOW ACCUMULATION, DISTRIBUTION, VELOCITY.

MP 1770

OBSERVATIONS OF VOLCANIC TREMOR AT MOUNT ST. HELENS VOLCANO.
Fehler, M., Apr. 10, 1983, 88(B4), p.3476-3484, Comment by M.G. Ferrick and W.F. St. Lawrence. Ibid., July 10, 1984, 89(B7), p.6349-6350. 37 refs. Ferrick, M.G., St. Lawrence, W.F.

39-325
VOLCANOES, ELASTIC WAVES, SPECTRA,
SEISMOLOGY, WAVE PROPAGATION, SOIL
MECHANICS, FLUID DYNAMICS, MOUNTAINS, THEORIES, UNITED STATES—WASH-INGTON-SAINT HELENS, MOUNT.

THERMODYNAMIC MODEL OF CREEP AT CONSTANT STRESS AND CONSTANT STRAIN RATE

Fish, A.M., July 1984, 9(2), p.143-161, For another source see 38-4470. Refs. p.159-161. 10.110

RHEOLOGY, THERMODYNAMICS, FROZEN GROUND MECHANICS, STRESS STRAIN DIA-GRAMS, SOIL CREEP, VISCOUS FLOW, MATH-EMATICAL MODELS, TESTS, LOADS

(FORCES). A thermodynamic model has been developed that describes the entire creep process, including primary, secondary, and tertiary creep, and failure for both constant stress (CS) tests and constant strain rate (CSR) tests, in the form of a unified constitutive equation and unified failure criteria. Deformation and failure are considered as a single thermoactivated process in which the dominant role belongs to the change of entropy. Families of creep curves, obtained from uniaxial compression CS and CSR tests of froren soil, respectively footh presented in dimensionless coordinates), are plotted as straight lines and are superposed, confirming the unity of the deformation and failure process and the validity of the deformation and failure process and the validity of the model. A method is developed for determining the parameters of the model, so that creep deformation and the stress-strain relationship of ductile materials such as soils can be predicted based upon information obtained from either type of test

MP 1772

METHOD OF DETECTING VOIDS IN RUB-

BLED ICE. Tucker, W.B., et al, July 1984, 9(2), p.183-188, 9 refs. Rand, J.H., Govoni, J.W.

PRESSUPE RIDGES, ICE JAMS, ICE DETECTION, ICE PILEUP, SURFACE ROUGHNESS, POROSITY.

MP 1773

UNIAXIAL COMPRESSIVE STRENGTH OF FROZEN SILT UNDER CONSTANT DEFORMA-

Zhu, Y., et al, June 1984, 9(1), p.3-15, 8 refs. Carbee, D.L.

FROZEN GROUND STRENGTH, STRESS STRAIN DIAGRAMS, COMPRESSIVE PROPER-TIES, GROUND ICE, ICE CRYSTAL STRUC-TURE, TESTS, STRAINS, VELOCITY, SOIL CREEP, RHEOLOGY, TEMPERATURE VARIA-TIONS, DENSITY (MASS/VOLUME).

TIONS, DENSITY (MASS/VOLUME).

Uniaxial compressive strength tests were conducted on remolded, saturated Fairbanks frozen silt under various constant machine speeds, temperatures and dry densities. Test results show that the peak strength of frozen silt is not sensitive to dry density (or water content) at 2 C, especially at clatively high strain rates, but is very sensitive to temperature and applied strain rate. However, the failure strain is not sensitive to temperature and afrain rate within a wide range of strain, rate, but is very sensitive to dry density. It has been found that the initial yield strength consistently increases with decreasing dry unit weight. The initial increases with decreasing dry unit weight. The initial yield strain is almost independent of dry density and temperature, but varies with strain rate. The initial tangent modulus of frozen silt is found to be nearly independent of strain rate, but the 50% strength modulus is closely related to strain rate. The test results indicate that there is a definite relationship between the two moduli.

MP 1774

FIELD DIELECTRIC MEASUREMENTS OF FROZEN SILT USING VHF PULSES.
Arcone, S.A., et al, June 1984, 9(1), p.29-37, 16 refs.

Delaney, A.J. 39-329

39-329
FROZEN GROUND PHYSICS, DIELECTRIC PROPERTIES, RADIO WAVES, PERMAFROST PHYSICS, GROUND ICE, TUNNELS, WAVE PROPAGATION, TRANSMISSION, ICE WEDGES, TESTS.

MP 1775

DIELECTRIC MEASUREMENTS OF FROZEN SILT USING TIME DOMAIN REFLECTOME-TRY.

Delaney, A.J., et al, June 1984, 9(1), p.39-46. Arcone, S.A.

39-330

PROZEN GROUND PHYSICS, DIELECTRIC PROPERTIES, GROUND ICE, REFLECTION, WATER CONTENT, TEMPERATURE EFFECTS, MEASURING INSTRUMENTS. MP 1776

ELECTROMAGNETIC PROPERTIES OF SEA ICE

Morey, R.M., et al, June 1984, 9(1), p 53-75, For another version see 38-4472 Kovacs, A., Cox, G.F.N.

39-332

ICE ELECTRICAL PROPERTIES, SEA ICE, ELECTROMAGNETIC PROPERTIES, ICE SPECTROSCOPY, ICE CRYSTAL STRUCTURE, MICROSTRUCTURE, BRINES, ANALYSIS (MATHEMATICS), DIELECTRIC PROPERTIES.

EMATICS), DIELECTRIC PROPERTIES.
Investigations of the in situ complex delectric constant of sea ice were made using time-domain spectroscopy. It was found that (1) for sea ice with a preferred horizontal c-axis alignment, the anivotropy or polarizing properties of of the ice increased with depth, (2) brine inclusion conductivity increased with decreasing temperature down to about -8. (2, at which point the conductivity decreased with decreasing temperature, (3) the DC conductivity of sea ice increased with increasing brine volume, (4) the real part of the complex delectric constant is strongly dependent upon brine volume but less dependent upon the brine inclusion orientation, (5) the imaginary part of the complex delectric constant was strongly dependent upon brine inclusion orientation but much less dependent upon brine volume

MP 1777

MP 1777

TRATIONS OF MICROSPHERULES IN SNOW AND PACK ICE FROM THE WEDDELL SEA. Kumai, M., et al, 1983, 18(5), c 128-131, 7 refs. Ackley, S.F., Clarke, D.B.

39-307

PACK ICE, SNOW CRYSTALS, MICROELE-MENT CONTENT, PARTICLES, ANTARCTICA WEDDELL SEA.

This paper presents the results of an investigation of microspherules found in snow and pack ice from the Weddell Sea, Antarctica, collected during the U.S.-U.S.S.R. Weddell Polynya Expedition, 1981. Elemental composition, size, and concentration of microspherules were determined using a scanning electron microscope (SEM) and energy dispersive X-ray analysis (BDXA). Typical textures of microspherules are shown in this report and compared with those found in snow and ice-fog crystals sampled from the Northern Hemisphere. In this study, 23 microspherules were found in the snow sample from the Weddell Sea and 6 from the snow-ice sample. The concentration of microspherules in the snow samples is calculated to be approx 0.001 percent, three orders of magnitude smaller than that of the Northern Hemisphere. This indicates that the concentration of microspherules in the Antarctic may be three orders of magnitude smaller than the concentration found in the Northern Hemisphere. Silicon- and titanium-rich microspherules from the Weddell Sea were found in fly ash of terrestiral origin. sphere. Sincon and the war found in fly ash of terrestrial origin. The iron rich microspherules were tentatively identified to be of extraterrestrial origin.

MP 1778

ARGE-SCALE ICE/OCEAN MODEL FOR THE

MARGINAL ICE ZONE. Hibler, W.D., III, et al, Apr. 1984, No.84-07, MIZEX 3. Modeling the marginal ice zone, p.1-7, ADA-145 351, 14 refs.

Bryan, K.

39-361
ICE MECHANICS, ICE WATER INTERFACE, SEA ICE DISTRIBUTION, OCEAN CURRENTS, DRIFT, ICE MODELS, SEASONAL VARIATIONS, WATER TEMPERATURE, SALINITY, WIND FACTORS, VELOCITY

MP 1779

EAST GREENLAND SEA ICE VARIABILITY IN

EAST GREENLAND SEA ICE VARIABILITY IN LARGE-SCALE MODEL SIMULATIONS.
Walsh, J.E., et al, Apr. 1984, No.84-07, MIZEX bulletin. 3. Modeling the marginal ice zone, p.9-14, ADA-145 351, 11 refs.
Hibler, W.D., III. 39-362

ICE MECHANICS, SEA ICE, ICE MODELS, THERMODYNAMICS, ICE CONDITIONS, DRIFT, ICE COVER THICKNESS, WIND FAC-TORS, GREENLAND SEA

MP 1780
ON THE DECAY AND RETREAT OF THE ICE COVER IN THE SUMMER MIZ.

Maykut, G.A., Apr. 1984, No.84-07, MIZEX bulletin. 3. Modeling the marginal ice zone, p.15-22, ADA-145 351, 15 refs.

SEA ICE DISTRIBUTION, ICE CONDITIONS SEA ICE DISTRIBUTION, ICE CONDITIONS, ICE MELTING, SOLAR RADIATION, ICE WATER INTERFACE, THERMODYNAMICS, ICE FLOES, HEAT FLUX, ICE MECHANICS, SEASONAL VARIATION, POLYNYAS

ON THE ROLE OF ICE INTERACTION IN MARGINAL ICE ZONE DYNAMICS.

Lepparanta, M, et al, Apr. 1984, No.84-07, MIZEX bulletia. 3. Modeling the marginal ice zone, p.23-29, ADA-145 351, 7 refs. Hibler, W.D., III.

39-364

ICE MECHANICS, ICE WATER INTERFACE, ICE EDGE, ICE COVER THICKNESS, ICE CONDITIONS, ICE AIR INTERFACE, RHEOLOGY, WIND FACTORS, VISCOSITY, MATHEMATICAL MODELS. CAL MODELS

MP 1782

ANALYSIS OF LINEAR SEA ICE MODELS WITH AN ICE MARGIN.

Leppäranta, M., Apr. 1984, No.84-07, MIZEX bulle-3. Modeling the marginal ice zone, p 31-36, ADA-145 351. 39-365

ICE MODELS, SEA ICE, RHEOLOGY, VISCOSI-TY, ICE EDGE, PACK ICE, ANALYSIS (MATHEMATICS), LOADS (FORCES)

SOME SIMPLE CONCEPTS ON WIND FORC-ING OVER THE MARGINAL ICE ZONE.

Tucker, W.B., Apr. 1984, No.84-07, MIZEX bulletin 3. Modeling the marginal ice zone, p.43-48, ADA-145 351, 20 refs.

ICE MECHANICS, ICE EDGE, WIND PRFS-SURE, SHEAR PROPERTIES, ICE PACK, WIND DIRECTION, SURFACE ROUGHNESS.

VARIATION OF THE DRAG COEFFICIENT ACROSS THE ANTARCTIC MARGINAL ICE ZONE

Andreas, E.L., et al, Apr. 1984, No.84-07, MIZEX bulletin. 3. Modeling the marginal ice zone, p.63-71, ADA-145 351, 40 refs. bulletin.

Tucker, W.B., Ackley, S.F.

ICE CONDITIONS, SEA ICE DISTRIBUTION, ICE EDGE, ATMOSPHERIC CIRCULATION, ICE SURFACE, SURFACE ROUGHNESS, AIR TEMPERATURE, WIND DIRECTION, ICE MODELS, BOUNDARY LAYER, ANTARCTICA—WEDDELL SEA DELL SEA.

In Oct. 1981 the U.S.-USSR Weddell Polynya Expedition crossed the Antarctic marginal ice zone (MIZ) near the Greenwich Meridian on the Michael Somov. Five radi-Greenwich Meridian on the Michail Somov. Five radiosondes, launched along a 150-km track starting at the ice edge, showed profound modification of the atmospheric boundary layer (ABL) as increasing surface roughness decelerated the flow. An equation is presented for the dependence of the drag coefficient on ice concentration that should be useful for modeling the surface stress in marginal ice zones. The sounding profiles and meteorological data provided a comprehensive look at how surface roughness and temperature changes in the MIZ can affect the ABL.

MECHANISM FOR FLOE CLUSTERING IN THE MARGINAL ICE ZONE.

Leppäranta, M., et al, Apr. 1984, No.84-07, MIZEX bulletin 3. Modeling the marginal ice zone, p.73-76, ADA-145 351, 3 refs.

Hibler, W.D., III. 39-371

ICE FLOES, ICE CONDITIONS, SEA ICE DISTRIBUTION, ICE EDGE, DRIFT, ICE MECHANICS, ICE COVER THICKNESS.

MP 1786

RELATIVE ABUNDANCE OF DIATOMS IN WEDDELL SEA PACK ICE.

Clarke, D.B., et al, 1983, 18(5), p.181-182, 12 refs. Ackley, S.F.

39-310

ALGAE, PACK ICE, FRAZIL ICE, CRYOBIOLO-GY, ANTARCTICA—WEDDELL SEA.

GY, ANTARCTICA—WEDDELL SEA.
Distoms were found throughout the length of sea ice cores
(average length, 75 cm) taken from the Weddell Sea during
the Oct-Nov 1981 joint U.S.-U S S.R. study As in previous
studies it was found that the pennate forms were dominant
Chaetoceros dichaeta Ehrenberg was the only centric species
which was "abundant" in the samples, and it has not previously
been reported as abundant. Of the pennate species found
in abundance, three have been found in abundance by other
authors These are Nitzschia closterium (Ehrenberg) W.
Smith, Nitzschia eylindrus (Grunow) Hasle, and Nitzschia
subcurvata Hasle Also found to be numerically significant
in the samples were Nitzschia prolongatorides Hasle, Nitzschia
turgiduloides Hasle, Tropidoneis glacialis Heiden, and an
undentified Navicula species. The table lists the dominant
Five species in each sample and their relative abundances. Five of these species have not previously been found in abundance in antarctic sea ice. Possible reasons for the variable species compositions in samples are discussed.

MP 1787

RESERVOIR BANK EROSION CAUSED BY

Gatto, L.W., Aug. 1984, 9(3), p.203-214, Refs. p.211-39.397

ICE EROSION, BANKS (WATERWAYS), RESERVOIRS, ICE CONDITIONS, WATER LEVEL, BOTTOM SEDIMENT, SHORE EROSION.

The purpose of this study was to evaluate the documented and potential importance of ice crosson along reservoir banks. The evaluation is based on a literature review and on inferences drawn from field observations and experience. Very little is known about the amount of reservoir bank crosson caused by ice action, although considerable information exists on to crosson processes along the shortclines and beaches of oceans, rivers and lakes The importance of ice-related crosson along a reservoir bank would depend primarily on water level, but ice conditions and bank sediment characteristics would also be important. If the reservoir water level ties would also be important. If the reservoir water level is at bank level, ice could directly erode a bank face. If the water is below the bank, ice would have no direct effect on it.

However, ice could indirectly increase bank instability by disrupting and eroding near-viore and beach zones, which could 'ead to bank erosion.

MP 1788

PRELIMINARY INVESTIGATION OF THER-MAL ICE PRESSURES.

Cox, G.F.N., Aug. 1984, 9(3), p.221-229, 16 refs.

ICE PRESSURE, ICE THERMAL PROPERTIES, STRESSES, RHEOLOGY, ICE TEMPERATURE, LAKE ICE, MATHEMATICAL MODELS, HY-DRAULIC STRUCTURES.

Measured ice stress data are needed to verify and improve thermal ice thrust prediction models used in estimating ice forces on dams, bridge piers, locks and other hydraulic structures. During February and March, 1983, thermal ice pressures were measured in the ice on a small lake in central New Hampshire. Even though the ice sheet was relatively warm and only exhibited small changes in temperature, stresses up to 200 to 300 kPa were recorded with a newly designed biaxial ice-stress sensor. Ice stresses normal and parallel to the shore of the lake were similar. Given the rate of change of temperature of the ice, ice pressures were calculated for the measurement period using a uniaxial rheological model consisting of a spring and nonlinear dashpot connected in sense Calculated and measured stresses were in good agreement. dashpot connected in series stresses were in good agreement

MP 1789

STATIC DETERMINATION OF YOUNG'S MODULUS IN SEA ICE.

Richter-Menge, J.A., Aug. 1984, 9(3), p.283-286, 3 refs.

ICE MECHANICS, SEA ICE, STRAINS, LOADS (FORCES), STRESSES, TENSILE PROPERTIES,

MP 1790

EFFECTS OF MAGNETIC PARTICLES ON THE UNFROZEN WATER CONTENT OF FROZEN SOILS DETERMINED BY NUCLEAR MAGNET-IC RESONANCE.

Tice, A.R., et al, July 1984, 138(1), p.63-73, 14 refs. Oliphant, J.L.

39-455 UNFROZEN WATER CONTENT, FROZEN GROUND PHYSICS, NUCLEAR MAGNETIC RESONANCE, PARTICLES, MAGNETIC PROP-ERTIES, GROUND THAWING.

ERTIES, GROUND THAWING.

Small ferromagnetic particles in soils locally change the magnetic field of a nuclear magnetic resonance (NMR) analyzer. This causes a decrease in the NMR signal intensity when NMR is being used to measure unfrozen water contents in partially frozen soils or total water contents in thawed soils. We mixed Tuto clay, a soil containing no magnetic particles, with various small amounts of pure powdered magnetite, and determined the NMR signal intensity while the samples were both thawed and partially frozen. Then we derived an equation that correlates the thawed sample signal intensity with the weight percent of powdered magnetite added. The unfrozen water content of the partially frozen samples could be determined accurately for samples containing up to 0.2 to 0.3% magnetite. Several methods for demagnetizing soils containing large amounts of magnetic particles were tried, with the most effective found to be stirring a slutry of the soil over a powerful permanent magnet. Accurate unfrozen water contents could be determined for all the partially frozen samples is ower form of demagnetizing procedure was used on those samples containing the most magnetic naturels. procedure was used on those samples containing the most magnetic particles

MP 1791

ICE DETERIORATION.

Ashton, GD., GLERL contribution, No.428, Great Lakes Ice Research Workshop, Columbus, OH, Oct. 18-19, 1983. Proceedings. Edited by R.A. Assel 18-19, 1983. Proceedings. and J.G. Lyon, Ann Arbor, MI, Great Lakes Environmental Research Laboratory, Sep. 1984, p.31-38, 10

39-481 ICE DETERIORATION, ICE MELTING, HEAT TRANSFER, ICE COVER STRENGTH, HEAT FLUX, BOUNDARY LAYER, ICE DENSITY, THERMAL CONDUCTIVITY, ICE PHYSICS, AL-

MP 1792

WATER SUPPLY AND WASTE DISPOSAL ON PERMANENT SNOWFIELDS.

Reed, S.C., et al, June 1985, 12(2), p 344-350, With French summary. 10 refs. Bouzoun, J.R., Tobiasson, W.

WATER SUPPLY, WASTE DISPOSAL, SNOW COVER EFFECT, WASTE TREATMENT, WATER CHEMISTRY, EQUIPMENT, ICE MELT-

The snow and glacial ice on permanent snowfields must serve as both the water source and the receptacle for wastes for any human habitation. In addition, the snow also serves as the support media for any structural foundations and hence the thermal aspects of water supply and waste disposal can be critical. Most activity has occurred on the ice caps of Greenland and Antarctica and has ranged the ice caps of Greenland and Antarctica and has ranged from small transient field parties to large permanent facilities in continuous use for over 25 years. Novel procedures to insure the reliable production of good quality water are described as well as the recommended criteria for water quantity depending on the size and duration of the activity. The various methods of wastewater disposal that have been used at temporary camps and permanent stations are described along with the results from studies that defined the fate of the wastewater following its discharge to the snow. Such definition is important to insure protection of the water supply as well as the thermal integrity of any structural foundation. MP 1793 COLD FACTS OF ICE JAMS: CASE STUDIES OF MITIGATION METHODS.

Calkins, D.J., Natural Hazards Research and Applica-tions Information Center special publication, No.11, Association of State Floodplain Managers Conference, 8th, Portland, ME, June 11-14, 1984. Proceedings. Managing high risk flood areas, 1985 and beyond, [1984], p.39-47, 10 refs. 40-4457

TICE JAMS, FLOODS, ICE CONTROL, ICE BREAKUP, ICE BOOMS, IMPACT STRENGTH, WATER LEVEL, ICE CONDITIONS.

MP 1794 POLARIZATION OF SKYLIGHT. Bohren, C., Oct. 1984, 37(5), p.261-265.

LIGHT (VISIBLE RADIATION), POLARIZA-TION (WAVES), CLOUDS (METEOROLOGY), LIGHT SCATTERING, PHOTOGRAPHIC TECH-NIQUES, ELECTROMAGNETIC PROPERTIES, OPTICAL FILTERS.

CONTROLLING RIVER ICE TO ALLEVIATE ICE JAM FLOODING.

Deck, D.S., Conference ron Water for Resource Development, Coeur d'Alene, Idaho, Aug 14-17, 1984. Proceedings, 1984, p.524-528, 4 refs.

ICE JAMS, ICE CONTROL, RIVER ICE, FLOODING, ICE BOOMS, ICE BREAKUP, COUNTER-MEASURES.

This paper addresses the author's involvement at two areas where ice jam flooding has caused severe economic hardship and loss of life. An ice boom has been used to control the formation of niver ice at Oil City, Pennsylvania, and a permanent ice control structure will be constructed on Cazenovia Cree' in West Seneca, New York, to control the river ice during break-up.

SALMON RIVER ICE JAMS.

Cunningham, LL, et al, Conference ton; Water for Resource Development, Cocur d'Alene, Idaho, Aug. 14-17, 1984 Proceedings, 1984, p.529-533, 4 refs. Calkins, D J.

ICE JAMS, RIVER ICE, FLOODING, ICE CONDITIONS, FREEZEUP, ICE COVER THICKNESS, ICE CONTROL, MODELS, UNITED STATES—IDAHO—SALMON RIVER.

IDAHO—SALMON RIVER.

A study was undertaken to document the ice conditions leading to the ice jam flooding along the Salmon River in the vicinity of Salmon, Idaho.

This short paper documents the ice conditions on the river during the freeze-up period and the simple analytical model used to pieute the advance of the ice cover leading edge for cover thickness in excess of 9 ft (3 m) were measured at cross sections where shoving had occurred the initiation of the ice cover for this reach of the river begins in a long, deep pool formed by an alluvial fan from Dump Creek that developed in the late 1800's By improving the flow conveyance through the alluvial fan and increasing the flow velocity in the backwater behind it, the initiation of the freeze-up ice cover could be delayed, thereby delaying the arrival of the leading edge at Salmon, Idaho, and reducing the potential for ice jam flooding

MODELING INTAKE PEFORMANCE UNDER FRAZIL ICE CONDITIONS.

Dean, A.M., Jr., Conference ton Water for Resource Development, Coeur d'Alene, Idaho, Aug. 14-17, 1984. Proceedings, 1984, p.559-563, 5 refs.

WATER INTAKES, FRAZIL ICE, ICE CONDI-TIONS, WATER PIPES, ICING, MODELS, COUN-TERMEASURES.

A water intake was modeled in a refrigerated flume in an active frazil icing environment in order to evaluate alternative modifications to the prototype structure. Conduit dimensions tested were 2.7-in round, 4.6 in round, 6-in square, 8-in square, and 12-in square Entrance shapes tested were square, quarter-rounded, and elliptical Model flows varied from 50 gpm to 360 gpm, resulting in average model intake velocities of 0.8 fps to 2.8 fps. Corresponding Froude prototype velocities varied from 0.3 fps to 2.0 fps. The length scale varied from 1.65 to 1.16. Tests were run until a head was developed across the model intake which was equivalent to a 12 foot head on the prototype, or until the icing tendency of the structure was determined. The icing mechanism observed in the model included stoppering of the intake with ice masses, restriction of the intake with multiparticle masses, and gradual accumulation of frazilice particles on the intake. A water intake was modeled in a refrigerated flume in

MP 1798 ICE JAMS IN SHALLOW RIVERS WITH FLOODPLAIN FLOW: DISCUSSION.

Beltaos, S, June 1984, 11(2), p.370-371, 3 refs. Reply by Calkins p.372. For paper being discussed see 38-776, MP 1644.

38-4402 ICE JAMS, RIVER ICE, ICE COVER THICKNESS, RIVER FLOW, FLOODS

MP 1799 SNOWPACK ESTIMATION IN THE ST. JOHN RIVER BASIN.

Power, J.M., et al, International Symposium on Remote Sensing of Environment, 14th, San Jose, Costa Rica, Apr. 23-30, 1980. Proc (1980), p.467-486, 11 refs.
Merry, C J., Trivett, N.B A., Waterman, S.E. Proceedings,

39-601

SYOU COVER DISTRIBUTION, SNOW WATER EQUIVALENT, RIVER BASINS, KEMOTE SENSING, SNOWMELT, VEGETATION FACTORS, LANDSAT, ACCURACY, COMPUTER APPLICATIONS, MODELS, MAPPING.

TIONS, MODELS, MAPPING.

Two methods for computing basin areal average water equivalent of the snowpack based on point snow course measurements are discussed. One involves the use of a square grid databank of elevations and vegetation types which are regressed against snow water equivalent. The other method utilizes digital tapes of LANDSAT satellite imagery to delineate various vegetation categories throughout a basin. Snow-course values obtained within a given vegetation category are then distributed over the area within each basin which contains that category of vegetation. Where possible, the methods were checked by deriving snowpack values for six basins in the Upper Saint John River basin for the spring of 1978. These values were then used as input to the SSARR model, and the resulting runoff hydrographs were compared to those obtained using the conventional "isoline mapping" method of distributing the snowcourse values. Lastly, a range of errors were introduced into the conventional-stayl, derived snowpack values, and the resulting range in errors ly derived snowpack values, and the resulting range in errors of the runoff hydrographs were computed to determine the sensitivity of the SSARR model to errors in snowpack input.

COMMENTS ON "THEORY OF METAMOR-PHISM OF DRY SNOW" BY S.C. COLBECK. Sommerfeld, R.A., June 20, 1984, 81(7), p 4963-4965, Includes reply by S.C. Colbeck. 9 refs. For the original article see 37-3571.

Colbeck, S C. 39-763

METAMORPHISM (SNOW), SNOW CRYSTAL GROWTH, ICE CRYSTAL GROWTH, TEMPERA-TURE GRADIENTS, VAPOR DIFFUSION, TURE GRADIENTS, VAPO ANALYSIS (MATHEMATICS).

MP 1801 SNOW LOADS ON STRUCTURES.

O'Rourke, M J., Conference on Applied Techniques for Cold Environments, Anchorage, Alaska, May 17-19, 1978 Proceedings, Vol 1, New York, American Society of Civil Engineers, 1978, p.418-428, 15 refs 32-3629

SNOW LOADS, ROOFS, WIND VELOCITY.

APPLICATION OF THE ANDRADE EQUATION TO CREEP DATA FOR ICE AND FROZEN SOIL. Ting, J.M, et al, June 1979, 1(1), p.29-36, 10 refs. Martin, R.T.

33-4238 ICE STRENGTH, FROZEN GROUND MECHAN-ICS, STRAINS, CREEP.

VOLUMETRIC CONSTITUTIVE LAW FOR SNOW BASED ON A NECK GROWTH MODEL. Brown, R L, Jan. 1980, 51(1), p.161-165, 10 refs

SNOW MECHANICS, SNOW DEFORMATION, SNOW CRYSTAL STRUCTURE, MODELS

MP 1804 TUSSOCK REPLACEMENT AS A MEANS OF STABILIZING FIRE BREAKS IN TUNDRA VEGETATION.

Patterson, W A. III. et al. June 1981, 34(2), p 188-189, 7 refs Dennis, J.G

36-1325 TUNDRA, FIRES. COUNTERMEASURES. REVEGETATION. VEGETATION. MOKARST

CREEP BEHAVIOR OF FROZEN SILT UNDER CONSTANT UNIAXIAL STRESS.

Zhu, Y., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings, Washington, D.C., National Academy Press, 1983, p.1507-1512, 10 refs. Carbee, D.L.

38-1373

GROUND STRENGTH, FROZEN GROUND MECHANICS, SOIL CREEP, COMPRESSIVE PROPERTIES, STRESS STRAIN DIAGRAMS, RHEOLOGY, TIME FACTOR.

MP 1806

MOBILIZATION, MOVEMENT AND DEPOSI-TION OF ACTIVE SUBAERIAL SEDIMENT FLOWS, MATANUSKA GLACIER, ALASKA. Lawson, D.E., May 1982, 90(3), p.279-300, 50 refs.

39-765 SEDIMENT TRANSPORT, GLACIAL DEPOSITS, GLACIER ABLATION, GLACIER MELTING, GLACIAL GEOLOGY, GLACIER SURFACES, MELTWATER, UNITED STATES—ALASKA— MATANUSKA GLACIER.

Subarral sediment flow is the predominant process depositing diamictons at the terminus of Matanuska Glacier. Flows originate where sediments overlie glacier ice. Ablation of ice exposed in slopes disaggregates the overlying sediment and mixes it with meliwater and debris released simultaneously. of ice exposed in slopes disaggregates the overlying sediment and mixes it with meltiwater and debris released simultaneously. This material generally flows only after its strength is further reduced by excess pore pressures and seepage pressures generated by meltiwater from thawing ice. Moving sediment flows show reasonably systematic changes in physical attributes such as dimensions, texture, flow rates, density and erosional action, and in grain support and transport mechanisms that can be related to changes in the water content of their matrix material. At lowest water contents, flows support grains by their strength and move through shear in a thin zone at their base. Increased thicknesses of the zone in shear and deformation of other types accompany increased water contents, with grain interference and collisions, localized iquefaction and fluidization, transient turbulence, and bedload traction and saltation operating simultaneously in such moving flows. At highest water contents, flow appear fully liquefied. The fluidity of the sediment flow and the amount of water in the sediment flow channel determine the degree of preservation of the source flow's properties and the depositional morphology. Because mobilization of a sediment flow destroys the glacial sedimentary properties of its sediment source and, further, because the mechanics of transport and deposition develop new "non-glacial" properties in this sediment, the diamicton deposited in the glacial environment by sediment flow should not be called till

MP 1807 CREEP BEHAVIOR OF FROZEN SILT UNDER

CONSTANT UNIAXIAL STRESS.

Zhu, Y, et al, Mar 1984, 6(1), p.33-48, In Chinese with English summary 13 refs. For another source with English summary sec 38-1373 (MP 1805). Carbee, D.L.

39-932
SOIL CREEP, FROZEN GROUND MECHANICS, RHEOLOGY, STRESSES, FROZEN GROUND STRENGTH, COMPRESSIVE PROPERTIES, FROZEN GROUND TEMPERATURE, GRAIN SIZE, TESTS, TEMPERATURE EFFECTS.

A series of unconfined compression creep tests was conducted on saturated frozen Farrbanks silt at constant-stress and constant-temperature conditions The authors suggest that the creep of frozen soil be classifed into two types short-term and long-term creep Different constitutive and strength-loss equations are presented for each type of creep on the basis of Assur's creep model (1980) and this criterion, a creep equation was derived that can describe the entire process of creep of frozen soil.

MP 1808

MP 1808 MECHANICAL PROPERTIES OF SEA ICE: A STATUS REPORT. Weeks, W F, et al, 1984, 9(2), p.135-198, Refs. p.191-

198

Cox, G.F.N. 30.071

39-9/1
ICE STRENGTH, ICE MECHANICS, DRIFT, SEA
ICE, ICE CRYSTAL STRUCTURE, RHEOLOGY,
COMPRESSIVE PROPERTIES, ICE SALINITY,
PRESSURE RIDGES, ICE LOADS, ICE CONDITIONS, OFFSHORE STRUCTURES

MP IRNO ICE SEGREGATION AND PROST HEAVING. National Research Council. Ad Hoc Study Group on Ice Segregation and Frost Heaving, Washington, D.C., National Academy Press, 1984, 72p., Refs. p.37-72 39-1042

39-1042
FROST HEAVE, GROUND ICE, ICE LENSES, ICE FORMATION, COLD WEATHER CONSTRUCTION, SEASONAL FREEZE THAW, UNFROZEN WATER CONTENT, PHASE TRANSFORMATIONS, HEAT TRANSFER, MODELS.

MP 1810 TERTIARY CREEP MODEL FOR FROZEN

SANDS (DISCUSSION).
Fish, A.M., et al, Sep. 1984, 110(9), p.1373-1378, 7 refs. For paper being discussed see 37-3969.

39-1038

FROZEN GROUND MECHANICS, SOIL CREEP. SANDS, STRAINS, MATHEMATICAL MODELS.

MP 1811 MIZEX 83 MESOSCALE SEA ICE DYNAMICS:

Hibler, W.D., III, et al, Sep. 1984, SR 84-28, p.19-28, ADA-148 255, 3 refs.

eppäranta, M. 39-1126

ICE MECHANICS, SEA ICE, STRAINS, ICE CON-DITIONS, ICE DEFORMATION, ICE FLOES, ICE EDGE.

MP 1812

ON THE RHEOLOGY OF A BROKEN ICE FIELD DUE TO FLOE COLLISION.

Shen, H., et al, Sep. 1984, SR 84-28, p.29-34, ADA-148 255, 6 refs. Hibler, W.D., III, Leppäranta, M.

J3-112/ ICE MECHANICS, RHEOLOGY, ICE FLOES, IN-TERFACES, STRESSES, ICE CREEP, ICE EDGE, MATHEMATICAL MODELS, VELOCITY.

MP 1813

MP 1813
ICE JAM RESEARCH NEEDS.
Gerard, R., Workshop on Hydraulics of River Ice, 3rd, Fredericton, New Brunswick, Canada, June 20-21, 1984. Proceedings Compiled by K.S. Davar and B.C. Burrell, Fredericton, University of New Brunswick, {1984}, p.181-193, With French summary. Discussion p.192-193.

ICE JAMS, FREEZEUP, ICE BREAKUP, ICE FOR-MATION, RIVER ICE, FRAZIL ICE, MODELS, CANADA—NORTHWEST TERRITORIES—

MACKENZIE RIVER.

MACKENZIE RIVER.

Suggestions developed by the NRCC Working Group on fee Jams for high priority research needs for ice jams are given. The suggestions concern ice jam formation, development and failure at freeze-up and break-up. Related processes such as frazil formation, hanging dams and ice deterioration were excluded from consideration. It is concluded that, despite significant progress in the past two decades, the work of developing a real understanding of ice jam fundamentals has really only just begun.

COMPUTER SIMULATION OF ICE COVER FORMATION IN THE UPPER ST. LAWRENCE

Shen, H.T., et al, Workshop on Hydraulics of River Ice, 3rd, Fredericton, New Brunswick, Canada, June 20-21, 1984. Proceedings. Compiled by K.S. Davar 20-21, 1984. Proceedings. Compiled by K.S. Davar and B C. Burrell, Fredericton, University of New Brunswick, [1984], p.227-245, With French summary., Discussion p.245. 23 refs. Yapa, P.D. 39-1466

ICE FORMATION, ICE COVER THICKNESS, RIVER ICE, RIVER FLOW, HEAT TRANSFER, ICE JAMS, HYDRAULICS, COMPUTERIZED SIMULATION, ANALYSIS (MATHEMATICS), CANADA—SAINT LAWRENCE RIVER

CANADA—SAINT LAWRENCE RIVER
A computer model was developed for simulating the formation of use cover in the Upper St. Lawrence River. The model included submodels for the river flow condition, the distribution of water temperature or fearli ice production, and the formation of an ice cover. Distributions of water temperature or ice production are determined by a Lagrangian solution of the equation for the transport of thermal energy subject to surface heat exchange. The formation of an ice cover and ice accumulations is formulated according to existing equilibrium ice jam theories. The hydraulic condition in the river system is determined by an implicit numerical solution of unsteady continuity and momentum equations.

MP 1815 NUMERICAL SIMULATION OF FREEZE-UP ON THE OTTAUQUECHEE RIVER.

ON THE OTTAUQUECHEE RIVER.
Calkins, D.J., Workshop on Hydraulics of River Ice,
3rd, Fredericton, New Brunswick, Canada, June 2021, 1984. Proceedings. Compiled by K.S. Davar
and B.C. Burrell, Fredericton, University of New
Brunswick, [1984], p.247-277, With French summary, Discussion p.275-277. 18 refs.
39-1467

FREEZEUP. RIVER ICE. RIVER METEOROLOGICAL FACTORS, HYDRAULICS, ICE MECHANICS, MATHEMATICAL MODELS, WATER LEVEL, ICE EDGE, ICE COVER THICKNESS, ICE JAMS, HEAT TRANSFER, UNITED STATES-VERMONT-OTTAUQUECHEE RIV-

A numerical model of the flow and ice conditions during freeze-up for the Ottauquechee River has been developed and calibrated with reasonable success A limited sensitivity analysis of the key ice hydraulic modeling coefficients and independent variables was undertaken to examine their effect independent variables was undertaken to examine their effect on the rate of leading edge progression, ice thicknesses and water levels. The criteria for advancement of the leading edge were based on both the entrainment velocity of incoming frazil slush at the leading edge and whether or not the flow condition was sub-critical just upstream of the leading edge. The depositional mode of ice thickness of the leading edge. The depositional mode of ice thickness in the steep reaches and over 80% in 1 km of the pool. The simulation suggests that the initial ice cover thickness during progression can be predicted using the equilibrium ice jam theory with a suitable cohesion coefficient. The inflow ice discharge and ice generated within the reach modeled were important and have to be known with reasonable accuracy to get good simulations of the ice thicknesses, water levels and ice cover progression.

MP 1816 RISE PATTERN AND VELOCITY OF FRAZIL

Wuebben, J.L., Workshop on Hydraulics of River Ice, 3rd, Fredericton, New Brunswick, Canada, June 20-21, 1984. Proceedings Compiled by K S Davar and B C. Burell, Fredericton, University of New Brunswick, [1984], p.297-316, With French sum-mary, Discussion p.315-316 3 refs. mary., 39-1469

FRAZIL ICE, RIVER ICE, ICE MECHANICS. VELOCITY, TESTS, ARTIFICIAL ICE.

VELOCITY, TESTS, ARTIFICIAL ICE.

The objective of this study was to examine the rise pattern and velocity of frazil ice. In addition, discs made of other materials were employed both to facilitate this study and to aid in the development of artificial frazil for future transport studies. The rise velocity is a parameter important to the understanding of frazil entrainment, transport and deposition. Laboratory tests were conducted in a large clear plastic cylinder at controlled temperatures. The rise velocity of real frazil is compared with theory and given an indirect verification that the preferential crystal growth direction increases disc diameter while the thickness remains essentially constant. The effective drag coefficients and rise pattern stability are discussed in terms of a Reynolds-Stroubal number relationship. The results from real and artificial frazil experiments are compared, and criteria for frazil simulation are suggested.

MP 1817 RADAR MEASUREMENTS OF BOREHOLE GEOMETRY ON THE GREENLAND AND AN-TARCTIC ICE SHEETS.

JOZEK, K. C., Feb. 1985, 50(2), p. 242-251, 12 refs. 39-1749
GLACIER FLOW, RADAR ECHOES, BORE-HOLES, ICE SHEETS, ICE MECHANICS, GLACIER OSCILLATION, GREENLAND, ANTARC-TICA POWE C. TICA-DOME C.

TICA—DOME C.

A method for measuring the geometry of borcholes in glaciers has been developed and tested in Greenland and Antactica Coordinates of points along the borchole are determined by lowering a passive radar target into the borchole and then tracking the target from three surface stations. Comparison of geometry interpreted from radar data and from a conventional inclinometry experiment indicates that radar data can be used to estimate average borchole inclination and arimuth but cannot be used to measure details of the borchole geometry that are revealed by conventional inclinometry surveys. Random error introduced by variations in the physical properties of the glacier and electrical noise in the radar unit limit measurement accuracy, but the accuracy can be improved by establishing additional surface radar stations around the borchole. These experiments demonstrate the utility of the radar method and suggest the possibility of deploying permanently installed radar targets in ice sheets of deploying permanently installed radar targets in ice sheets to measure intraglacial movements. (Auth.)

WEST ANTARCTIC SEA ICE.

Ackley, S.F., Environment of West Antarctica: potental CO2-induced changes, report of a workshop, July 1983, Washington, D.C., 1984, p.88-95, PB85-110 757, 14 refs. 39-1502

SEA ICE, ICE COVER EFFECT, CLIMATIC CHANGES, CARBON DIOXIDE, HEAT TRANS-FER, ANTARCTICA—AMUNDSEN SEA, ANTARCTICA—ROSS SEA.

In constructing models for predicting antarctic sea ice effect on global climate, temperature and wind fields over and below the pack ice must be analyzed. These elements affect the maximum extent of the ice pack and the ice dynamics in the pack strongly modulates the CO2-induced temperature rises.

These factors are discussed in text and diagrams

MP 1819

TRANSPORT OF WATER IN FROZEN SOIL: 5. METHOD FOR MEASURING THE VAPOR DIF-FUSIVITY WHEN ICE IS ABSENT.
Nakano, Y., et al, Dec. 1984, Vol.7, p.172-179, 12 refs.

Tice, A.R., Jenkins, T.F.

39-1719

FROZEN GROUND, SOIL WATER MIGRATION. WATER TRANSPORT, VAPOR DIFFUSION, EXPERIMENTATION.

A new experimental method is introduced for determining the relative magnitudes of liquid and vapor diffusion by using a small amount of soluble chemical as a tracer. The theoretical justification of the method is presented for the case where ice is absent. The feasibility of the method is demonstrated by an experiment using marine-deposited

MP 1820 LONG-TERM EFFECTS OF OFF-ROAD VEHI-

CLE TRAFFIC ON TUNDRA TERRAIN.
Abele, G., et al, 1984, 21(3), p.283-294, 10 refs.
Brown, J., Brewer, M.C

AIR CUSHION VEHICLES, TRACKED VEHI-CLES, TUNDRA, DAMAGE, ACTIVE LAYER, VEGETATION, PERMAFROST, ENVIRONMEN-TAL IMPACT, THAW DEPTH, TESTS.

TAL IMPACT, THAW DEPTH, TESTS.

Traffic tests were conducted at two sites in northern Alaska with an air cushion vehicle, two light tracked vehicles, and three types of wheeled Rolligon vehicles

The traffic impact tsurface depression, effect on thaw depth, damage to vegetation, traffic signature visibility) was monitored for periods of up to 10 years

Data show the immidiate and long-term effects from the various types of vehicles for up to 50 traffic passes and the rates of recovery of the active layer. The air cushion vehicle produced the least impact. Multiple passes with the Rolligons caused longer-lasting damage than the light tracked vehicles because of their higher ground contact pressure and wider area of disturbance. Recovery occurs even if the initial depression of the tundra surface by a track or a wheel is quite deep (15 cm), as long as the organic mat is not sheared or destroyed.

MP 1821 DISCUSSION: ELECTROMAGNETIC PROP-ERTIES OF SEA ICE BY R.M. MOREY, A. KOVACS AND G.F.N. COX. Arcone, S A., Nov. 1984, 10(1), p.93-94, For paper being discussed see 39-332 (MP 1776). 1 ref.

39-1626

ICE ELECTRICAL PROPERTIES, ELECTRO-MAGNETIC PROPERTIES, SEA ICE, ICE RELAXATION.

AUTHORS' RESPONSE TO DISCUSSION ON: ELECTROMAGNETIC PROPERTIES OF SEA

Morey, R.M., et al. Nov. 1984, 10(1), p.95-97, For original paper see 39-332 (MP 1776), for discussion by S.A. Arcone, see 39-1626 (MP 1821). 1 ref. Kovacs, A., Cox, G.F N.

39-1627

ICE ELECTRICAL PROPERTIES, ELECTRO-MAGNETIC PROPERTIES, SEA ICE, ICE RELAXATION, ELECTRICAL RESISTIVITY

MP 1823 PROBABILITY MODELS FOR ANNUAL EXTREME WATER-EQUIVALENT GROUND SNOW.

Ellingwood, B, et al, June 1984, 112(6), p.1153-1159,

12 refs Redfield, R.K

SNOW WATER FQUIVALENT, SNOW LOADS, ROOFS, STATISTICAL ANALYSIS, DESIGN

A statistical analysis of annual extreme water equivalents of ground snow (reported as inches of water) measured up through the winter of 1979-80 at 76 weather stations in the northeast quadrant of the United States is presented

The analysis suggests that probability distributions with longer upper tails than the Type I distribution of extreme values are preferable for describing the annual extremes at a majority of sites

Sampling errors and the selection of water-equivalents for planning and design purposes also are described.

ICE FLOW LEADING TO THE DEEP CORE

HOLE AT DYE 3, GREENLAND.
Whillans, I.M., et al, 1984, Vol.5, p.185-190, 12 refs.
Jezek, K.C., Drew, A.R., Gundestrup, N.

ICE MECHANICS, RHEOLOGY, BOREHOLES, ICE BOTTOM SURFACE, RADIO ECHO SOUNDINGS, ICE COVER THICKNESS, VELOCITY, GREENLAND.

LABORATORY INVESTIGATION OF THE KI-NETIC FRICTION COEFFICIENT OF ICE.

Forland, K.A., et al, IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug 27-31, 1984. Proceedings, Vol.1, [1984], p.19-28, 11 refs Tatinclaux, J.C.

39-1752

39-1752
ICE FRICTION, ICE LOADS, ICE MECHANICS, ICE HARDNESS, ICE SOLID INTERFACE, SURFACE ROUGHNESS, EXPERIMENTATION, TEMPERATURE EFFECTS, SHEAR STRESS.

TEMPERATURE EFFECTS, SHEAR STRESS.
In the growing field of ice engineering there is a need to establish standardized model tests of structures for use in environments. This study was designed to investigate the relative influence of vanous parameters on the kinetic friction coefficient between ice and different surfaces and determine which of those variables would need future, indepth investigation. Friction tests were performed with urea-doped, columnar ice, and the parameters of normal pressure, velocity, type of material, material roughness, ice hardness and test configuration were studied. Tests were conducted by pulling a loaded sample of ice over a sheet of material and by pulling a loaded sample of material over an ice sheet. An ambient temperature of -1.5C was maintained throughout the testing process, and the ice surface hardness was measured using a specially designed apparatus. The experimental results of the friction tests revealed that the behavior of the friction coefficient with varying velocity was significantly influenced by the test configuration and material roughness. Its magnitude was also affected by varying normal pressure, ice hardness, surface roughness and type of material

MP 1826 FLEXURAL STRENGTHS OF FRESHWATER MODEL ICE

Gow, A.J., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.1, (1984), p.73-82, 4 refs.

ICE STRENGTH, FLEXURAL STRENGTH, LAKE ICE, ICE CRYSTAL STRUCTURE, ICE TEMPERATURE, GRAIN SIZE, TESTS.

TEMPERATURE, GRAIN SIZE, TESTS.
In this paper we present results of small beam tests performed on simulated lake ice corresponding in structure to the two major ice types, S1 and S2, encountered in lake ice covers. In these tests a combination of cantilever and simply supported beams was used to ascertain the dependence of flexural strength of the ice on its structure and temperature. It was found that macrocrystalline (S1) ice and columnar (S2) ice exhibit significant differences in bending strength and that substantial stress concentrations exist at the fixed corners of cantilever beams. Differences in response of S1 and S2 ice to bending forces clearly reflect variations in grain size, crystal orientation, temperature, and temperature gradient in the simulated ice, and these factors must be carefully considered when interpreting results of tests of the flexural strength of natural ice covers

MP 1827 ICEBREAKING BY GAS BLASTING. Mellor, M., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceed-ings, Vol.1, [1984], p 93-102, 6 refs

ICE BLASTING, ICE BREAKING, HIGH PRES-SURE TESTS, ICE COVER THICKNESS, GASES, TESTS, ICE LOADS, HYDRAULIC STRUC-TURES, EQUIPMENT.

TURES, EQUIPMENT.

Icebreaking texts utilizing high pressure air and CO(2), low pressure air, and fuel/oxidant combustion are reviewed and the results are interpreted. Applying cube root energy scaling to text discharges of approximately 1 MJ, it appears that fracture craters up to about 5.8 m/MJ(1/3) in diameter can be formed by optimum underwater blasts. Practical systems for clearing or displacing ice could be based on air guns developed for offshore seismic work, with gun pressure in the range 17-20 MPa and single-gun energy up to about 11 MJ. A procedure for making preliminary design calculations and safety appraisals is outlined, and it is concluded that a working "Super-Bubbler" need not be very complex or expensive.

QUIET FREEZING OF LAKES AND THE CON-CEPT OF ORIENTATION TEXTURES IN LAKE

Gow, A.J., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.1, [1984], p.137-149, 6 refs. 39.1763

LAKE ICE, ICE CRYSTAL STRUCTURE, ICE NU-CLEI, FREEZING, TURBULENCE, TESTS.

CLEI, FREEZING, TURBULENCE, TESTS.
Several years' observations of the crystalline structure of ice sheets forming on a number of New England lakes indicate that just two major types of congelation ice are formed during quiet (non-turbulent) freezing of lake water These are. (1) ice sheets characterized by the growth of massive prismatic crystals exhibiting vertical or near-vertical c-axes probably equivalent to so-called S1 ice and (2) ice sheets composed predominantly of vertically elongated crystals exhibiting horizontally oriented c-axes, so-called columnar ice or S2 ice in this context of quiet freezing of lakes it was also determined that columnar textures are always associated with horizontal c-axis orientations of the crystals, whereas the development of c-axis vertical orientation is invariably linked with the growth of massive crystals. These observations have fostered the concept of orientation textures.

DYNAMICS OF FRAZIL ICE FORMATION. Daly, S.F., et al, IAHR International Symposium on Ice, 7th, Hamburg, F.R.G, Aug. 27-31, 1984. Proceedings, Vol.1, 1984, p.161-172, 10 refs. Stolzenbach, K.D.

FRAZIL ICE, ICE CRYSTAL GROWTH, HEAT TRANSFER, MATHEMATICAL MODELS, MASS TRANSFER, SURFACE PROPERTIES, ICE CRYS-TAL NUCLEL

This paper applies quantitative approaches of large-scale industrial crystallization to the study of frazil ice. The development of a crystal number continuity equation and a heat conservation equation can serve as a basis for predicting size distribution and concentration of frazil crystals. The size distribution and concentration of razil crystals in the key parameters in these equations are the crystal growth rate and the rate of secondary nucleation. The crystal growth rate is determined by the heat transfer rate from the crystals to the fluid, the intrinsic kinetics of the crystals. the crystals to the fluid, the intinuic kinetics of the crystals, surface tension, and the mass transfer rates. Available data indicate that the growth of the major axis of frazil crystals is controlled largely by heat transfer. The heat transfer expression for disks suspended in turbulent flow is presented. The rate of secondary nucleation can be expressed as the product of three functions, which relate the energy transferred to crystals by collision and the number of surviving crystals produced by the collision. The secondary nucleation rate is found to be a function of the turbulent energy dissipation and a strongly nonlinear function of the form and magnitude of the crystal size distribution. The number continuity and heat conservation equations are troublesome to solve simultaneously because they are nonlinear and dimensionally incompatible. However, the equations can be used in the development of models of frazil ice formation.

FIELD INVESTIGATION OF ST. LAWRENCE RIVER HANGING ICE DAMS.

Shen, H.T., et al, IAHR International Symposium on Ice, 7th, Hamburg, F.R. G., Aug. 27-31, 1984. Proceedings, Vol.1, [1984], p 241-249, 12 refs. Van DeValk, W.A.

39-1772

ICE DAMS, RIVER ICE, ICE SURVEYS, RIVER FLOW, CHANNELS (WATERWAYS), BOTTOM TOPOGRAPHY, CANADA—SAINT LAWRENCE

A field survey of a hanging ice dam in the St Lawrence River is reported Cross section profiles of the dam, the channel geometry, and velocity profiles underneath the dam were measured Formation processes of hanging dams are discussed and supported by field observations.

MP 1831

METHODS OF ICE CONTROL FOR WINTER NAVIGATION IN INLAND WATERS.

Frankenstein, G.E., et al, IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984

Proceedings, Vol.1, [1984], p.329-337, 11 refs.

Wortley, CA. 39-1780

ICE NAVIGATION, ICE CONTROL, RIVER ICE. PORTS, WINTER MAINTENANCE, ICE BREAK-ING, THERMAL EFFECTS, ICE REMOVAL, ICE

Successful methods of controlling ice in rivers and harb where winter navigation is maintained are described. These methods are developed from field and laboratory research studies and from operating experiences. The control of ice is achieved through layout and design of harbor facilities, management of traffic operations, and by using chemical, electrical, mechanical, and thermal methods including ice breaking, channel and flow modifications, air bubbling, warm

water discharges, resistance heating, coatings, and control structures. The control methods used must be evaluated in terms of reliability, safety, energy consumption, and environmental impact for costs and effectiveness for both docks and harbors. Thermal methods and mechanical methods most favored by these criteria.

MP 1832

ICE SHEET RETENTION STRUCTURES.

Perham, R.E., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.1, [1984], p.339-348, 20 refs.

1985, Vol.1, (1984), p.339-340, 20 fets.
39-1781
ICE CONTROL, STRUCTURES, ICE SHEETS, ICE
BOOMS, ICE FORMATION, ICE COVER, COUNTERMEASURES, WATER FLOW.
Ice sheets are formed and retained in several ways in nature, and an understanding of these factors is needed before most ice sheet retention structures can be successfully applied. Many retention structures float and are somewhat flexible, others are fixed and rigid or semiring An example of the former is the Lake Erie boom and of the latter, the Montreal ice control structure lee sheet retention technology is changing. The use of timber cribs is gradually but not totally giving way to sheet steel pilings and concrete, but with caution. Ice-hydraulic analyses are helpful in predicting the effects of structures and channel modifications on ice cover formation and retention. Often, varying the flow rate in a particular system at the proper time will make the difference between whether a structure will or will not retain ice. The structure, however, invariably adds reliability to the sheet ice retention process.

MP 1833 ANALYSIS OF RAPIDLY VARYING FLOW IN

ICE-COVERED RIVERS.
Ferrick, M.G., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.1, [1984], p.359-368, 6 refs.

RIVER FLOW, RIVER ICE, ICE COVER EFFECT, ICE BREAKUP, WATER WAVES, FRICTION, EXPERIMENTATION, ICE JAMS, ICEBOUND RIV-

ERS.
Rapidly varying flow waves are a primary cause of ice cover breakup on rivers.

Due to the presence of ice and the difficulties involved in determining conditions in the field, analyses of river waves during breakup are subject to much uncertainty. We conducted laboratory experiments to determine the effects of the ice cover upon these waves, and to identify the physical processes that produce these effects. The dimensionless friction scaling parameter of the St. Venant equations provides a quantitative estimate of the friction/inerita balance that dictates river wave behavior Knowledge of this balance is essential to interpretation and analysis of flow wave data. In this paper we apply the friction parameter in our interpretation of the laboratory data and address discrepancies between data and previous analyses of an ice jam release on the Athabasca River.

MP 1834

MP 1834 CRUSHING ICE FORCES ON CYLINDRICAL STRUCTURES.

Morris, C.E., et al, IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.2, [1984], p.1-9, 19 refs Sodhi, D.S. 39-1787

ICE PRESSURE, STRUCTURES, ICE SOLID IN-TERFACE, COMPRESSIVE PROPERTIES, ICE COVER THICKNESS, PILES, ICE LOADS, ICE STRENGTH, VELOCITY, EXPERIMENTATION. INCOMENSIA, VELOCITY, EXPERIMENTATION. Ine parameters varied during the experimental program were structure diameter and velocity. Maximum ice forces were normalized by the product of structure diameter, ice thickness and uncohined compressive strength of the ice. The results show that ice forces depend significantly on aspect ratio and velocity-to-thickness ratio, and that variations in velocity-to-thickness does not influence the maximum normalized forces.

MP 1835

CRYSTALLINE STRUCTURE OF UREA ICE SHEETS USED IN MODELING IN THE CRREL TEST BASIN.

7th, Hamburg, F R G, Aug 27-31, 1984 Proceedings, Vol 2, [1984], p 241-253, 13 refs. 39-1807

ICE CRYSTAL STRUCTURE, UREA, ARTIFI-CIAL ICE, MICROSTRUCTURE, ICE MODELS, SEA ICE, ICE STRENGTH, ICE SHEETS, TESTS. SEA ICE, ICE STRENGTH, ICE SHEETS, TESTS. Standard petrographic techniques were used for studying microstructure in thin sections of urea ice sheets now being used extensively in the CRREL. Test Basin for modeling sea ice. Depending mainly on the section in the column of urea-doped water two kinds of ice with radically different structural and mechanical properties have been identified in the one exhibiting vertical c-axis structure minimal urea is incorporated into the ice crystals, and ice sheets with this kind of structure tend to remain strong even after the temperature of the ice is raised close to its melting point. Ice of the second type is characterized by a preponderance of crystals exhibiting horizontal c-axes. This kind of ice, which is only produced when the test basin is seeded prior to freezing, also contains abundant inclusions of urea prior to freezing, also contains abundant inclusions of urea systematically incorporated into the crystals; the overall colum-nar structure of this ice closely resembles that of ordinary sea ice and optimum test conditions for modeling purposes are usually obtained with warm isothermal ice sheets of

EVALUATION OF A BIAXIAL ICE STRESS SENSOR.

Cox, G.F.N., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.2. (1984), p.349-361.

ICE LOADS, STRESSES, MEASURING INSTRU-

ICE LOADS, STRESSES, MEASURING INSTRU-MENTS, TESTS
Controlled laboratory tests were performed to evaluate the response of a cylindrical, biaxial ice stress sensor. The tests demonstrate that the sensor has a low temperature sensitivity and is not significantly affected by differential termal expansion between the ice and gauge. Loading tests on fresh water and saline ice blocks containing the embedded sensor show that the sensor has a resolution of 20 kPa and an accuracy of better than 15% under a variety of uniaxial and biaxial loading conditions

MP 1837 STRUCTURE OF FIRST-YEAR PRESSURE RIDGE SAILS IN THE PRUDHOE BAY RE-GION.

Tucker, W.B., et al. Alaskan Beaufort Sea ecosystems and environments Edited by P.W. Barnes, D.M. Schell and E. Reimnitz, Orlando, FL, Academic Press, 1984, p.115-135, 25 refs. Sodhi, D.S., Govoni, J.W.

39-1873

PRESSURE RIDGES, ICE STRUCTURE, SEA ICE, ICE COVER THICKNESS, ICE SHEETS, MODELS, ICE PILEUP, UNITED STATES—ALASKA— PRUDHOE BAY.

MP 1838 SOME PROBABILISTIC ASPECTS OF ICE GOUGING ON THE ALASKAN SHELF OF THE BEAUFORT SEA.

Weeks, W.F., et al, Alaskan Beaufort Sea. ecosystems and environments. Edited by P.W. Barnes, D.M Schell and E. Reimnitz, Orlando, FL, Academic Press, 1984, p 213-236, 23 refs.

Barnes, P.W., Rearic, D.M., Reimnitz, E. 39-1877

39-1877
ICE SCORING, PRESSURE RIDGES, BOTTOM
TOPOGRAPHY, OCEAN BOTTOM, STATISTICAL ANALYSIS, OFFSHORE STRUCTURES, DESIGN, BOTTOM SEDIMENT, PIPELINES, BEAU-FORT SEA

MP 1839 DETERMINING DISTRIBUTION PATTERNS OF ICE-BONDED PERMAFROST IN THE U.S. BEAUFORT SEA FROM SEISMIC DATA.

Neave, K.G., et al, Alaskan Beaufort Sea. ecosystems and environments. Edited by P.W. Barnes, D.M. Schell and E. Reimnitz, Orlando, FL, Academic Press, 1984, p.237-258, 24 refs.

Sellmann, P.V.

39-1878
SUBSEA PERMAFROST, SEISMIC VELOCITY, PERMAFROST DISTRIBUTION, EXPLORATION, CRUDE OIL, SEISMIC REFRACTION, VELOCITY, TEMPERATURE DISTRIBUTION, DETECTION, BEAUFORT SEA.

MP 1840 USE OF SIMILARITY SOLUTIONS FOR THE PROBLEM OF A WETTING FRONT—A QUESTION OF UNIQUE REPRESENTATION. Nakano, Y., Sep. 1982, Vol.5, p.156-166, 30 refs.

SEEPAGE, WATER, POROUS MATERIALS, SOIL PHYSICS, SOIL WATER MIGRATION, FLOW RATE, ANALYSIS (MATHEMATICS).

The use of similarity solutions for the problem of horizontal infiltration of water into a semi-infinite, dry and homogeneous porous medium is studied based upon some recent results of functional analysis. It is found that the so-called non-unique representation of reported experimental moisture profiles for this problem is not necessarily evidence against the validity of the extended Darcy's law for unsaturated flow through porous media

TRANSPORT OF WATER IN FROZEN SOIL: 3. EXPERIMENTS ON THE EFFECTS OF ICE CONTENT.

Nakano, Y., et al, Mar. 1984, Vol. 7, p. 28-34, 5 refs. Tice, A.R., Oliphant, J.L.

WATER TRANSPORT, FROZEN GROUND, GROUND ICE, SOIL WATER MIGRATION, WATER VAPOR, WATER CONTENT, EXPERIMENTATION.

PERIMENTATION.

Effects of use content on the transport of water in frozen soil are studied experimentally and theoretically under isothermal conditions. A physical law, that the flux of water in unsaturated frozen soil is proportional to the gradient of total water content, is proposed. Theoretical justification is made by the use of the two-phase flow theory. The experimental results are shown to support the proposed physical law. The results of this study are presented in two parts. The experimental aspects of the study are presented in this paper and the second paper contains the theoretical aspects of the study. of the study.

MP 1842

ROLE OF HEAT AND WATER TRANSPORT IN FROST HEAVING OF FINE-GRAINED POR-OUS MEDIA UNDER NEGLIGIBLE OVERBUR-DEN PRESSURE.

Nakano, Y., et al, June 1984, Vol.7, p.93-102, 18 refs. Horiguchi, K. 39-1936

FROST HEAVE, HEAT TRANSFER, WATER TRANSPORT, SOIL WATER MIGRATION, POR-OUS MATERIALS, WATER INTAKES, GRAIN SIZE. FINES.

An equation accurately describing the rate of frost heave is derived by using the mixture theory of continuum mechanics it is shown that the rate of frost heave is determined mainly by the rate of heat removal and the rate of water intake It is shown that the late of the control of the con

TRANSPORT OF WATER IN FROZEN SOIL: 4. ANALYSIS OF EXPERIMENTAL RESULTS ON THE EFFECTS OF ICE CONTENT.
Nakano, Y., et al, June 1984, Vol.7, p.58-66, 19 refs.

Tice, A.R, Oliphant, J.L. 10-1046

WATER TRANSPORT, FROZEN GROUND, GROUND ICE, SOIL WATER MIGRATION, DIFFUSION, ANALYSIS (MATHEMATICS)

Effects of ice content on the transport of water in frozen soil are studied experimentally and theoretically under isothermal conditions. A physical law, that the flux of water in unsaturated frozen soil is proportional to the gradient of total water content is proposed. Theoretical justification is made by the use of the two-phase flow theory. The experimental results are shown to support the proposed physical law. The results of this study are presented in two parts and this is the second paper describing the theoretical aspects of the study. the study.

RHEOLOGY OF GLACIER ICE.

Jezek, K.C., et al, Mar. 15, 1985, 227(4692), p.13351337, 13 refs.

Alley, R.B., Thomas, R.H.

GLACIER ICE, RHEOLOGY, ICE SHELVES, STRAINS, ICE MECHANICS, ANTARCTICA—ROSS ICE SHELF.

NOSS ICE SHELF.

A new method for calculating the stress field in bounded ice shelves is used to compare strain rate and deviatoric stress on the Ross Ice Shelf. Antarctica.

The analysis shows that strain rate (per second) increases as the third power of deviatoric stress (in newtons per square meter), with a constant of proportionality equal to 2.3 x 10 to the -25th power (Auth)

MP 1845 SITE-SPECIFIC SYNOPTIC AND

METEOROLOGY. Bates, R.E., June 1983, SR 83-16, SNOW-ONE-B data report, p.13-80, ADB-088 224. 10.1052

SYNOPTIC METEOROLOGY. METEOROLOGICAL DATA, SNOW COVER, SNOW CRYSTAL STRUCTURE, WIND VELOCITY, AIR MASSES, STATISTICAL ANALYSIS.

ATMOSPHERIC TURBULENCE MEASURE-MENTS AT SNOW-ONE-B.
Andreas, E.L., June 1983, SR 83-16, SNOW-ONE-B

data report, p 81-87, ADB-088 224. 39.1953

ATMOSPHERIC CIRCULATION, SNOWFALL, SPECTRA, REFRACTION, TURBULENCE, ELECTROMAGNETIC PROPERTIES, MEASUR-ING INSTRUMENTS.

MP 1847 SNOW CHARACTERIZATION AT SNOW-ONE-

Berger, R.H., et al, June 1983, SR 83-16, SNOW-ONE-B data report, p.155-195, ADB-088 224, 2 refs. Fisk, D., Koh, G., Lacombe, J.

39-1953 ICE CRYSTAL STRUCTURE, SNOW CRYSTAL STRUCTURE, SNOW CRYSTAL GROWTH, SNOW COVER DISTRIBUTION, PARTICLE SIZE DISTRIBUTION, SNOWFALL, TEMPERATURE EFFECTS, HUMIDITY, STATISTICAL ANAL-

MP 1848

SUMMARY OF THE STRENGTH AND MODU-Cox, G.F.N, et al, Mar. 1985, 107(1), p.93-98, 14 refs. For another source see 38-2035. Richter, J.A., Weeks, W.F., Mellor, M. 39-2082 US OF ICE SAMPLES FROM MULTI-YEAR

PRESSURE RIDGES, ICE STRENGTH, COM-PRESSIVE PROPERTIES, STRAINS, TEMPERA-TURE EFFECTS, POROSITY, TESTS.

Over two hundred unconfined compression tests were performed on vertical ice samples obtained from 10 multi-year pressure ridges in the Beaufort Sea. The tests were performed on a closed-loop electrohydraulic testing machine at two strain rates 1/100,000 and 1/1,000/s and two tempera-tures (-20 and -5C). This paper summarizes the sample preparation and testing techniques used in the investigation and presents data on the compressive strength and initial tangent modulus of the ice.

MP 1849
PRELIMINARY EXAMINATION OF THE EFFECT OF STRUCTURE ON THE COMPRESSIVE STRENGTH OF ICE SAMPLES FROM
MULTI-YEAR PRESSURE RIDGES.
Richter, J. A., et al., Mar. 1985, 107(1), p.99-102, 9 refs.
For another source see 38-2037 (MP 1685).

Cox, G.F.N. 39-2083

PRESSURE RIDGES, ICE CRYSTAL STRUCTURE, ICE STRENGTH, COMPRESSIVE PROPERTIES, STRAINS, SEA ICE, TEMPERATURE EFFECTS, POROSITY, TESTS

EFFECTS, POROSITY, TESTS.

A series of 222 uniaxial constant-strain-rate compression tests was performed on vertical multi-year pressure ridge sea ice samples. A preliminary analysis of the effect of structure on the compressive strength of the ice was performed on 78 of these tests. Test parameters included a temperature of -5C (23F) and strain rates of 1/100,000 and 1/1,000/s. Columnar ice loaded parallel to the elongated crystal axes and perpendicular to the crystal c-axis was consistently the strongest type of ice. The strength of the columnar samples decreased significantly as the orientation of the elongated crystals approached the plane of maximum shear. Samples containing granular rice or a mixture of granular and columnar ice resulted in intermediate and low strength values. No clear relationship could be established between structure and strength for these ice types. strength values No clear relationship could be established between structure and strength for these ice types However in general, their strength decreased with an increase in porosity However.

MP 1850 DESIGN AND PERFORMANCE OF WATER-RE-TAINING EMBANKMENTS IN PERMAFROST. Sayles, F.H., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983 Final proceedings, Washington, D.C., National Academy Press, 1984, p.31-42, Refs. p.40-42 39-2124

39-2124
PERMAFROST BENEATH STRUCTURES,
WATER RETENTION, DAMS, GROUND THAWING, FREEZE THAW CYCLES, EMBANKMENTS, MAINTENANCE, DESIGN, PERMAFROST THERMAL PROPERTIES, ARTIFICIAL
FREEZING, SOIL FREEZING, COLD WEATHER CONSTRUCTION.

CONSTRUCTION.

To date, the water-retaining structures constructed and maintained on permafrost in North America have been designed and built using a combination of soil mechanics principles for unfforce soils and unproven permafrost theory. In the USSR, at least five sizeable hydroelectric and water supply embankment dams as well as several small water supply embankment dams have been constructed and maintained on permafrost. The larger dams are understood to have performed well, but the smaller dams have been a mix of successes and failures. Specific criteria are still.

lacking for design, operation, and post-construction monitoring of water-retaining embankments founded on permafrost. The purpose of this presentation is to review the current practice, point out how it is deficient, and note what major problems need attention.

MP 1851

STATUS OF NUMERICAL MODELS FOR HEAT AND MASS TRANSFER IN FROST-SUSCEPTI-BLE SOILS.

BEE SOILS.
Berg, R.L., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Final proceedings, Washington, D.C., National Academy Press, 1984, p.67-71, Refs. p.69-71.

PERMAFROST **THERMAL** PROPERTIES. PERMAFROST THERMAL FROFERILL, FROST RESISTANCE, HEAT TRANSFER, MASS TRANSFER. THERMAL CONDUCTIVITY, TRANSFER, THERMAL CONDUCTIVIT FROST HEAVE, MATHEMATICAL MODEL HYDRAULICS, LATENT HEAT, MOISTUR TRANSFER, BOUNDARY LAYER. MOISTURE

MP 1852

SUBSEA PERMAFROST DISTRIBUTION ON THE ALASKAN SHELF.

Sellmann, P.V., et al, International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Final proceedings, Washington, D.C., National Academy Press, 1984, p.75-82, 30 refs.

Hopkins, D.M. 39-2131

SUBSEA PERMAFROST, PERMAFROST DISTRI-BUTION, PERMAFROST THERMAL PROPER-TIES, PERMAFROST DEPTH, OCEAN BOITOM, WATER TEMPERATURE, SHORES, SEISMIC SURVEYS, BOTTOM SEDIMENT, CHUKCHI SEA, BEAUFORT SEA.

MF 1833 LABORATORY TESTS AND ANALYSIS OF THERMOSYPHONS WITH INCLINED THERMOSYPHONS WI EVAPORATOR SECTIONS.

EVAPORATOR SECTIONS.

Zarling, J.P., et al, International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985. Proceedings, Vol.2, New York, American Society of Mechanical Engineers, 1985, p.31-37, 16 refs. Haynes, F.D.

39-2392

39-2392 SUBGRADE SOILS, COOLING, EVAPORATION, HEAT TRANSFER, THERMAL CONDUCTIVI-TY, WIND TUNNELS, WIND VELOCITY, AIR TEMPERATURE, FOUNDATIONS, GRAVEL, ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS). Subgrade cooling methods in cold regions include the use of thermosyphons with inclined evaporator sections. This laboratory study was conducted to determine the thermal performance characteristics of a thermosyphon. Evaporator inclination angles ranged from 0 to 12 deg from the horizontal. A standard full size thermosyphon, charged with carbon dioxide, was tested in CRREL's atmospheric wind tunnel. Empirical expressions are presented for heat removal rates as a function of wind speed and ambient air temperature for each of the inclined evaporator angles. An approximate canalytical method is also presented for foundation thermal design using thermosyphons under buildings with a slabon-grade foundation. Heat gains from the slab to the thermosyphon as well as the evapor, for temperature are presented as functions of time.

MP 1854

FREEZING OF SOIL WITH PHASE CHANGE OCCURRING OVER A FINITE TEMPERATURE ZONE.

Lunardini, V.J., International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas. Feb. 17-21, 1985 Proceedings, Vol.2, New York, American Society of Mechanical Engineers, 1985, p.38-46, 10 refs. 39-2393

39-293 SOIL FREEZING, PHASE TRANSFORMA-TIONS, TEMPERATURE DISTRIBUTION, ANALYSIS (MATHEMATICS), FREEZE THAW CYCLES, UNFROZEN WATER CONTENT. THERMAL CONDUCTIVITY. PHASE TRANSFORMA-ATURE DISTRIBUTION.

THERMAL CONDUCTIVITY.

While many materials undergo phase change at a fixed temperature, soil systems exhibit a definite zone of phase change. The variation of unfrozen water with temperature causes the soil to freeze or thaw over a finite temperature range. Exact and approximate solutions are given for conduction phase change of plane layers of soil with water contents that vary linearly, quadratically, and exponentially with temperature. The temperature and phase change depths are found to vary significantly from those of the constant temperature or Neumann problem.

MP 1855

DETERMINING THE CHARACTERISTIC LENGTH OF FLOATING ICE SHEETS BY MOV-CHARACTERISTIC ING LOADS.

Sodhi, D.S., et al, International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985. Proceedings, Vol.2, New York, American Society of Mechanical Engineers, 1985, p.155-159, 6 refs.

Martinson, C.R., Tucker, W.B.

FLOATING ICE, ICE SHEETS, ICE COVER THICKNESS, DYNAMIC LOADS, ICE DEFOR-MATION, VELOCITY, TESTS.

MATION, VELOCITY, TESTS.

To determine the characteristic length of a floating ice sheet, the deflection of the ice sheet must be measured in response to a known load Deflection measurements with a deflectometer require reference to a fixed datum. A simple deflection measuring technique is described here that is based on integration of the response of a sensitive slope transducer to a moving load at constant speed. This procedure does not require reference to a fixed datum, instead the gravitational field acts as the datum. The characteristic lengths obtained from the slope-integration method compare very favorably with those obtained from direct measurement of deflections.

MP 1856 TENSILE STRENGTH OF MULTI-YEAR PRES-

SURE RIDGE SEA ICE SAMPLES. Cox, G.F.N., et al, International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985. Proceedings, Vol.2, New York, American Society of Mechanical Engineers, 1985, p.186-193, 20 refs. Richter-Menge, J.A.

39-2412

PRESSURE RIDGES, ICE STRENGTH, TENSILE PROPERTIES, SEA ICE, STRESS STRAIN DIA-GRAMS. TESTS.

Thirty-six constant strain-rate uniaxial tension tests were performed on vertically oriented multi-year pressure ridge samples from the Beaufort Sea. The tests were performed on a closed-loop electro-hydraulic testing machine at two strain rates (1/100000 and 1/1000/s) and two temperatures (-20 and -5C) This paper summarizes the sample preparation and testing techniques used in the investigation and presents data on the tensile strength, initial tangent modulus, and failure strain of the ice. and failure strain of the ice.

MP 1857

MP 1857
STRUCTURE, SALINITY AND DENSITY OF
MULTI-YEAR SEA ICE PRESSURE RIDGES.
Richter-Menge, J A, et al, International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985. Proceedings, Vol.2,
New York, American Society of Mechanical Engineers, 1985, p.194-198, 11 refs. Cox, G.F.N.

39-2413

PRESSURE RIDGES, ICE STRUCTURE, ICE SALINITY, ICE DENSITY, SEA ICE, ICE LOADS, PROFILES, BEAUFORT SEA.

Data are presented on the variation of ice structure, salinity, Sea. Two continuous multi-year pressure ridges from the Beaufort Sea. Two continuous multi-year pressure ridge cores are examined as well as ree sample data from numerous other pressure ridges. The results suggest that the large scale properties of multi-year pressure ridges are not isotropic, and that the use of amisotropic ridge models may result in lower design ridge ice loads.

GRAIN SIZE AND THE COMPRESSIVE STRENGTH OF ICE.

Cole, D.M., International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985. Proceedings, Vol.2, New York, American Society of Mechanical Engineers, 1985. p 220-226, 15 refs. 39-2416

ICE STRENGTH, COMPRESSIVE PROPERTIES, GRAIN SIZE, STRESS STRAIN DIAGRAMS.

This work presents the results of uniaxial compression tests on freshwater polycrystalline ice. Grain size of the test material ranged from 15 to 5 mm, strain rate ranged from 171,000,000 to 17100/s and the temperature was -5 C. The grain size effect emerged clearly as the strain rate increased to 17100,000/s and persisted to the highest applied strain rates. On average, the stated increase in grain size brought about a decrease in peak stress of approximately 31%. The occurrence of the grain size effect coincided with the onset of stuble cracking. The strength of the material increased to a maximum at a strain rate of 11,000 s, and then dropped somewhat as the strain rate increased further to 1100 s. Strain at peak stress generally tended to decrease with both increasing grain size and increasing strain rate. The results are discussed in terms of the deformational mechanisms which lead to the observed behavior. This work presents the results of uniaxial compression tests

MP 1859

IN-ICE CALIBRATION TESTS FOR AN ELON-GATED. UNIAXIAL BRASS ICE STRESS SEN-SOR.

Johnson, J.B., International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985. Proceedings, Vol.2, New York, American Society of Mechanical Engineers, 1985, p.244-249, 8 refs. 39-2420

ICE LOADS, STRESSES, MEASURING INSTRU-MENTS, LOADS (FORCES), DESIGN, TESTS.

MENTS, LOADS (FORCES), DESIGN, TESTS. An elongated, uniaxual brass ice stress sensor has been developed by the University of Alaska and used in several field experiments. Laboratory calibration tests have been conducted, in a 60 x 29 5 x 8 5 in (1524 x 750 x 216 mm) ice block into which the sensor was frozen, to determine the sensor is response characteristics. Test results indicate that the sensor acts as a stress concentration with a stress concentration factor of 2 4 and transverse sensitivity of 13 at stresses below 30 lbf/sq in (207 kPa). At stresses greater than 30 lbf/sq in the stress concentration factor increased and the sensor exhibited a time delay response to load. Differences of 22% were measured between the measured sensor stress immediately after a constant ice load was applied and the asymptotic stress limit. Interpretation of measured sensor stresses can be considered reliable at ambient ice stress levels below 30 lbf/sq in

MP 1860 CALIBRATING CYLINDRICAL HOT-FILM ANEMOMETER SENSORS.

Andreas, E.L., et al, June 1986, 3(2), p.283-298, Refs. p.298

Murphy, B. 40-4484

ANEMOMETERS.

We report the results of 82 separate calibrations of cylindrical, platinum hot-film anemometer sensors in air. The calibrations for each sensor involved a determination of its temperaplatinum notining alternometer sensors in air. In canona-tions for each sensor involved a determination of its tempera-ture-resistance characteristics, a study of its heat transfer in forced convection, and an investigation of its yaw response. The convective heat transfer relation that we derive predicts the Nusselt number of the sensor as a linear function of R exp. 0.40, where R is the Reynolds number based on sensor diameter (1<R<43) For the 53 micrometer diame-ter sensors that we used, this heat transfer relation applies to wind speeds typical of the atmospheric surface layer, I to 20 m/s. From the heat transfer relation we also devise a method for determining hor-film operating characteris-tics at temperatures other than the calibration temperature-flinize's relation is the best model for the yaw response of these sensors, being valid over virtually the entire range of yaw angles, 0 to 90 deg. Although the yaw parameter is so weak in the atmospheric surface layer that k can be assumed constant at 0.3.

MP 1861 TECHNIQUE FOR OBSERVING FREEZING FRONTS

Colbeck, S.C., Jan. 1985, 139(1), p.13-20, 8 refs.

ICE WATER INTERFACE, FREEZING, ICE FOR-MATION. SOIL FREEZING, ICE LENSES,

On the basis of observations of freezing fronts and liquid inclusions in liquid-saturated glass beads, a simple technique is described for making these direct observations. The ice-water interface at the freezing front was concave when viewed from the ice side, because the glass beads were preferentially wetted by the liquid. The size and number of liquid inclusions decreased with distance behind the freezing front. of liquid inclusions decreased with distance behind the freezing front. More liquid is trapped by smaller glass beads. The liquid inclusions are probably enriched in soluble impurities. No tendency for pressure buildup or ice lense formation was observed, perhaps because large particles were used it is very important to extend these observations to other conditions, especially to smaller particle sizes.

MP 1862 GRAIN GROWTH AND THE CREEP BEHAV-IOR OF ICE. Cole, D.M., Feb. 1985, 10(2), p 187-189, 4 refs.

GRAIN SIZE, RHEOLOGY, ICE GROWTH, STRAINS, TESTS.

MP 1863 THERMAL (2-5.6 MICRON) EMITTANCE OF DIATHERMANOUS MATERIALS AS A FUN TION OF OPTICAL DEPTH, CRITICAL ANGLE AND TEMPERATURE.

Munis, R.H., et al, Society of Photo-Optical In-strumentation Engineers. Proceedings, Vol. 510. In-frared technology X, Bellingham, WA, 1984, p.209-220, 11 refs.

Marshall, S.J. 39-2842

TEMPERATURE MEASUREMENT, MATERIALS, INFRARED PHOTOGRAPHY, THERMAL RADIATION, OPTICAL PROPERTIES, SPECTRA, REFLECTIVITY, TEMPERATURE EFFECTS, MATHEMATICAL MODELS.

FECTS, MATHEMATICAL MODELS.

Thermal measurements of the normal emittance of several diathermanous maternals were made at 152 C, 49 C and -5.6 C. Calculations of the total hemispherical emittance were made from normal emittance and plotted against the optical depth. A comparison of these data with a model proposed by Gardon indicates that at near-ambient temperatures they agree very closely. It has been observed that normal emittance is greater than hemispherical emittance by approx. 5% for both weakly and strongly absorbing maternals. This is attributable to phase differences in the multiply reflected internal radiation attempting to exit the specimen throughout steradians. Other radiation properties of the maternals, i.e. diffuse transmittance, absorption coefficient, and absorption index were calculated.

MP 1864

ATTENUATION AND BACKSCATTER FOR SNOW AND SLEET AT 96, 140, AND 225 GHZ. Nemarich, J., et al, Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984. Proceedings, Vol.1, p.41-52, ADB-090 935, 3 refs. Wellman, R.J., Gordon, B.E., Hutchins, D.R., Turner, G.A., Lacombe, J.

39-2947 ATTENUATION, SNOWFLAKES, BACKSCAT-TERING, ICE CRYSTALS, WAVE PROPAGA-TION, SNOWFALL, RAIN, TRANSMISSION, METEOROLOGICAL FACTORS.

METEOROLOGICAL FACTORS.

Measurements are reported for attenuation and backscatter at 96, 140, and 225 GHz for falling snow and for mixed snow, sleet, and rain. The measurements were made with the Harry Diamond Laboratones Near-Millimeter Wave Mobile Measurement Facility at the SNOW-TWO Test at Grayling, MI, during the winter of 1983-1984. The dependence of the attenuation and backscatter levels on frequency, snow mass concentration, and ground-level air temperature are discussed. Measurements dade at 96 GHz with various combinations of transmitter and recover polarizations showed combinations of transmitter and receiver polarizations showed no polarization-related effects on the attenuation or backscatter

MP 1865

CATALOG OF SMOKE/OBSCURANT CHARAC-TERIZATION INSTRUMENTS.

O'Brien, H.W., et al. Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984. Proceedings, Vol.1, p.77-82, ADB-090 935. Bowen, S.L.

39-2950

WAVE PROPAGATION, TRANSMISSION, AIR POLLUTION, ELECTRICAL MEASUREMENT, ATTENUATION, OPTICAL PROPERTY SNOWFLAKES, AEROSOLS, DUST, MEASURING INSTRUMENTS, RADIOMETRY, BACK-SCATTERING.

SCATTERING.

The requirement for improved quantification of obscuration parameters is generally recognized by those who attempt to measure, evaluate or predict electro-optical system performance during periods of adverse transmission conditions. A broad spectrum of measurement devices, ranging frem simple to extremely sophisticated, are presently in use for making obscurant measurements. To minimize duplication of effort and to help disseminate information on the current status of instrumentation, the Project Manager for Smoker/Obscurants tasked the U.S. Army Cold Regions Research and Engineering Laboratory with initiating a catalog of instrumentation current justed by government agencies and their contractors to make obscuration measurements.

MP 1866

PERFORMANCE OF MICROPPG, ESSOR-CONTROLLED SNOW CRYSTAL REPLICATOR. Koh, G., Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984. Proceedings, Vol.1, p.107-111, ADB-090 935, 4 refs. 39-2954

SNOW CRYSTAL STRUCTURE, SNOWFALL, TRANSMISSION, ELECTROMAGNETIC PROP-ERTIES, SNOWFLAKES, ICE CRYSTAL REPII-CAS, ARTIFICIAL SNOW.

CAS, ARTIFICIAL SNOW.

Changes in snow crystal characteristics during snowstorms are frequently observed. A continuous record of these changes is required to study the effect of airborne snow on the transmission properties of electromagnetic energy. A continuous snow crystal replicator suitable for this task has been developed and was field-tested at the SNOW.

Il exercise. This replicator, which employs a Formvar technique for snow crystal replication developed by Schaefer (1956) possesses electronic and mechanical features previously unavailable in other replicators and represents a significant improvement in Formvar replication technique. A microprocessor controls the operation of the replicator, resulting in improved quality of snow crystal replicas as well as a decrease in data reduction time. This is accomplished by 1) regulating the temperature of a heater bar designed to reduce blushing (condensed moisture on the film which obscures the detailed structures of replicated crystals), 2) ensuring uniform thickness of the Formvar coating by adjusting the flow rate according to film speed, 3) encoding time on the film, and 4) monitoring moiston of the film to ensure proper operation of the replicator. A description of this instrument is presented and details of its operation at SNOW II are discussed. Il exercise. This replicator, which employs a Formvar Il are discussed

MP 1867

NEW METHOD FOR MEASURING THE SNOW-SURFACE TEMPERATURE

Andreas, E.L., Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984. Proceedings, Vol.1, p.161-169, ADB-090 935, 5 refs. 39.7959

39-2959 SNOW SURFACE TEMPERATURE, HUMIDITY, HYGROMETERS, DEW POINT, SURFACE ROUGHNESS, METEOROLOGICAL DATA, THERMISTORS, ANALYSIS (MATHEMATICS).

Because of the tenuousness of a snow cover, measuring its surface temperature is not easy. The surface is ill-defined and easily disturbed, invasive transducers commonly used for other surfaces may thus be inappropriate for snow A hygrometric method is described for measuring the snowand non-radiative and that it depends only weakly on the surface temperature, the advantages are that it is non-invasive and non-radiative and that it depends only weakly on the surface structure. The key assumption is that air at a snow surface is in saturation with the snow, the dew-point temperature of the air is thus T(s), the surface temperature Consequently, under the right conditions, by measuring the dew-point temperature 10 cm above the surface, we, in effect, measure the surface temperature

OVERVIEW OF METEOROLOGICAL AND SNOW COVER CHARACTERIZATION AT SNOW-TWO.

Bates, R.E., et al, Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984 Proceedings, Vol.1, p.171-191, ADB-090 935, 6 refs. O'Brien, H.W.

39-2960

SNOW COVER DISTRIBUTION, SNOW PHY-SNOW COVER DISTRIBUTION, SNOW PHYSICS, METEOROLOGICAL DATA, MILITARY OPERATION, SNOW DEPTH, SNOW DENSITY, UNFROZEN WATER CONTENT, TEMPERATURE DISTRIBUTION, GRAIN SIZE, TESTS.

TURE DISTRIBUTION, GRAIN SIZE, TESTS.

The performance of military airborne down-look systems, regardless of wavelength, depends upon the recognition of differences between target and background features as viewed through an intervening medium. In cold regions the background may consist partially or entirely of snow cover during winter months. Prediction or evaluation of system performance under such conditions requires detailed characterization of snow cover, meteorological situation and, in some cases, subsurface features such as soil. This paper presents a brief overview of meteorological and snow cover background measurements made at Camp Grayling, Michigan, during SNOW-TWO. Eight independent system tests were supported, each of which required meteorological and/or snow-over "ground-truth" characterization. Support was provided at four meteorological sites and seven snow cover characterization locations. Methodology is described briefly and a listing given of available data taken by CRREL in support of these tests.

MP 1869 APPROACH TO SNOW PROPAGATION MOD-

Koh, G., Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984 Proceedings, Vol 1, p.247-259, ADB-090 935, 9 refs 39-2965

SNOWFALL. TRANSMISSIVITY. ATTENUA-TION, SNOW CRYSTAL STRUCTURE, SOLAR RADIATION, PARTICLE SIZE DISTRIBUTION, ELECTROMAGNETIC PROPERTIES, MATH-EMATICAL MODELS, FALLING BODIES, IN-FRARED RADIATION, RADIATION ABSORP-

TION.

The attenuation of electromagnetic energy transmitted through failing snow can be determined if sufficient information regarding the physical and optical properties of airborne snow is known. Due to the complex and dynamic nature of falling snow the necessary parameters to predict transmission are often difficult to measure. Therefore it is necessary to carefully evaluate all the snow properties that are measurable in order to identify some ideal set of snow parameters that can be used to adequately model transmission through falling snow. A basic quantitative measurement of falling snow that can be continuously monitored is the mass concentration. Thus an approach to modeling transmistance through airborne snow using mass concentration as one of the inputs should be thoroughly investigated. This paper explores

a potential method of predicting transmittance based on mass concentration measurement, taking into consideration the size and shape of the snow crystals. Although the paper focuses on visible radiation the concepts discussed are also applicable to infrared radiation.

MP 1870

FORWARD-SCATTERING CORRECTED EX-TINCTION BY NONSPHERICAL PARTICLES. Bohren, C.F., et al, Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16. 1984. Proceedings, Vol.1, p.261-271, ADB-090 935, 16 refs. Koh, G. 39-2966

SNOW CRYSTAL STRUCTURE, LIGHT SCAT-TERING, SNOWFLAKES, WAVE PROPAGA-TION, PARTICLES, ANALYSIS (MATHEMAT-ICS).

Measured extinction of light by particles, especially those much larger than the wavelength of the light illuminating them, must be corrected for forward scattered light collected by the detector Near-forward scattering by arbitrary nonspherical particles is, according to Fraunhofer diffraction theory, more sharply peaked than that by spheres of equal projected area. The difference between scattering by a nonspherical particle and that by an equal-area sphere is greater the more diffusely the particle's projected area is distributed about its centroid. Snowflakes are an example of large atmospheric particles that are often highly nonspherical. Calculations of the forward-scattering correction to extinction by ice needles have been made under the assumption that they can be approximated as randomly oriented prolate spheroids (aspect ratio 10-1). The correction factor can be as much as 20% less than that for equal-area spheres depending on the detector's acceptance angle and the wavelength. Randomly oriented oblate spheroids scatter more nearly like equal-area spheres.

DISCRETE REFLECTIONS FROM THIN LAY-ERS OF SNOW AND ICE.

Jezek, K.C., et al, Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984. Proceedings, Vol.1, p.323-331, ADB-090 935, 11 refs. Clay, C.S. 39-2971

39-2971
REMOTE SENSING, SNOW PHYSICS, ICE PHYSICS, REFLECTION, RADAR ECHOES, WAVE PROPAGATION, SNOW ACOUSTICS, ICE ACOUSTICS, ELECTROMAGNETIC PROPER-TIES.

A new approach was developed for computing the impulse response of a layered material. Our approach is different from other formulations in that we rely on a simple algorithm for polynomial division rather than the usual and more cumbersome matrix schemes. Our model is strictly valid for normally incident plane waves and does not allow for dispersion in a lossy material but we can account for geometrical spreading ano believe the technique can be adapted for oblique incidence. The advantages of our technique are simplicity and the impulse nature of the solution. Consequently, we can compute the band limited response of the layered material through a straightforward convolution of the impulse response with any desired source function. In this paper, we outline the method and discuss examples of radar waves reflected from layers of snow and ice. We suggest the method may be a convenient tool for modelers studying acoustic and electromagnetic reflections from snow and ice cover. for polynomial division rather than the usual and more co

MP 1872

EXPLOSIVE OBSCURATION SUB-TEST RE-SULTS AT THE SNOW-TWO FIELD EXPERI-

Ebersole, J.F., et al. Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984. Proceedings, Vol 1, p.347-354, ADB-090 935 Williams, R.R., Bates, R.E.

39-2973

TRANSMISSIVITY, EXPLOSIVES, SNOW COV-ER, ICE COVER, VISIBILITY, ATTENUATION, TIME FACTOR, EXPLOSION EFFECTS, SANDS,

A series of explosive obscuration trials was conducted in January 1984 as a sub-test to the SNOW TWO field experiment conducted in Grayling. MI In this paper, a discussion is presented of the time space-dependent obscuration effects produced by explosives detonated on snow are ground cover In addition, time space dependent thermal signatures of the resulting craters are presented

CHEMISTRY OF OBSCURANTS ED DURING SNOW-TWO/SMOKE SNOW RELEASED

Cragin, J.H., Dec. 1984, SR 84-35, Snow Symposium, 4th, Hanover, N.H., Aug. 14-16, 1984 Proceedings, Vol.1, p. 409-416, ADB-090-935 39-2980

SMOKE GENERATORS, SNOW COMPOSITION, CHEMICAL ANALYSIS, SNOWFALL INFRA-RED RADIATION, VISIBILITY, PARTICLE SIZE DISTRIBUTION, AEROSOLS SNOW AND ICE PREVENTION IN THE UNIT-ED STATES.

Minsk, L.D., 1986, 28(1), p.37-42, In Italian with French, German and English summaries.

SNOW REMOVAL, ICE REMOVAL, ICE CONTROL, ROAD MAINTENANCE, WINTER MAINTENANCE, COUNTERMEASURES, SNOW ACCUMULATION, CHEMICAL ICE PRE-VENTION, UNITED STATES.

MP 1875

ANALYSIS OF RIVER WAVE TYPES Ferrick, M.G., Feb. 1985, 21(2), p.209-220, 20 refs. 39-3098

JAMS, DAMS, ELECTRIC POWER, FLOODS, RAIN, MATHÉMATICAL MODELS.

RAIN, MATHEMATICAL MODELS.

In this paper we consider long-period, shallow-water waves in rivers that are a consequence of unsteady flow. River waves result from hydroelectric power generation or flow control at a dam, the breach of a dam, the formation or release of an ice jam, and rainfall-runoff processes. The Saint-Venant equations are generally used to describe river waves. This paper is an investigation into areas which are fundamental to river wave modeling. The analysis is based on the concept that river wave behavior is determined by the balance between friction and inertia. The Saint-Venant equations are combined to form a system equation that is written in dimensionless form. The dominant terms of the system equation change with the relative magnitudes of a group of dimensionless scaling parameters that quantify the friction-inertia balance. These scaling parameters are continuous, indicating that the various river wave types and the transitions between them form a spectrum

MP 1876

EFFECT OF ICE COVER ON HYDROPOWER PRODUCTION.

Yapa, P.D., et al, Sep. 1984, 110(3), p 231-234, 7 refs. Shen, H.T. 39-3096

ICE COVER EFFECT, RIVER FLOW, RIVER ICE, WATER LEVEL, DAMS, ICE CONDITIONS, ELECTRIC POWER, ICE SURFACE, ICE COVER STRENGTH, SURFACE ROUGHNESS.

EFFECT OF SAMPLE ORIENTATION ON THE COMPRESSIVE STRENGTH OF MULTI-YEAR PRESSURE RIDGE ICE SAMPLES.

RESSURE RIDGE ICE SAMPLES.
Richter-Menge, J.A., et al, Conference Arctic '85.
Proceedings. Civil engineering in the Arctic offshore.
Edited by F.L. Bennett and J.L. Machemehl, New
York, American Society of Civil Engineers, 1985,
p.465-475, 13 refs.

Cox, G.F.N. 39-3196

PRESSURE RIDGES, COMPRESSIVE PROPERTIES, ICE STRENGTH, IMPACT STRENGTH, STRAINS, POROSITY, ICE SAMPLING, BEAU-

Matched pairs of horizontal and vertical sea ice samples Matched pairs of horizontal and vertical sea ice samples were taken from a multi-year pressure ridge in the Beaufort Sea. Each pair was tested in unlaxial constant strain-rate compression to evaluate the effect of sample orientation on the compressive strength. The results indicate that sample orientation must be considered in the interpretation of ridge compressive strength data.

MP 1878

TRIAXIAL COMPRESSION TESTING OF ICF. Cox, G.F.N., et al. Conference Arctic '85 Proceedings. Civil engineering in the Arctic offshore. Edited by F.L. Bennett and J.L. Machemehl, New York. American Society of Civil Engineers, 1985, p.476-488, 11 refs.

Richter-Menge, J.A. 39-3197

ICE STRENGTH, COMPRESSIVE PROPERTIES. STRESS, STRAIN DIAGRAMS, TESTS, MEASURING INSTRUMENTS

ING INSTRUMENTS
Procedures have been refined for performing constant-strain rate triangla tests on ice samples such that the confining pressure axial stress ratio femanic constant. Sample axial displacements are measured inside the cell on the sample and outside the cell between the cell and the loading priston. In addition to reviewing the development of the equipment and testing procedures, data are presented to illustrate the problems of using outside displacement measurements. In general, direct axial displacement measurements on the sample are essential to obtain accurate test strain rates and ice moduli. This is particularly true for brittle ice at low temperatures, high strain rates, and high confining pressures.

MP 1879 SHEAR STRENGTH IN THE ZONE OF FREEZ-ING IN SALINE SOILS.

Chamberlain, E.J., Conference Arctic '85. Proceedings Civil engineering in the Arctic offshore. Edited by F.L. Bennett and J.L. Machemehl, New York, American Society of Civil Engineers, 1985, p.566-574, 39-3205

FROZEN GROUND STRENGTH, SALINE SOILS, SHEAR STRENGTH, DEFORMATION, SOIL FREEZING, CLAY SOILS, SANDS, SEA WATER, TEMPERATURE EFFECTS, TESTS.

TEMPERATURE EFFECTS, TESTS.

Laboratory direct shear strength tests were conducted on sand and clay soil samples as they were freezing. Samples prepared with seawater and distilled water were tested in a modified direct shear box at shear plane temperatures ranging from 0 C to -5 C. The shear strengths of the freezing saline clay and sand samples were observed to be significantly less than shear strengths or the fresh water samples. For the clay samples, these shear strength differences could be accounted for principally by the 1.8 C freezing point depression caused by the salts in the sea water, the two shear strength curves nearly paralleling and overlapping each other when plotted versus temperature below freezing in a similar plot for the sands, the two curves diverge considerably from a common strength at 0 C. It is shown that the shear strength reduction of the saline clay soil is principally the result of increased unfrozen water content It is postulated that knowledge of unfrozen water content relationships for frozen saline soils will probably allow better predictive capabilities for the shear strength in the freezing zone.

MP 1880

EXPLORATION OF A RIGID ICE MODEL OF FROST HEAVE.

O'Neill, K., et al, Mar. 1985, 21(3), p.281-296, 29 refs. Miller, R.D. 19-3276

FROST HEAVE, GROUND ICE, ICE MODELS, ICE LENSES, FREEZING RATE, ICE GROWTH, MATHEMATICAL MODELS, FROZEN GROUND THERMODYNAMICS.

A numerical model is explored which simulates frost heave in saturated, granular, air-free, solute-free soil It is based on equations developed from fundamental thermomechanical on equations developed from fundamental thermomechanical considerations and previous laboratory investigations. Although adequate data are lacking for strict experimental verification of the model, we note that simulations produce an overall course of events together with significant specific features which are familiar from laboratory experience. Simulated heave histories show proper sensitivities in the shapes and orders of magnitude of output responses and in the relations between crucial factors such as heave rate. freezing rate, and overburden.

MP 1881 SIMILARITY SOLUTIONS OF THE CAUCHY PROBLEM OF HORIZONTAL FLOW OF WATER THROUGH POROUS MEDIA FOR EX-PERIMENTAL DETERMINATION OF DIF-

FUSIVITY.

Nakano, Y., Mar. 1985, 8(1), p.26-31, 23 refs.

POROUS MATERIALS, WATER FLOW, DIFFU-SION, WATER CONTENT, MATHEMATICAL MODELS, EXPERIMENTATION.

An experimental method for determining diffusivity is studied by using similarity solutions of the Cauchy problem of horizontal flow of water through homogeneous porous media. The theoretical justification of the method is presented by applying a mathematical theorem recently derived by Van Duyn Some important aspects of data analysis are discussed by vice water aspectal. using actual experimental data

MP 1882 NUMERICAL SIMULATION OF NORTHERN HEMISPHERE SEA ICE VARIABILITY, 1951-

Walsh, J.E., et al, May 20, 1985, 90(C3), p 4847-4865.

36 refs. Hibler, W.D., III, Ross, B.

39-3431

SEA ICE, ENVIRONMENT SIMULATION, SEA-SONAL VARIATIONS, ICE MODELS, DRIFT. ICE COVER THICKNESS.

ICE COVER THICKNESS.

The model is run with a daily time step and is forced by interannually varying fields of geostrophic wind and termperature-derived thermodynamic fluxes. The results include documentation of the sensitivities to the source of the thermodynamic forcing data and to the number of thickness levels in the thermodynamic formulation. The fields of ice velocity and thickness show strong seasonal as well as interanual sariability. The Pacific gyre is found to be well-developed in spring and autumn but less so in winter and summer. The simulated velocities show no bias but considerable scatter relative to the drift of the Arctic buoys in 1979 and 1980. An analysis of the regional mass budgets shows that the normal seasonal cycle is controlled primarily by the thermodynamic processes but that the thickness anomalies in michanic during winter, spring, and autumn.

Thermodynamic processes during winter, spring, and autumn.

cesses contribute more strongly to summer anomalies near the ice edge The tendency for ice anomalies to be advected by the pattern of mean drift is apparent in multiseason lag correlations involving subregions of the Arctic Basin and the peripheral seas (Auth. mod.)

MP 1883

OF RIVER AND LAKE ICE.
Ramseier, R.O., Quebec, P.Q., Université Laval, Feb.
1972, 243p., Ph.D. thesis Corrected Oct. 1975.

39-3387 ICE MECHANICS, RIVER ICE, LAKE ICE, ICE GROWTH, ICE CRYSTAL STRUCTURE, ICE PHYSICS, SNOW ICE, TEMPERATURE EFFECTS, METEOROLOGICAL FACTORS, GRAIN SIZE, ICE CREEP, EXPERIMENTATION.

MP 1884 SCIENCE PROGRAM FOR AN IMAGING RADAR RECEIVING STATION IN ALASKA. Weller, G, et al, Pasadena, CA, U.S. National Aeronautics and Space Administration, Dec. 1, 1983,

45p., 19 refs. Carsey, F., Holt, B., Rothrock, D.A., Weeks, W.F. 39-3415

REMOTE SENSING, ICE CONDITIONS, STA-TIONS, RESEARCH PROJECTS, SEA ICE DIS-TRIBUTION, OCEANOGRAPHY, MARINE GEOLOGY, GLACIOLOGY, VEGETATION, UNITED STATES—ALASKA, ARCTIC OCEAN.

UNITED STATES—ALASKA, ARCTIC OCEAN.
There would be broad scientific benefit in establishing in Alaska an imaging radar receiving station that would collect data from the European Space Agency's Remote Sensing Satellite, ERS-1; this station would acquire imagery of the ice cover from the American territorial waters of the Beaufort, Chukchi, and Bering Seas, this station, in conjunction with similar stations proposed for Kiruna, Sweden, and Prince Albert, Canada, would provide synoptic coverage of nearly the entire Arctic The value of such coverage to aspects of occanography, geology, glaciology, and botany is considered.

CONTROLLING RIVER ICE TO ALLEVIATE ICE JAM FLOODING.

Deck, D.S., IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984 Proceedings, Vol.3, [1984], p.69-76, 4 refs.

ICE CONTROL, RIVER ICE, ICE JAMS, FLOODS, ICE BOOMS, ICE BREAKUP, ICE COVER THICKNESS, MODELS, COUNTERMEASURES.

NESS, MODELS, COUNTERMEASURES.

Many communities affected by ice jam flooding have accepted the event as unpreventiable. Others have approached their problem as one of open channel flow and implemented standard projects such as channel modifications or dikes to combat their flooding. We feel that the best approach is to control the river ice before it poses a problem, by controlling either freeze-up or break-up. This paper addresses our involvement at two areas where ice jam flooding has caused severe economic hardship and loss of life. An ice boom has been used to control the formation of river ice at Oil City, Pennsylvania, and a permanent ice control structure will be constructed on Cazenovia Creek in West Senecs, New York, to control the river ice during break-up.

MP 1886 4TH REPORT OF WORKING GROUP ON TEST-

ING METHODS IN ICE. Earle, E N, et al, IAHR International Symposium on Lee, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.4, [1984], p.1-41, Refs. passim. Frederking, R., Gavrilo, V.P., Goodman, D.J., Häusler, F.U., Mellor, M., Petrov, I.G., Vaudrey, K.

39-3494 ICE PHYSICS, ICE STRENGTH, AIR ENTRAIN-MENT, ICE FRICTION, COMPRESSIVE PROP-ERTIES, FLEXURAL STRENGTH

MP 1887 FORCES ASSOCIATED WITH ICE PILE-UP AND RIDE-UP.

Sodhi, D.S. et al, IAHR International Symposium on Ice, 7th, Hamburg, F.R.G., Aug. 27-31, 1984. Proceedings, Vol.4, [1984], p.239-262, Refs. p.257-262. Kovacs, A

32-3500 37-300 ICE LOADS, ICE PILEUP, ICE OVERRIDE, FLOATING ICE, ICE MECHANICS, ICE PRES-SURE, ICE SOLID INTERFACE, WIND FAC-TORS, OCEAN WAVES, ANALYSIS (MATH-EMATICS), PRESSURE RIDGES.

EMATICS). PRESSURE RIDGES.

A review of the literature on shore ice pile-up and tide-up observations is presented along with the average forces associated with the phenomena. Besides wind/water driving forces, it is postulated that storm surges or waves may also earry the floating ice sheet faither inland, where damage to structures and human lives is possible. A brief review of presented of the analytical and experimental work done to understand the behavior of ice sheets in relation to ita

piling or riding up the beach A short summary of each model study that is reported in open literature is also given.

MP 1888

HEAT AND MOISTURE ADVECTION OVER ANTARCTIC SEA ICE. Andreas, E.L., May 1985, 113(5), p.736-746, 27 refs.

ICE EDGE, HEAT LOSS, SEA ICE DISTRIBUTION, PACK ICE, ANTARCTICA—WEDDELL SEA.

SEA.

Surface-level meteorological observations and upper-air soundings in the Weddell Sea provide the first in situ look at conditions over the deep antarctic ice pack in the spring. The surface-level temperature and humidity were relatively high, and both were positively correlated with the northerly component of the \$50 mb wind vector as far as 600 km from the ice edge. Since even at its maximum extent, at least 60% of the antarctic ice pack is within 600 km of the open ocean, long-range atmospheric transport of heat and mosture from the ocean must law a key part in antarctic. and mosture from the ocean must play a key part in antarctic sea ice heat and mass budgets. From one case study, the magnitude of the ocean's role is inferred at this time of year the total turbulent surface heat loss can be greater under southerly winds than under northerly ones. (Auth.)

ENERGY EXCHANGE OVER ANTARCTIC SEA ICE IN THE SPRING.

Andreas, E.L., et al, July 20, 1985, 90(C4), p.7199-7212, Refs. p.7211-7212.

Makshtas, A.P.

SEA ICE, ABLATION, RADIATION BALANCE, HEAT FLUX.

In October and November of 1981, during the US-USSR Weddell Polynya Expedition, we made the first measurements ever of the turbulent and radiative fluxes over the interior pack ice of the southern ocean The daily averaged, surface-averaged sum of these fluxes—the so-called balance, which averaged sum of these fluxes—the so-called balance, which comprises the conductive, heat storage, and phase-change terms—was positive for all but one day during the cruise, the ablation season had begun. Of ariability in the sum of the turbulent fluxes produced most of the variability in the balance. These turbulent fluxes generally correlated with the geostrophic wind—a northerly wind (in off the ocean) transferring heat to the surface, and a southerly wind removing it. (Auth)

USE OF REMOTE SENSING FOR THE U.S. ARMY CORPS OF ENGINEERS DREDGING PROGRAM.

PROGRAM.

McKim, H.L., et al, International Symposium on Remote Sensing of Environment, 18th, Paris, France, Oct. 1-5, 1984. Proceedings, Ann Arbor, Environmental Research Institute of Michigan, (1985), p.1141-1150, Refs. p.1147-1149. Klemas, V., Gatto, L.W., Merry, C.J. 39-3707

REMOTE SENSING, DREDGING, SEDIMENT TRANSPORT, CHANNELS (WATERWAYS), SUSPENDED SEDIMENTS, ENVIRONMENTAL

IMPACT.

The objectives of this study were to review the uses of existing remote sensing techniques for providing data in the Corps of Engineers dredging program, to define promising new techniques for monitoring dredging operations, and to recommend those techniques that should be used now and those to be developed for future use. The uses for which remote sensing techniques were evaluated include channel surveys and engineering considerations, monitoring of sediment drift and dispersion during dredging operations, monitoring of water quality and suspended sediment concentration, disposal site selection and monitoring of environmental effects at disposal sites, and long-range dredged material disposal management strategies

MP 1891 FULL-CYCLE HEATING AND COOLING PROBE METHOD FOR MEASURING THER-MAL CONDUCTIVITY.

McGaw, R., (1984), No.84-WA/HT-109, 8p. 32

39.3902 THERMAL CONDUCTIVITY, COOLING, HEAT-ING, THERMAL DIFFUSION, ANALYSIS (MATHEMATICS), TESTS.

(MATHEMATICS), tESTS.

A modification of the traditional probe test procedure is described which incorporates the cooling stage that succeeds each heating stage. The improved procedure enables ascond value of thermal conductivity to be determined for each test. A comparison between the two values gives a measure of the experimental error for the test, and provides a means by which physical changes within the test specimen may be detected. If the ambient test temperature of the specimen has thered during a test, the effect on the test values may also be determined through a comparison of the heating-stage and cooling-stage temperatures

MP 1892

AUTOMATED SOILS FREEZING TEST.

Chamberlain, E.J., National Conference on Mi-crocomputers in Civil Engineering, 2nd, Orlando, Florida, Oct. 30-Nov. 1, 1984. Proceedings. Edited by W.E. Carroll, [1985], 5p., 2 refs. 39-3903

SOIL FREEZING, FREEZE THAW CYCLES, FROST HEAVE, FREEZE THAW TESTS, THER-MOCOUPLES, COMPUTER PROGRAMS.

MOCOUPLES, COMPUTER PROGRAMS.

An inexpensive data acquisition/control system is used to control the freeze-thaw cycling and data logging in a new laboratory freezing test. The test imposes two freeze-thaw cycles on four soil samples. The data logger is set up with 3-10 channel multiplexer cards for analog measureset up with 3-10 channel multiplexer cards for analog measurement and actuator control. Two of the multiplexer cards are configured for a total of 36 single-ended thermocouple measurements which are accurate to plus or minus 0.1 C. The third multiplexer card is configured with two actuator switches to control the temperatures of two refrigerated circulating baths and with five double-ended channels to read the output of four linear motion DC transformers and one power supply

The data acquisition/control unit is controlled using a HP41CX hand-held calculator and the HP41CX hand-held calculator and the HP41CX hand-held calculator and the HP41CX thand-held calculator and the HP41CX thand-held calculator is programmed with over 30 programs and subroutines to control the temperature, and to reduce, print out, store and plot the test data

MP 1893

2-D TRANSIENT FREEZING IN A PIPE WITH TURBULENT FLOW, USING A CONTINUALLY DEFORMING MESH WITH FINITE ELE-

Albert, M.R., et al. International Conference on Albert, M.R., et al, International Conference on Numerical Methods in Thermal Problems, 3rd, Seat-tle, WA, Aug 2-5, 1983. Proceedings. Edited by R.W. Lewis, J.A. Johnson and W.R. Smith, Swansea, U.K., Pineridge Press, 1983, p.102-112, 10 refs.

39-3963 PIPELINE FREEZING, TURBULENT FLOW, HEAT FLUX, HEAT TRANSFER, ANALYSIS (MATHEMATICS), FLOW RATE.

SOLUTION OF 2-D AXISYMMETRIC PHASE CHANGE PROBLEMS ON A FIXED MESH, WITH ZERO WIDTH PHASE CHANGE ZONE. O'Neill, K., International Conference on Numerical Methods in Thermal Problems, 3rd, Seattle, WA, Aug. 2-5, 1983. Proceedings. Edited by R.W. Lewis, J.A. Johnson and W.R. Smith, Swansea, U.K., Pineridge Press, 1983, p.134-146, 21 refs.

39-3955
THERMAL CONDUCTIVITY, ENTHALPY, ARTIFICIAL FREEZING, HEAT CAPACITY, PHASE TRANSFORMATIONS, SOIL FREEZING, BOUNDARY LAYER, ANALYSIS (MATHEMAT-

A new method is presented for solving two-dimensional axisymmetric heat conduction problems with phase change. axisymmetric heat conduction problems with phase change. A strict discontinuity between phases is assumed, and no artificially smoothed enthalpy transition between phases need be introduced. Step changes across phase boundaries in the sensible heat capacity and thermal conductivity are accommodated, when the phase change isotherm cuts arbitrarily across a fixed mesh of linear triangular finite elements. Latent heat effects are accounted for through a Dirac delta function in the heat capacity.

This is absorbed mathematically and the effects described and the effects are accounted for through a Dirac delta function in the heat capacity. tent near effects are accounted for integer a price tentile function in the heat capacity. This is absorbed mathematically and its effects distributed appropriately over discrete mesh entities in the course of ordinary Galerkin finite element procedures. Computed results agree well with analytical solutions in the limited cases where they are available, and numerical results in more general cases behave quite reasonability.

MP 1895

COMPUTATION OF POROUS MEDIA NATURAL CONVECTION FLOW AND PHASE

O'Neill, K, et al, International Conference on Finite Elements in Water Resources, 5th. Burlington, VT, June 1984. Proceedings. Edited by J.P. Laible, C.A. Brebbia, W. Gray and G. Pinder, Berlin, Springer-Verlag, 1984. p. 213-229, 13 refs.

39-3981
POROUS MATERIALS, FLUID FLOW, PHASE TRANSFORMATIONS, CONVECTION, HEAT TRANSFER, HEAT CAPACITY, BOUNDARY LAYER, COMPUTER APPLICATIONS, ANALYSIS (MATHEMATICS)

MP 1896

ROLE OF PHASE EQUILIBRIUM IN FROST HEAVE OF FINE-GRAINED SOIL UNDER NEG-LIGIBLE OVERBURDEN PRESSURE. Nakano, Y., et al, June 1985, 8(2), p.50-68, 17 refs.

Horiguchi, K. 40.33

40-33
FROST HEAVE, UNFROZEN WATER CONTENT, SOIL WATER, SUPERCOOLING, PRESURE, PHASE TRANSFORMATIONS, SOIL FREEZING, ANALYSIS (MATHEMATICS).

The role of the phase equil-brim of water in frost heave was studied for two kinds of soil. The rate of frost heave and the rate of water intake were measured simultaneously under various rates of heat removal. The experimental data revealed a trend common for both soils that the rate of materials and the rate of the soils that the rate of materials are revealed as trend common for both soils that the rate data revealed a trend common for both soils that the rate of water intake attains its maximum at a certain critical rate of heat removal. The data were analyzed by using equations accurately describing the relation between these rates. The results of the analysis indicate a senious doubt about the validity of phase equilibrium in the system. Alternatively, an assumption was introduced that supercooling occurred between a frost front and an unfrozen part of the soil. It was shown that supercooling could explain the data well under certain conditions.

MP 1897

EXPERIMENTAL STUDY ON FACTORS AF-FECTING WATER MIGRATION IN FROZEN MORIN CLAY.

Xu, X., et al, Ground freezing. Proceedings of the 4th International Symposium on Ground Freezing, Sapporo, Japan, Aug. 5-7, 1985. Edited by S. Kinoshita and M. Fukuda Rotterdam, A.A. Balkema, 1985, p.123-128. Oliphant, J.L., Tice, A.R.

40-213
FROZEN GROUND PHYSICS, SOIL WATER MIGRATION, CLAY SOILS, FROST HEAVE, DENSITY (MASS/VOLUME), SATURATION, SOIL
FREEZING, TEMPERATURE GRADIENTS,

TESTS.

The amount of water migration in an unsaturated frozen soil, morin clay, was determined in horizontally closed soil columns under linear temperature gradients. The temperature at the warm end of the soil column was below its freezing point at the initial water content in order to keep the soil specimen always in the frozen state during testing. The flux of water migration was calculated from the distribution curves of the total water content before and after testing. Four factors affecting the flux, including temperature, temperature gradient, test duration and the dry density of the soil, were investigated. It was found that the flux is directly proportional to the square root of the test duration, decreases with the decrease in temperature in the power law form, and changes with the dry density. The behavior of water migration in unsaturated, frozen morin clay is something like that in the unsaturated, unfrozen soils.

STRAIN RATE EFFECT ON THE TENSILE STRENGTH OF FROZEN SILT.
Zhu, Y., et al, Ground freezing. Proceedings of the 4th International Symposium on Ground Freezing, Sapporo, Japan, Aug. 5-7, 1985. Edited by S. Kinoshita and M. Fukuda, Rotterdam, A.A. Balkema, 1985, 152, 157, 0 or fee. p.153-157, 9 refs. Carbee, D.L.

10-217

PROZEN GROUND STRENGTH, PERMAFROST PHYSICS, STRAINS, TENSILE PROPERTIES, TEMPERATURE EFFECTS, DENSITY (MASS/-VOLUME), TESTS.

VOLUME), TESTS.

Tension tests at constant rates were conducted on remolded saturated frozen Fairbanks silt with medium density at 5 C for various machine speeds. It is found that the ensite strength depends strongly upon strain rate and the critical strain rate for ductile-brittle transition was about 1/100s. The peak tensile strength considerably decreases with decreasing strain rate for ductile failure, while it slightly decreases with increasing strain rate in the brittle region. The failure strain also varies with strain rate, but the initial tangent modulus is found not to be dependent upon strain rate.

MP 1899 KADLUK ICE STRESS MEASUREMENT PRO-GRAM.

Johnson, J.B., et al. International Conference on Port Johnson, J.B., et al, international Conference on Fort and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985 Proceed-ings, Vol. 1, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p.88-100, 9 refs. Cox. G F.N., Tucker, W.B.

40-268

ICE SHEETS. STRESSES. ICE LOADS. OFF-SHORE STRUCTURES, ICE CONDITIONS, ICE PRESSURE, THERMAL EXPANSION

Cylindrical biasial stress sensors were used to measure ice stress variations as a function of depth across an ice peninsula

on the shoreward side (south) of Kadluk Island. The stresses varied in a complex manner both laterally and with depth in the ice sheet. Average stresses were calculated and summed across the ice peninsula to determine the ice load acting on the structure. The maximum measured average stress and corresponding calculated structural load during the experiment were about 300 kPa and 150 MN respectively. All significant measured stresses were caused by thermal expansion of the ice sheet.

MP 1900 ICE ISLAND FRAGMENT IN STEFANSSON SOUND, ALASKA.

Kovacs, A., International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985. Proceedings, Vol.1, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p.101-115, 9 refs. 40.269

40-269
ICE ISLANDS, ICE STRENGTH, ICE PHYSICS,
GROUNDED ICE, CALVING, ICE COVER
THICKNESS, ICE SALINITY, ICE DENSITY, ICE
TEMPERATURE, STATISTICAL ANALYSIS.

TEMPERATURE, STATISTICAL ANALYSIS.

A small ice island fragment was found in a unique location southwest of Cross Island, Alaska, in April 1983 Investigations were made to determine the thickness, salinity, density, internal temperature, and strength of the ice island ice Measurements were also made which revealed that the ice island was grounded. Side scan sonar, depth profiles and direct sounding measurements of the sea bottom revealed that the ice island had gouged into the seabed when it was driven into shallower waters. Implications of this ice feature to offshore petroleum development are discussed

MP 1901 APPARENT UNCONFINED COMPRESSIVE STRENGTH OF MULTI-YEAR SEA ICE.

Kovacs, A., International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985. Proceed-ings, Vol.1, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p.116-127, 4 refs.

40-270 ICE STRENGTH, SEA ICE, ICE LOADS, COM-PRESSIVE PROPERTIES, ICE TEMPERATURE, ICE DENSITY, BRINES, TESTS.

ICE DENSITY, BRINES, TESTS.

An axial double-ball load test system for determining the apparent unconfined compressive strength of multi-year sea ice was evaluated. The effects of loading ball size, ice temperature, and brine free density on the apparent unconfined compressive strength of the ice were investigated. Axial double-ball load test results are compared with those obtained from labor intensive conventional unconfined compression tests made on similar density ice. The results from the two testing methods were found to agree very well, indicating that the axial double-ball load test may be used to provide a rapid method for determining an apparent unconfined compressive strength index for ice.

INVESTIGATION OF THE ELECTROMAGNET-IC PROPERTIES OF MULTI-YEAR SEA ICE.

Morey, R.M., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985. Proceed-ings, Vol.1, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p.151-167, 11 refs.

Kovacs, A.

ICE ELECTRICAL PROPERTIES, ELECTRO-MAGNETIC PROPERTIES, SEA ICE, ICE COVER THICKNESS, ICE BOTTOM SURFACE, REMOTE SENSING, PROFILES, ICE DETECTION, ICE STRUCTURE, ICE MODELS, BRINES, RADAR

ECHOES.

Sounding of multi-year sea ice, using impulse radar operating in the 80- to 500-MHz frequency band, revealed that the bottom of this ice could not always be detected. This paper discusses the results of a field program aimed at inding out why the bottom of thick multi-year sea ice could not be profiled and at determining the electromagnetic (EM) properties of multi-year sea ice. It was found that the bottom of the ice could not be detected when the ice structure had a high brine content. Because of brine's high conductivity, its volume dominates the loss mechanism in first-year sea ice, and the same was found true for multi-year sea ice. A two-phase dielectite mixing formula, used by the authors for describing the EM properties of first-year sea ice, was modified to include the effects of the gas pockets found in the multi-year sea ice. This three-phase mixture model was found to estimate the EM properties of the multi-year ice studied over the frequency band of interest. The latter values were determined by 11 vertical sounding to a subsurface target of known depth and 21 cross-borchole transmission measurements

MP 1903 PHYSICAL PROPERTIES OF SEA ICE IN THE

GREENLAND SEA. nucker, w.B., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985. Proceedings, Vol.1, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p. 177-188, 9 refs.

Gow, A.J., Weeks, W.F.
40-275 Tucker, W.B., et al, International Conference on Port

40-275
ICE PHYSICS, SEA ICE, PACK ICE, ICE SALINITY, ICE TEMPERATURE, ICE COVER THICKNESS, ICE CRYSTAL STRUCTURE, SNOW
DEPTH, GREENLAND SEA.

DEPTH, GREENLAND SEA.

The physical properties of sea ice in the Fram Strait region of the Greenland Sea were examined during June and July 1984 in conjunction with the MIZEX field program. The properties of the pack ice in the Fram Strait are believed to be representative of ice from many locations within the Arctic Basin since Fram Strait is the major ice outflow region for the Basin Most of the ice observed and sampled was multi-year. The majority of the first-year ice appeared to have been deformed prior to entering Fram Strait. The properties measured at each sampling site included salinity, temperature, thickness, crystal structure and snow depth. The measured salinities agreed well with those taken during summer at other locations in the Arctic. An important finding was that snow depths on multi-year ice were much larger than those on first-year ice. Finally, the crystal structure analysis indicated that about 75% of the ice consisted of congelation ice with typically columnar type crystal structure. The remaining 25% consisted of granular ice

MP 1904 NUMERICAL SIMULATION OF ICE GOUGE FORMATION AND INFILLING SHELF OF THE BEAUFORT SEA. ON

Weeks, W.F., et al, International Conference on Port weeks, w.r., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985. Proceedings, Vol. I, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p.393-407, 12 refs. Tucker, W.B., Niedoroda, A.W. 40, 204

ICE SCORING, BOTTOM TOPOGRAPHY, BOT-TOM SEDIMENT, OCEAN BOTTOM, SEDI-MENT TRANSPORT, MODELS, DISTRIBUTION, COMPUTER APPLICATIONS, BEAUFORT SEA. COMPUTER APPLICATIONS, BEAUFORT SEA.

A simulation model for sea rec-induced gouges on the shelf of the Beaufort Sea is developed by assuming that annual occurrence of new gouges is given by a Poisson distribution, locations of the gouges are random, and distribution of gouge depths is specified by an exponential distribution. Once a gouge is formed it is subject to infilling by transport of sediment into the region and by local movement of sediment along the sea floor These processes are modeled by assuming a sediment input based on stratigraphic considerations and by calculating bedload transport using methods from sediment transport theory. It is found that if currents are sufficient to transport sediment, rapid infilling of gouges occurs.

MP 1905 REVIEW OF EXPERIMENTAL STUDIES OF UPLIPTING FORCES EXERTED BY ADFROZ-EN ICE ON MARINA PILES.

Christensen, F.T., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep. 7-14, 1985. Pro-ceedings, Vol. 2, Hörsholm, Denmark, Danish Hydraulic Institute, 1985, p.529-542, 30 refs.

Zabilansky, L.J.

40-303
PILE EXTRACTION, ICE ADHESION, WATER LEVEL, SHEAR PROPERTIES, FLEXURAL STRENGTH, ICE COVER EFFECT, ICE SOLID INTERFACE, ICE LOADS, ICE PHYSICS, CONSTRUCTION MATERIALS.

Over the last decade the problem of pile jacking has been studied experimentally, both in the field and in laboratory studies. This paper reviews the findings of these studies and suggests subjects for further research

MP 1906

SHEET ICE FORCES ON A CONICAL STRUC-TURE: AN EXPERIMENTAL STUDY.

Sodhi, D.S., et al. International Conference on Port and Ocean Engineering under Arctic Conditions, 8th, Narssarssuaq, Greenland, Sep 7-14, 1985 Proceedings, Vol.2, Hörsholm, Denmark Danish Hydraulic Institute, 1985, p.643-655, 11 refs. Morris, C.E., Cox, G.F.N.

40-312
ICE PRESSURE, ICE SHEETS, OFFSHORE
STRUCTURES, ICE LOADS, FLEXURAL
STRENGTH, SURFACE PROPERTIES, ICE LOADS, FRICTION, EXPERIMENTATION

Small-scale experiments were performed to determine sheet ice forces on a control structure. The experiments were conducted with a 45 deg upward breaking conical structure which had diameters of 15 m at the waterline and 0.33

m at the top. The surface of the structure was initially smooth; later it was roughened to investigate the effect of surface friction on the ice load. The thickness and the flexural strength of ice sheets were varied, and the tests were conducted at three fixed velocities.

MP 1907 GRAIN SIZE AND THE COMPRESSIVE STRENGTH OF ICE.

Cole, D.M., Sep. 1985, 107(3), p.369-374, 15 refs. 40-363

ICE STRENGTH, ICE MECHANICS COMPRES-SIVE PROPERTIES, GRAIN SIZE, LOADS (FORCES), ICE CRYSTAL STRUCTURE, STRESS STRAIN DIAGRAMS, ICE CRACKS, TEMPERA-TURE EFFECTS, FRACTURING.
This work presents the results of uniazial compression tests

This work presents the results of uniaxial compression tests on freshwater polycrystalline ice. Grain size of the test material ranged from 1.5 to 5 mm, strain rate ranged from 171,000,000 to 17100/s and the temperature was -5 C. The grain size effect emerged clearly as the strain rate increased to 17100,009/s and persisted to the highest applied strain rates. On average, the stated increase in grain size brought about a decrease in peak stress of approximately 31 percent. The occurrence of the grain size effect coincided with the onset of visible cracking. The strength of the material increased to a maximum at a strain rate of 171,000/s, and then dropped somewhat as the strain rate increased further to 17100/s. Strain at peak stress generally tended to decrease with both increasing grain size and increasing strain rate. The results are discussed in terms of the deformation mechanisms which lead to the observed behavior.

MP 1908 TENSILE STRENGTH OF MULTI-YEAR PRES-SURE RIDGE SEA ICE SAMPLES

Cox, G.F.N., et al, Sep. 1985, 107(3), p.375-380, 20 refs.

Richter-Menge, J.A.

40-364
PRESSURE RIDGES, ICE STRENGTH, TENSILE PROPERTIES, SEA ICE, STRAINS, TESTS.

TROPERTIES, SEA LCE, STRAIRS, 1ES13. Thirty-sux constant strain-rate uniaxual tension tests were performed on vertically oriented multi-year pressure ridge samples from the Beaufort Sea. The tests were performed on a closed-loop electro-hydraulic testing machine at two strain rates (1/10,000 and 1/1,000/s) and two temperatures (-20 and -5 C). This paper summarizes the sample preparation and testing techniques used in the investigation and presents data on the tensile strength, initial tangent modulus, and failure strain of the ice.

COMPARISON OF SPOT SIMULATOR DATA WITH LANDSAT MSS IMAGERY FOR DELI-NEATING WATER MASSES IN DELAWARE BAY, BROADKILL RIVER, AND ADJACENT WETLANDS.

Ackleson, S.G., et al. Aug. 1985, 60(8), p.1123-1129,

Klemas, V., McKim, H.L., Merry, C.J.

WATER RESERVES, REMOTE SENSING, HYDRODYNAMICS, RADIOMETRY, LANDSAT, WATER FLOW, DELAWARE BAY.

DNODYNAMICS, RADIOMETRY, LANDSAT, WATER FLOW, DELAWARE BAY.

The radiometric and spatial qualities of SPOT simulator and Landsat-3 MSS data are compared as to their ability to distinguish different water masses within Delaware Bay and z ljacent weiland areas. The SPOT simulator data contain a greater range of gray level values for all water careas than do the Landsat MSS data. The greater spatial resolution of the SPOT simulator data provides information about small-scale hydrodynamics not available on the Landsat MSS data. Both types of data show a plume of spectrally unique water flowing from Roosevelt Inlet into Delaware Bay. The plume is most visible in SPOT simulator band it (300-590 nm) and Landsat MSS band 4 (500-600 nm). In both bands, the plume appears dark relative to the surrounding Delaware Bay water. Recent hydrographic surveys characterize the plume as an ebb itial feature with high concentrations of dissolved and particulate organic matter believed to originate from the adjacent Canary Creek Marsh and Great Marsh. SPOT simulator data are found to delineate water masses with a high degree of separation Radiometrically degraded SPOT data produce similar results Landsat J MSS data, although useful for delineating water masses, do not produce good separation because of sensor noise

SIMULATED SEA ICE USED FOR CORRELATING THE ELECTRICAL PROPERTIES OF THE ICE WITH ITS STRUCTURAL AND SALINITY CHARACTERISTICS.

Gow, A.J., International Geoscience and Remote Sensing Symposium (IGARSS '85), Amherst, MA, Oct. 7-9, 1985. Digest, Vol. 1, New York, Institute of Electrical and Electronics Engineers, Inc. 1935,

p.76-82. 40-409

ICE ELECTRICAL PROPERTIES, SEA ICE, ICE CRYSTAL STRUCTURE, ICE SALINITY, REMOTE SENSING, REFLECTIVITY, ICE COVER THICKNESS, ICE GROWTH, EX-PERIMENTATION.

MP 1911 DIELECTRIC PROPERTIES AT 4.75 GHZ OF SALINE ICE SLABS.

Arcone, S.A., et al, International Geoscience and Remote Sensing Symposium (IGARSS '85), Amherst, MA, Oct. 7-9, 1985. Digest, Vol. 1, New York, Institute of Electrical and Electronics Engineers, Inc., 1985, p.83-86, 10 refs.

McGrew, S.G.

40-410
ICE ELECTRICAL PROPERTIES, SEA ICE, ICE
SALINITY, MICROWAVES, DIELECTRIC PROPERTIES, RADIOMETRY, BRINES, EXPERIMEN-

The complex relative dielectric permittivity of saline ice The complex relative dielectric permittivity of saline is slabs removed from an artificially grown rec sheet has been measured at 4.75 GHz as a function of temperature. The frequency lies within the range used by other researchers who conducted radiometric tests concurrently on the same ice sheet. The slabs were placed between open waveguide radiators and defectine properties calculated from the forward scattering coefficient. The results show both real (k²) and imaginary (k²²) parts to vary almost in direct proportion to the brine volume. However, the values for k² show more variation, probably due to scattering.

LABORATORY STUDIES OF ACOUSTIC SCAT-TERING FROM THE UNDERSIDE OF SEA ICE. Jezek, K.C., et al. International Geoscience and Remote Sensing Symposium (IGARSS '85). Amherst, MA, Oct. 7-9, 1985. Digest, Vol. 1. New York, Insti-tute of Electrical and Electronics Engineers, Inc., 1985, p.87-91.

Gow, A.J., Stanton, T.K.

ICE ACOUSTICS, ICE BOTTOM SURFACE, SEA ICE, ATTENUATION, REMOTE SENSING, ACOUSTIC MEASUREMENT.

ACOUSTIC MEASUREMENT.

An analysis has shown that reflection coefficient for growing see is about .06

This coefficient increases dramatically as the see decays.

At frequencies above 100 kHz, exittering is dominated by the orienties at the base of the see. Fluctuations in normal incidence echoes are significant above 100 kHz.

Backscatter from the undertide of sea see does not change significantly as the size grows out of the melt (0 to 10 cm thick). Attenuation is found to be far greater than the attenuation reported by Langitchen who performed measurements horizontally and away from the dendritic sayer (same acoustic fromemers). (same acoustic frequencies)

100 MHZ DIELECTRIC CONSTANT MEASURE-MENTS OF SNOW COVER: DEPENDENCE ON ENVIRONMENTAL AND SNOW PACK PARAM-ETERS.

Burns, B.A., et al. International Geoscience and Remote Sensing Symposium (IGARSS '85), Amherst, MA, Oct. 7-9, 1985. Digest, Vol. 2, New York, Insti-1985, p.829-834, 3 refs. Larson, R.W., Onstott, R.G., Fish, D.J.

SNOW COVER DISTRIBUTION, SNOW ELEC-TRICAL PROPERTIES, REMOTE SENSING, MI CROWAVES. DIELECTRIC PROPERTIES, SNOW DEPTH SNOW WATER CONTENT, SI'R-FACE ROUGHNESS, SNOW TEMPERATURE. SNOW DENSITY

SNOW DENSITY

Snow cover of both land and ocean (sea use) areas presents a challeng to remote sensing. On one hand, it acts as a mask over surfaces of interest and part of the remote sensing problem is then to deterrine whether the soom cover is transparent, opaque, or partially transparent resulting in an ariskinguous signature. On the other hand, the properties of the snow cover uself may be of interest, sine as depth, snow myter equivalent and coverage. Microwave remote securics of their capabilities to pentitate the surface, deter small wetness differences and operate in all weather condenses. (Foster, et al., 1945). To relate this potential in ordersant to understand how snow properties affect remote seame signatures. Microwave signatures of snow are a fanction

of diciectric constant as well as surface roughness and depth A primary objective therefore is to determine the relationship between the dielectric constant and environmental parameters, including physical properties of the snow cover and local meteorological variables

MP 1914

ICE CONDITIONS ON THE OHIO AND IL-

LINOIS RIVERS, 1972-1985.
Gatto, L.W., International Geoscience and Remote Sensing Symposium (IGARSS '85), Amherst, MA. Oct. 7-9, 1985. Digest, Vol. 2, New York, Institute of Electrical and Electronics Engineers, Inc., 1985, p.356-361, 3 refs.

RIVER ICE, ICE CONDITIONS, ICE FORECASTING, REMOTE SENSING, MAPPING, AERIAL SURVEYS, UNITED STATES—OHIO RIVER, UNITED STATES—ILLINOIS RIVER.

MP 1915

SHEET ICE FORCES ON A CONICAL STRUC-TURE: AN EXPERIMENTAL STUDY.

Sodhi, D.S., et al, Arctic Energy Technologies Workshop, Morgantown, WV, Nov 14-15, 1934 Proceed-Ings. U.S. Department of Energy, Morgantown Energy Technology Center, DOE/METC-85/5014, Apr. 1985, p.46-54, DE85003360, 11 refs.

Morris, C.E., Cox, G.F.N. 10.611

ICE PRESSURE, OFFSHORE STRUCTURES, ICE LOADS, FLEXURA! STRENGTH, ICE COVER THICKNESS, ICE FRICTION, ICE SHEETS, SUR-FACE PROPERTIES, ICE MECHANICS, VELOCI-

TY. Small-scale experiments were performed to determine sheet see forces on a conical structure. The experiments were conducted with a 45 deg, upward-breaking conical structure which had diameters of 15 m at the waterine and 0.33 m at the top. The surface of the structure was initially smooth, later it was initialized to investigate the effect of surface friction on the ice load. The thickness and the fleaural strength of ice sheets were varied, and the tests were conducted at three fixed velocities. The measured tests were conducted at three fixed velocities. The measured forces for tests conducted for a low coefficient of friction (0.1), whereas some velocity effect on the horizontal ice forces is found for tests conducted with the rough surface forces are higher at lewer vewcrities. The surface having a coefficient of friction equal to 0.5. The horizontal ice forces are higher at lewer vewcrities. The sure of the broken ice preces, determined from a power spectrum analysis of the horizontal ice force records, was found to be about one-third of the characteristic length.

MP 1916

MP 1916

MEASURING MULTI-YEAR SEA ICE THICK-NESS USING IMPULSE RADAR.

Kovaza, A., et al. Arctic Energy Technologies Workshop, Morgantown, WV, Nov. 14-15, 1984. Proceedings, U.S. Department of Energy, Morgantown Energy Technology Center, DOE METC 85-6014. Apr 1985, p.55-67. DE85003360, 6 refs

Morey, R.M 40-645

ICE COVER THICKNESS, REMOTE SENSING, ICE BOTTOM SURFACE, ICE STRUCTURE, RADAR ECHOES, SEA ICE, ICE DETECTION, BRINES, ICE ELECTRICAL PROPERTIES

BRINES, ICE ELECTRICAL PROPERTIES. Sounding of multi-year sea see, using impulse radar operating in the 30- to 500 MHz frequency band, revealed that the hottom of this see could not always be detected. It was found that the bottom of the see could not be detected where the see structure had a high being centern! Because of Sinus's high conductivity, bring volume dominates the loss mechanism in first year sea see, and the same was found true for multi-year sea see. Technimary findings also induste that a representation value for the apparent balk dedectine constant of multi-year sea see is \$1.5. This represents an effective EM wavefer velocity of 0.16 m in, which may be used to estimate multi-year sea see theckness in cases where the see bottom is detected in see provide data. 411

PRELIMINARY SIMULATION STUDY OF SEA ICE INDUCED GOUGES IN THE SEA FLOOR. Weeks, W.F., et al. Arctic Energy Technologies Workshop, Morgantown, W.V., Nov. 14-15, 1984 Proceedings, U.S. Department of Energy, Morgantown Energy Technology Center, DOE METC-85 6014, Apr. 1985, p. 126-135, DES5003360, 16 refs. Technology W.B., Nordands, S. W.

Tucker, W.B., Niedoroda, A.W. 40-651

ICF SCORING, SEDIMENT TRANSPORT, OCEAN BOTTOM, BOTTOM TOPOGRAPHY. TRANSPORT. GRAIN SIZE, BOTTOM SEDIMENT, BEAUFORT

I unwater mode for sea accurated proges on the shed of the Resident Sea is developed by assumpt people on the second Sea is developed by assumpt that the second occurrence of new googles is given by a Postson distribution the locations of the googles are random, and the distribution

of gouge depths is specified by an exponential distribution. Once a goige is formed at it subject to infilling by transport of sediment into the region and by local movement of sediment along the sea floor. These processes are modeled by assuming a sediment input based on stratigraphic considerations and by calculating bed-load transport using methods floor sediment transport theory. It is found that if currents are stiffenent to transport sediment, rayed infilling of gouges occurs. In that these thresheld currents are small for typical grain sizes on the Beaufort Shelf, this suggests that the goiging recised commonly represents only a few tens of years.

MP 1918

MAPPING RESISTIVE SEABED FEATURES USING DC METHODS.

OSING DC METHODS. Sellmann, P.V., et al, Arctic Energy Technologies Workshop, Morgantown, WV, Nov. 14-15, 1984, Proceedings, U.S. Department of Energy, Morgan-town Energy Technology Center, DOE/METC-85/6014, Apr. 1985, p. 136-147, DE85003360, 6 refs. Delaney, A.J., Arcone, S.A. 40-652

SUBSEA PERMAFROST, OCEAN BOTTOM, BOTTOM SEDIMENT, SOIL STRENGTH, ELEC-TRIC EQUIPMENT, MAPPING, MODELS.

TRIC EQUIPMENT, MAPPING, MODELS.
Geophysical field observations of apparent resistivity using Wenter and dipole-dipole electrode arrays were made at sciental New England coastal sites. The objective was to assess the performance of these systems in detecting resistive scabed features as an innexation of their potential for tubica permafront mapping. Two sites on the Maine coast acre used for observations on bedook below a thin layer of sediments. A seaborne survey was then conducted in New Haven Harbor, Connecticut, at a site where the depth to bedrook below a three states where the depth to bedrook below a three the depth to bedrook below a three depth to bedrook below a three the depth to bedrook below a first where the define the range of apparent resistivity values expected in areas of subsea permation), the effect of water depth so the quality of a survey, and the vertical and lateral resolution expatibities of the arrays used. Good qualitative agreement between took depth and resistivity was observed, even with rock depths up to 50 m below the scabed. Data were also collected in a reas where storme methods had been make to extract subbottom information due to the gas content of local organs sediments.

MP 1919 RECONSIDERATION OF THE MASS BALANCE OF A PORTION OF THE ROSS ICE SHELF, AN-TARCTICA.

Jezzk, K.C., et al. 1984, 30(106), p.381-384, 6 refs., With French and German summaries.

Bentley, C.R 39-3793

ICE SHELVES, GROUNDED ICE, MASS BAL-ANCE, ANTARCTICA -ROSS ICE SHELF.

ANCE, ANTARCHICA-ROSS ICE STREET.

The identification of a small report of grounded see in
the north-vestern sector of the Ross Ice Shell has forced
a recycliustion of the mass-balance casulations carried out
by Thomas and Rentify (1478). Those anthers concluded
that the Ross Ice Shell up-stream of Crary Ice Rise was
tinckening, but they did not take into account the effects
on the velocity field of grounded see which is located near
the input gate to their volume element. Reasonable estin aterof the decree for which the interior of the decree for their section. the input gate to their solume element. Reasonable estimates of the degree to which the use videous past spiritum of the grounded as in diminished indicate that it is no longer possible to conclude that the use shell is thickening using Thomas and Bentley's original flow hand. Therefore, a new firm hand, was chosen which was grid east of Thomas and Bentley's would and maffected by any nearby grounded areas. The mass balance in this flow hand was found to be zero within experimental critical a difference exceeding about 0.2 in a in magnifiede beforeen the thickness good bottom freeze-on rates is unlikely. (Auth.)

MP 1920
PREFERENTIAL DETECTION OF SOUND BY
PERSONS BURIED UNDER SNOW AVALANCHE DEBRIS AS COMPARED TO PERSONS ON THE OVERLYING SURFACE,
Johnson, J.B., International Snow Science Workshop,
Aspen, CO., Oct. 24-27, 1954. Proceedings, Aspen,
CO. ISSW Workshop Committee, (1954, p.42-47, 8)

sef.

4C-501

RESCUE OPERATIONS, AVAILANCHE DEPOSITS, DETECTION, SNOW ACOUSTICS, SNOW COVER EFFECT, SOUND WAVES, ATTENUA

TION. The preferential detection of smooth is a person based under stome can be explained by the strong attenuation of assistantians can be explained by the strong attenuation of assistantians in some and the recultives togeth even of basing mind assistant some many and the soon satisfact as compared to an avalanche himal column. This move massis smooth transmitted to persons no the soon sentence cassing a columnous of Egisting several net as compared to the basin column. Mediumnia the intering on consisting of a burief indexistant is generally greater from persons making on the soons surface in casing the softly treatments of sound.

NEW CLASSIFICATION SYSTEM FOR THE SEASONAL SNOW COVER.

SEASONAL SNOW COVER.

Colbeck, S.C., International Snow Science Workshop,
Aspen, CO, Oct. 24-27, 1984. Proceedings, Aspen,
CO, ISSW Workshop Committee, [1984], p.179181, 3 refs.

40-825 SNOW CRYSTAL STRUCTURE, METAMOR-PHISM (SNOW), SNOW WATER CONTENT, FREEZE THAW CYCLES, CLASSIFIC. TO ICE CRYSTAL GROWTH, SNOW MELTING, SNOW COVER, GRAIN SIZE.

SNOW COVER, GRAIN SIZE.

It is necessary to assign terms to snow crystals so that we can refer to them at any time. TCSI (1954) suggested five classes of snow crystals but many in .c. tant types of crystals were not included. Sommerfel. '969) and then Sommerfeld and Lachapelle (1970) suggestal as classification based on processes because, if the processes could be correctly identified, information would be provided about both crystal shares and metamorphic processes. Unfortunately, many identified, information would be provided about both crystal shapes and metamorphic processes. Unfortunately, many of the names used—equitemperature, temperature gradient, and melt-freeze—can misrepresent the processes responsible for generating those shapes. Other terms are suggested here in hopes of correctly describing snow crystals. Only the major categories are dealt with here; a more detailed classification will be published later.

MP 1922

REVIEW OF ANALY CAL METHODS FOR GROUND THERMAL REGIME CALCULA-TIONS.

Lunardini, V.J., Thermal design considerations in froz-en ground engineering. Edited by T.G. Krzewinski and R.G. Tart, Jr., New York, NY, American Society of Civil Engineers, 1985, p.204-257, 33 refs.

PERMAFROST THERMAL PROPERTIES. FROZ-PERMAFROST THERMAL PROPERTIES, FROZ-EN GROUND TEMPERATURE, THERMAL REGIME, HEAT TRANSFER, STRUCTURES, HEAT BALANCE, PHASE TRANSFORMA-TIONS, STEFAN PROBLEM, ANALYSIS (MATH-EMATICS).

MP 1923

THAWING OF FROZEN CLAYS.

Anderson, D.M., et al, Freezing and thawing of soil-water systems. Edited by D.M. Anderson and P.J. Williams, New York, NY, American Society of Civil Engineers, 1985, p.1-9, 11 refs.

Tice, A.R. 40-612

40-612
GROUND THAWING, CLAYS, SOIL WATER MIGRATION, GROUND ICE, ICE NUCLEI, POROUS MATERIALS, LATENT HEAT, UNITROZEN
WATER CONTENT, ICE CRYSTALS, TEMPERA-TURE EFFECTS, PHASE TRANSFORMATIONS.

MP 1924
PARTIAL VERIFICATION OF A THAW SETTLEMENT MODEL.

Guymon, G.L., et al, Freezing and thawing of soil-water systems. Edited by D.M. Andersen and P.J. Williams, New York, NY, American Society of Civil Engineers, 1985, p.18-25, 6 refs.

Berg, P.L., Ingersoll, J. 40-614

40-014
GROUND THAWING, SET FLEMENT (STRUCTURAL), HEAT TRANSFER, MOISTURF
TRANSFER, FROST HEAVE, FREEZE THAW
CYCLES. MODELS, THAW WEAKENING, TESTS.

Results from a one-dimensional model that estimates frost Results from a one-dimensional model that estimates frost heave and thaw settlement are compared to insoratory soil column data. The model is based upon well known equations that describe heat and moisture flow in soils Processes in freezing or thawing zones are approximated by a lumped sothermal heat budget approach as well as phenomenological equations that account for overburden effects and reduced fluid movement due to ice formation. Labyratory soil column data were obtained for one-dimensional freezing and then thawing of a sitt soil. The model results accurately estimate temperature distributions and pore water p. essures during thawing.

MP 1925

HYDRAULIC PROPERTIES OF SELECTED SOILS.

Ingersoll, J., et al, Freezing and thawing of soil-water systems. Edited by D.M. Anderson and P.J. Williams, New York, NY, American Society of Civil Engineers, 1985, p.26-35, 4 refs.

40-615

40-615
SOIL WATER, FROST HEAVE, SETTLLMENT
(STRUCTURAL), FREEZE THAW CYCLES,
PAVEMENTS, TENSILE PROPERTIES, SOIL
STRUCTURE, GRAIN SIZE, MATHEMATICAL

The method and equipment used to coincidentally determine the hydraulic conductivity versus soil moisture tension and

soil moisture tension versus moisture content relationships are described. Over 30 soils have been tested, including gravels, sands, silts and clays. Most of the work has been conducted at soil moisture tensions less than 100 kPa (1 bar), but a few moisture retention curves extend to about 12 bars of soil maintage quoties. 12 bars of soil moisture suction Results for one soil from each type are described and discussed in detail. Grain trom each type are described and discussed in detail. Grain size distributions and the two hydraulic relationships are shown for each of the four soils. An equation suggested by Gardner is used to approximate both relationships. Coefficients for Gardner's equations for several different soils have been obtained and are tabulated.

MODEL FOR DIELECTRIC CONSTANTS OF

FROZEN SOILS.
Oliphant, J.L., Freezing and thawing of soil-water systems. Edited by D.M. Anderson and P.J. Williams, tems. Edited by D.M. Anderson and P.J. Williams, New York, NY, American Society of Civil Engineers, 1985, p.46-57, 17 refs. 40-617

FROZEN GROUND PHYSICS, SOIL COMPOSITION, GROUND THAWING, UNFROZEN WATER CONTENT, DIELECTRIC PROPERTIES, TEMPERATURE EFFECTS, NUCLEAR MAGNETIC RESONANCE.

The dielectric constant of frozen soils is made up of contribu-tions from each phase—mineral, ice, air and liquid water —in the soil. Solinite, Morin clay and Palouse sit-loam, were measured under both thawed and frozen conditions at various soils, a kaominet, which they and readuse shrotain, were measured under both thawed and frozen conditions at various temperatures and various water contents using time domain reflectometry (TDR). Nuclear magnetic resonance (NMR) was used to measure the unfrozen water contents of these soils at subfreezing temperatures. The NMR data were used to calculate the volume fractions of the ice and liquid water phases in the TDR experiments. It was found that a mixing model for the apparent dielectric constant of the soil samples assuming spherical air, ice and minderal inclusions in a water matrix was able to closely fit the TDR data. To obtain the best fit it was necessary to use an average dielectric constant for water somewhat less than that for bulk water. The mixing model can be used for the interpretation of TDR data obtained in the field. This allows for the measurement of unfrozen water contents using TDR at temperatures just below 0 C, where the liquid water phase makes up a significant portion of the TDR signal.

MP 1927 FROST HEAVE OF FULL-DEPTH ASPHALT CONCRETE PAVEMENTS.

Zomerman, I., et al, Freezing and thawing of soil-water systems. Edited by D.M. Anderson and P.J. Williams, New York, NY, American Society of Civil Engineers, 1985, p.66-76, 12 refs.

Berg, R.L. 40-619

40-619
FROST HFAVE, PAVEMENTS, BITUMINOUS
CONCRETES, THAW WEAKENING, SOIL WATER, SOIL STRUCTURE, FROST PENETRATION, CRAIN SIZE, TESTS, HEAT TRANSFER,
MOISTURE TRANSFER, FROST RESISTANCE.

MOISTURE TRANSPER, FROST RESISTANCE. During 1984 and early 1985 frost penetration, frost heave and thaw weakening were monitored on two full-depth test section as CRREL. The subgrade soil beneath one test section was a lean c'ty and the subgrade soil beneath the second test section was Hanover silt. Laboratory frost susceptibility tests were corducted for each soil, as were moisture retention curves and curves relating moisture content and unsaturated hydratic conditions. Results from the laboratory tests were used with FROSTIB, a coupled heat and mass flow computer model, a simulate performance or the field test sections. FROSTIB had never been applied to a cohesive soil similar to the lean clay. Results and mass now computer model, 3 simulate performance or the field test sections. FROSTIB had never been applied to a cohesive soil similar to the lean clay. Results from model 5 mulations on both soils agreed well, 1 e within shout 15% with field measurements of frost heave and frost penetration with time

MP 1928

CREEP STRENGTH, STRAIN RAIE, TEMPERA-TURE AND UNFROZEN WATER RELATION-SHIP IN FROZEN SOIL

Fish, A.M., International Symposium on Ground Freezing, 4th, Sapporo, Japan, Aug. 5-7, 1985. Proceedings, Vol.2, [Rotterdam, A.A. Balkema, 1985], p.29-36, 32 refs.

FROZEN GROUND STRENGTH, SOIL CREEP, STRAINS, FROZEN GROUND TEMPERATURE, UNFROZEN WATER CONTENT, FROZEN GROUND PHYSICS, COMPRESSIVE PROPERTIES, TEMPERATURE EFFECTS, ANALYSIS (MATHEMATICS)

(MATHEMATICS)
A relationship was develope, between maximum (peak) strength, strain rate, strain, and temperature using data on unitaxial compression of remolded frozen Fairbanks silt obtained in the temperature range from -0.5 to -10. C at constant strain rates (CuR) that varied between 1/100 and 1/1,000,000/s. It is shown that three principal parameters of frozen oul define the "agnitude of strength at a given strain rate, the instantaneous strength, the activation energy, and the strain hardenne parameters are the strain hardenne parameters. and the strain hardening parameter all relate to each other. Their absolute values depend upon temperature and are linked

with the simplest physical characteristics of soil and especially the ice and unfrozen water contents. The activation energy of frozen soil is presented as a sum of two components: activation energy of the soil skeleton and activation energy of the unfrozen water. The activation energy of frozen soil varied due to the changes of unfrozen water content between 16 6 and 13.2 kcal/mole.

MP 1929

PREDICTION OF UNFROZEN WATER CON-TENTS IN FROZEN SOILS BY A TWO-POINT OR ONE-POINT METHOD.

Xu, X., et al, International Symposium on Ground Freezing, 4th, Sapporo, Japan, Aug. 5-7, 1985. Pro-ceedings, Vol.2, ¡Rotterdam, A.A. Balkema, 1985], p.83-87, 5 refs. Oliphant, J.L., Tice, A.R.

FROZEN GROUND, UNFROZEN WATER CON-TENT, DENSITY (MASS/VOLUME), TEMPERA-TURE EFFECTS.

The unfrozen water content in frozen soils, with different initial water content, dry density and molality, was determined by the nuclear magnetic resonance technique. Results show that the unfrozen water content in frozen morin clay changes with the initial water content and the dry density only within a range of three percent of the dry soil weight, and increases with the increase in the molality linearly because of the linear freezing point depression. The curves of the unfrozen water content vs temperature are quite parallel with the change in the initial water content and rots'e a little bit counterclockwise with the increase in the dry density. On the basis of the data mentioned above, a two-point method by the measurements of two freezing points at two different initial water contents, and a one-point method by the measurement of the unfrozen water content at The unfrozen water content in frozen soils, with different at two different initial water contents, and a one-point method by the measurement of 'he unfrozen water content at - 1 C if the initial water content and its freezing point are given, is presented.

Errors of predicting the unfrozen water content are 1-3% on the average for the two-point method and 1% or so for the one-point method.

MP 1930

FROST JACKING FORCES ON H AND PIPE PILES EMBEDDED IN FAIRBANKS SILT. Johnson, J.B., et al, International Symposium on

Jonnson, J.B., et al, International Symposium on Ground Freezing, 4th, Sapporo, Japan, Aug. 5-7, 1985. Proceedings, Vol.2, [Rotterdam, A.A. Balkema, 1985], p.125-133, 5 refs. Esch, D.C. 40-676

FROST HEAVE, PILE EXTRACTION, PIPELINE SUPPORTS, SHEAR STRESS, PERMAFROST DISTRIBUTION, FOUNDATIONS, TEMPERA-TURE EFFECTS, FROZEN GROUND MECHAN-FROST PENETRATION, COUNTERMEAS-URES.

URES.
The magnitude and variation of forces and shear stresses, caused by soil frost heaving, for a pipe pile and an H pile were determined as a function of depth along the upper 3 m of the piles for two consecutive winters. The maximum frost heaving forces on the H pile during each winter were 943 kN and 899 kN The maximum frost heaving force on the pipe pile was 703 kN Maximum local shear stresses for the H pile were 1 MPa and 903 kPa for the two winters. The maximum local shear stress for the tipe pile was 896 kPa Maximum average shear stresses over the two winters were 324 kPa and 427 kPa for the pipe pile and 324 kPa for the pipe pile. Maximum heaving forces and shear stresses occurred during periods of maximum cold and soil surface heave magnitude. These were related to the depth of frost for most of the winter the soil was frozen completely to the permafrost table.

SHEAR STRENGTH ANISOTROPY IN FROZEN SALINE AND FRESHWATER SOILS.

Chamberlain, E.J., International Symposium on Ground Freezing, 4th, Sapporo, Japan, Aug. 5-7, 1985. Proceedings, Vol.2, [Rotterdam, A.A. Balkema, 1985], p.189-194, 2 refs. 40-687

FROZEN GROUND STRENGTH, SHEAR STRENGTH, ANISOTROPY, SALINITY, CLAY SOILS, SANDS, TESTS.

The shear strength anisotropy of frozen freshwater and seawater clay and sand soils was investigated using the direct shear technique. Samples were sheared at angles of 0, 30, 60 and 90 degrees between the shear and freezing planes. and yo degrees between the shear and freezing planes. Because of variations in sample density, there was considerable scatter in the data. This scatter and the relationship of the maximum shear strength to the angle between the shear and freezing planes were accounted for by conducting multiple linear regression analysis on empirical equations relating the test variables to the shear strength. MP 1932 SOIL-WATER POTENTIAL AND UNFROZEN WATER CONTENT AND TEMPERATURE.

Xu, X., et al, 1985, 7(1), p.1-14, 8 refs., In Chinese with English summary

Oliphant, J.L., Tice, A.R.

FROZEN GROUND TEMPERATURE. CLEAR MAGNETIC RESONANCE, UNFROZEN WATER CONTENT, SOIL WATER, SOIL STRUC-TURE, WATER CONTENT, FREEZING POINTS, SOIL CHEMISTRY, SOIL TEMPERATURE, DEN-SITY (MASS/VOLUME).

SITY (MASS/VOLUME).
Soil-water potential was determined by the extraction method and four factors affecting the soil-water potential, including water content, soil type, dry density and temperature, were investigated. The unfrozen water content of frozen soils was determined by the pulsed nuclear magnetic resonance technique and three factors affecting the unfrozen water content, including initial water content, dry density and salt concentration, were investigated. Results have shown that the soil-water potential in the unsaturated, unfrozen soils decreases both with the decrease in the water content and with the increase in the dispersion of the soil and increases with the increases in the dry density and temperature. The unfrozen water content and the dry density and temperature with the increase in the salt concentration.

MP 1933

EFFECTS OF SOLUBLE SALTS ON THE UN-FROZEN WATER CONTENTS OF THE LANZ-HOU, PRC, SILT.

Tice, A.R., et al, June 1985, 7(2), p 99-109, In Chinese with English summary, 20 refs For English version see 39-2916. Zhu, Y., Oliphant, J.L.

40.830

40-830 UNFROZEN WATER CONTENT, FROZEN GROUND PHYSICS, SALINE SOILS, ELECTRI-CAL RESISTIVITY, SOIL CHEMISTRY.

CAL RESISTIVITY, SOIL CHEMISTRY.

Phase composition curves are presented for a typical saline sailt from Lanzhou and compared to some silts from Alaska. The unfrozen water content of the Chinese silt is much higher than the Alaskan silts. This higher amount is due to the large amount of soluble salts present in the silts from China which are not present in the silts from miterior Alaska. When the salts are removed, the unfrozen water contents are then similar for the Chinese and Alaskan silts. We have introduced a technique for correcting the unfrozen water content of partially frozen soils due to high salt concentrations. This correction is possible by calculating the modality of the unfrozen water at each temperature from a measurement of the electrical conductivity of the extract of a saturated paste.

WATER MIGRATION IN UNSATURATED FROZEN MORIN CLAY UNDER LINEAR TEM-PERATURE GRADIENTS.

Xu, X., et al, June 1985, 7(2), p.111-122, 14 refs, In Chinese with English summary.

Oliphant, J.L, Tice, A R.

40-831

SOIL WATER MIGRATION, CLAY SOILS, FROZEN GROUND PHYSICS, SATURATION, TEMPERATURE GRADIENTS.

MP 1935 PRESSURE RIDGE MORPHOLOGY PHYSICAL PROPERTIES OF SEA ICE IN THE GREENLAND SEA.

Tucker, W.B, et al, Arctic Oceanography Conference and Workshop, Hattiesburg, MS, June 11-14, 1985. Proceedings, U.S. Department of the Navy, 1985, p.214-223, 13 refs Gow, A.J., Weeks, W.F. 40.057

40-957

PRESSURE RIDGES, ICE STRUCTURE, ICE PHYSICS, SEA ICE, SALINITY, GROUNDED ICE, ICE CRYSTAL STRUCTURE, ICE FLOES. GRÉENLAND SEA.

Field investigations of pressure ridge sails have shown that ridge height is limited by the thickness of the ice that deformed sail height and width can be conveniently expressed as functions of the thickness of the ice blocks contained in the ridge Surface dimensions of the blocks. expressed as functions of the thickness of the ice blocks contained in the ridge. Surface dimensions of the blocks are also related to ice thickness. Ridge height may be determined by the ability of the parent sheet to support the loading imposed by the ridge or by the type of failure occurring. Some insight into the structure of ridge keels may result from detailed study of the sails. The physical properties of sea ice in the Fram Strait region of the Greenland Sea were examined as part of the MIZEX field program in 1984. The properties measured at each sampling site included salinity, temperature, thickness, crystal structure and snow depth. The measured salinities agreed well with those measured elsewhere in the Arctic during summer Crystal texture analysis indicated that about 75° of the ice consisted of columnar type crystal structure. The remaining 25% consisted of granular ice.

MP 1936

MECHANICAL PROPERTIES OF MULTI-YEAR PRESSURE RIDGE SAMPLES.

Richter-Menge, J.A., Arctic Oceanography Conference and Workstop, Hatricsburg, MS, June 11-14, 1985. Proceedings, U.S. Department of the Navy, 1985, p.244-251, 19 refs.

PRESSURE RIDGES, ICE MECHANICS, COM-PRESSIVE PROPERTIES, TENSILE PROPER-TIES, ICE DENSITY, MECHANICAL TESTS, SALINITY

Over 500 laboratory tests have recently been completed on ice samples collected from multi-year pressure ridges in the Alaskan Beaufort Sea. Tests were performed in uniaxial constant-strain-rate compression and tension and in confined compression. The tests were conducted at two temperatures, -5 and -20 C, and four strain rates ranging from 1/100 to 1/100,000/s. This discussions ammarizes the sample preparation and testing techniques used in the investigation and presents data on the compressive, tensile and confined compressive strength of multi-year ridge samples. This information is necessary for designing arctic structures and vessels that must withstand the impact of a multi-year pressive ridge. Over 500 laboratory tests have recently been completed

MP 1937 EXPERIENCE WITH A BIAXIAL ICE STRESS SENSOR.

SENSOR.

Cox, G.F.N., Arctic Oceanography Conference and Workshop, Hattiesburg, MS, June 11-14, 1985. Proceedings, U.S. Department of the Navy, 1985, p.252-258, 10 refs. 40.961

ICE PRESSURE, ICE STRENGTH, STRESSES, LOADS (FORCES), OFFSHORE STRUCTURES, ICE MECHANICS, ICE LOADS, TESTS, SEA ICE, ICE NAVIGATION.

ICE NAVIGATION.

A biaxial ice stress sensor has been developed to measure the magnitude and direction of the principal stresses in an ice sheet. Controlled laboratory tests indicate that the sensor has a resolution of 20 kPa and an accuracy of better than 10% under a variety of loading conditions. The sensor has been successfully used to measure thermal ice pressures in lakes and ice loads on a caisson-retuined island in the Beaufort Sea.

MP 1938 NUMERICAL SIMULATION OF SEA ICE IN-DUCED GOUGES ON THE SHELVES OF THE

DUCED GOUGES ON THE SHELVES OF THE POLAR OCEANS.
Weeks, WF, et al, Arctic Oceanography Conference and Workshop, Hattiesburg, MS, June 11-14, 1985 Proceedings, US Department of the Navy, 1985, p 259-265, 16 refs.
Tucker, W.B.
40,962

40-962

40-962
ICE SCORING, COMPUTER PROGRAMS,
MATHEMATICAL MODELS, ICE SHELVES,
SEA ICE, SEDIMENT TRANSPORT, OCEAN
BOTTOM, DISTRIBUTION, STATISTICAL
ANALYSIS, STRATIGRAPHY, OCEAN CUR-RENTS

A simulation model for sea ice-induced gouges on the shelves of the polar seas is developed by assuming that the annual occurrence of new gouges is given by a Poisson distribution, the locations of the gouges are random, and the distribution of gouge depths is specified by an exponential distribution Once a gouge is formed it is infilled by assuming a sediment input based on stratigraphic considerations and by calculating bed-load transport using methods from sediment transport theory. If currents are sufficient to transport sediment, rapid infilling of gouges occurs. In that these threshold currents are small for typical grain sizes, this suggests that the gouging record commonly represents only a few tens of years

MP 1939

TEMPERATURE DEPENDENCE OF THE EQUI-LIBRIUM FORM OF ICE.

Colbeck, S.C., Sep. 1985, 72(3), p.726-732, 25 refs 40-981

ICE CRYSTAL GROWTH, ICE CRYSTAL STRUC-TURE, SNOW CRYSTAL STRUCTURE, TEMPERATURE EFFECTS, PLATES, SURFACE ROUGHNESS. EXPERIMENTATION

ROUGHNESS. EXPERIMENTATION
Individual crystals are grown under controlled conditions at temperatures between -0.6 and -20.C at rates as low as 1.0,000,090. The transition between the kinetic growth form and the equilibrium form is clearly distinguished at temperatures between -2 and -10.C where the equilibrium form is a well rounded plate with an aspect ratio of about 2.5. At temperatures below -11.C the equilibrium form is a well rounded plate with an aspect ratio. This transition coincides with the rapid increase in surface roughening on the prism faces at temperatures above -10.C. The equilibrium form is a fully rounded particle just below 0.C aithough we had expected the fully rounded particle to prevail down to at least -5.C. Furthermore, there are unresolved differences between these experimental results and observations of crystals from the scasonal snow cover

where particles are fully rounded at slow growth rates and low temperatures.

MP 1940

ICE JAM FLOOD PREVENTION MEASURES: LAMOILLE RIVER AT HARDWICK, VER-

MONT, USA.
Calkins, D.J., International Conference on the Hydraulics of Floods and Flood control, 2nd, Cambridge, England, Sep 24-26, 1985 Proceedings, Cranfield, Bedford, England, BHRA, The Fluid Engineering Centre, 1985, p.149-168, 4 refs.

ICE CONTROL, ICE JAMS, RIVER ICE, FLOODS, WATER LEVEL, TOPOGRAPHIC EFFECTS, COUNTERMEASURES.

COUNTERMEASURES.
Prevention of ice-induced flooding is very difficult, but the impact can be minimized if the winter ice regime can be altered. The Lamoille River at Hardwick, Vermont, is a steep, shallow stream during non-ice periods. Under ice jam conditions stage increases of 1-2 m above the elevation of the floodplain have been implemented to minimize the ice jam flood levels, their performance was evaluated for the winter of 1983-84.

MP 1941

GEOPHYSICAL SURVEY OF SUBGLACIAL GEOLOGY AROUND THE DEEP-DRILLING SITE AT DYE 3, GREENLAND.

Jezek, K.C., et al, 1985, No 33, p 105-110, 14 refs.

Roeloffs, E.A., Greischar, L L.

39-3573
GEOPHYSICAL SURVEYS, GLACIER BEDS, GLACIAL GEOLOGY, SUBGLACIAL OBSERVATIONS, BOREHOLES, TOPOGRAPHIC FEATURES, GEOMORPHOLOGY, RADAR ECHOES, TECTONICS, GREENLAND.

MP 1942 SIMPLE DESIGN PROCEDURE FOR HEAT TRANSMISSION SYSTEM PIPING.

Phetteplace, G, Intersociety Energy Conversion Engineering Conference, 19th, San Francisco, CA, Aug. 19-24, 1984 Proceedings Vol 3, American Nuclear Society, 1984, p.1748-1752, 4 refs. 40-1688

COST ANALYSIS, HEAT TRANSMISSION, PIPE-LINES, LOADS (FORCES), DESIGN, ANALYSIS (MATHEMATICS), HEATING, COOLING, HEAT

Piping systems represent the major portion of the total cost of most district heating applications and constitute a barrier to their widespread implementation

This paper presents to their widespread implementation a methodology for least-cost design of these systems under realistic conditions of varying load. Cost-effective design of piping for district he ling and cooling applications requires careful consideration of the various components of the owning and operating costs. These costs are included in the formulation of an optimization problem to determine the minimum cost design on a yearly cycle basis.

MP 1942

MP 1943 NITROGEN REMOVAL IN WASTEWATER STA-BILIZATION PONDS.

Reed, S.C., (1983), 13p. + figs., Presented at 56th Annual Conference of the Water Pollution Control Federation, Atlanta, Georgia, Oct 2-7, 1983 Un-published manuscript 14 refs 40-1089

WASTE TREATMENT, WATER TREATMENT, WATER POLLUTION, PONDS, COUNTER-MEASURES, DESIGN CRITERIA, LAND REC-LAMATION, CHEMICAL ANALYSIS.

LAMATION, CHEMICAL ANALYSIS.

A rational procedure for estimating nitrogen removal in facultative wastewater stabilization ponds has been developed and validated. The procedure, based on first order plug flow kineties is dependent on pH, temperature and residence time. The model was developed from extensive data obtained at four facultative ponds in various parts of the US and was validated with independent data from five pond systems in the US and Canada. The procedure should be useful whenever system design enteria require nitrogen removal or ntiffication. It should be particularly helpful for the pond component of land treatment systems when nitrogen is the limiting design parameter.

MP 1944

MP 1944 PROBLEMS WITH RAPID INFILTRATION—A

POST MORTEM ANALYSIS.
Reed, S.C., et al., [1984], 17p. + figs., Presented at 57th Annual Conference of the Water Pollution Control Federation, New Orleans, LA, Oct. 1-4, 1984 Lnr., olished manuscript. 7 refs. Crites, R.W., Wallace, A.T. 40,1086.

40-1086

WATER FREAFMENT, WASTE FREATMENT, SEEPAGE, GROUND WATER, DESIGN, COST ANALYSIS

Rapid infiltration is a reliable and cost effective technique for wastewater treatment. Over 300 municipal systems are in successful use in the United States. A few of the recently constructed systems have not satisfied all design.

expectations, particularly with respect to the amount of was-tewater that can infiltrate within the time allowed Correc-tion of these problems often requires additional construction and increases costs but the cumulative effect is also to raise general concerns within the profession regarding the suitability and applicability of the basic concept. An analysis of the failures, and some of the problem systems was conducted and this paper will describe the results

MP 1945 WETLANDS FOR WASTEWATER TREATMENT IN COLD CLIMATES.

Reed, S.C., et al, (1984), 9p. + figs., Presented at Water Reuse Symposium, 3rd, San Diego, CA, Aug. 26-31, 1984. Unpublished manuscript. 13 refs. 26-31, 1984. Unpublished manus Bastian, R., Black, S., Khettry, R. 40-1087

WASTE TREATMENT, WATER TREATMENT, COLD WEATHER PERFORMANCE, WATER LEVEL, GROUND WATER, VEGETATION FAC-TORS, SATURATION.

MP 1946
DESIGN, OPERATION AND MAINTENANCE
OF LAND APPLICATION SYSTEMS FOR LOW
COST WASTEWATER TREATMENT.
Reed, S.C., [1983], 26p. + £69, Presented at Workshop on Low Cost Waste water Treatment, Clemson,

SC, Apr. 19-21, 1983. Unpublished manuscript.

40-1088

WASTE TREATMENT, WATER TREATMENT, SEEPAGE, VEGETATION FACTORS, DESIGN CRITERIA, LAND RECLAMATION, SATURA-

INCIDENTAL AGRICULTURE REUSE AP-PLICATION ASSOCIATED WITH LAND TREATMENT OF WASTEWATER—RESEARCH NEEDS.

Environmental Engineering Research Council Workshop-Water Conservation and Reuse in Industry and Agriculture. Research Needs, Kiawah Island, South Carolina, Mar. 3-6, 1982. Proceedings, New York, NY, American Society of Civil Engineers, 1982, p.91-123, 34 refs.

40-1091
WASTE TREATMENT, WATER TREATMENT,
LAND RECLAMATION, SEEPAGE, AGRICULTURE, VEGETATION, IRRIGATION, DESIGN,
WATER POLLUTION, COUNTERMEASURES.

ENGINEERING SYSTEMS.
Loehr, R., et al, Workshop on Utilization of Municipal Wastewater and Sludge on Land, 1983. Proceedings. Edited by A.L. Page, L. Gleason, III, J.E. Smith, Jr., I.K. Iskandar, and L.E. Sommers, Riverside, University of California, 1983, p.409-417, Includes discussions.

W' TREATMENT, WATER TREATMENT, SUJIGES, LAND RECLAMATION, WATER POLLUTION, COUNTERMEASURES

MAINTAINING FROSTY FACILITIES. Reed, S.C., et al, Feb. 1985, p.9-15, 6 refs. Niedringhaus, L

40-1240 WASTE TREATMENT, WATER TREATMENT, COLD WEATHER OPERATION, MUNICIPAL ENGINEERING, MAINTENANCE, FLOW ENGINEERING, MAINTENANCE, FLOW MEASUREMENT, SEDIMENTATION, DAM-AGE, SLUDGES

GROWTH AND FLOWERING OF COTTON-GRASS TUSSOCKS ALONG A CLIMATIC TRAN-SECT IN NORTHCENTRAL ALASKA.

SEUL IN NORTHCENTRAL ALASKA.
Haugen, R.K., et al, Arctic Workshop, 13th, Boulder, CO. Mar. 15-17, 1984. ¡Proceedings, Boulder, University of Colorado, Institute of Arctic and Alpine Research, 1984, p 10-11, 2 refs
Shaver, G.R., King, G.G.

HUMMOCKS, PLANT PHYSIOLOGY, GROWTH, CLIMATIC FACTORS, AIR TEMPERATURE, PRECIPITATION (METEOROLOGY), PIPELINES, ALTITUDE, UNITED STATES ALAS-

MP 1951 DIELECTRIC STUDIES OF PERMAFROST USING CROSS-BOREHOLE VHF PULSE PROPAGATION.

Arcone, S.A., et al, May 1985, No.85-05, Workshop on Permafrost Geophysics, Golden, Colorado, Oct. 23-24, 1984. Proceedings, p.3-5, ADA-157 485, 1

Delaney, A.J.

40-1290
PERMAFROST PHYSICS, DIELECTRIC PROP-ERTIES, BOREHOLES, GROUND ICE, ELEC-TROMAGNETIC PROPERTIES, RADAR ECHOES, WAVE PROPAGATION, SOIL STRUC-TURE, PERMAFROST THERMAL PROPERTIES.

MP 1952 IMPULSE RADAR SOUNDING OF FROZEN

Kovacs, A., et al, May 1985, No.85-05, Workshop on Permafrost Geophysics, Golden, Colorado, Oct. 23-24, 1984. Proceedings, p.28-40, ADA-157 485, 1 ref. 24, 1984. Pro Morey, R.M. 40-1295

FROZEN GROUND PHYSICS, RADAR ECHOES, GROUND ICE, ICE DETECTION, SOUNDING, PIPELINES, PINGOS, ELECTROMAGNETIC PROSPECTING, ICE VOLUME.

ANALYSIS OF WIDE-ANGLE REFLECTION AND REFRACTION MEASUREMENTS.

Morey, R.M., et al, May 1985, No.85-05, Workshop on Permafrost Geophysics, Golden, Colorado, Oct. 23-24, 1984. Proceedings, p.53-60, ADA-157 485, 6

Kovacs

AU-1299
RADAR ECHOES, SUBSURFACE INVESTIGATIONS, DIELECTRIC PROPERTIES, REFLECTION, REFRACTION, MATHEMATICAL MODELS, WAVE PROPAGATION

SOME ASPECTS OF INTERPRETING SEISMIC DATA FOR INFORMATION ON SHALLOW

SUBSEA PERMAFROST.
Neave, K.G., et al, May 1985, No.85-05, Workshop on
Permafrost Geophysics, Golden, Colorado, Oct 2324, 1984 Proceedings, p.61-65, ADA-157 485, 6 refs.

Sellmann, P.V.

SUBSEA PERMAFROST, SEISMIC SURVEYS, PERMAFROST DISTRIBUTION, SEISMIC REFRACTION, SEISMIC VELOCITY, PERMA-FRACTION, SI FROST DEPTH.

MP 1955 GALVANIC METHODS FOR MAPPING RESIS-

GALVANIC METHODS FOR MAFFING RESISTIVE SEABED FEATURES.
Sellmann, P.V., et al, May 1985, No.85-05, Workshop on Permafrost Geophysics, Golden, Colorado, Oct. 23-24, 1984. Proceedings, p 91-92, ADA-157 485. Delaney, A.J., Arcone, S.A.
40-1305

SUBSEA PERMAFROST, PERMAFROST PHYSICS, GROUND ICE, CABLES (ROPES), MAPPING, SEA WATER, SALINITY.

MP 1956

MP 1956
HEAT TRANSMISSION WITH STEAM AND HOT WATER.
Aamot, HWC, et al, Cogeneration district heating applications Edited by I Oliker, New York, American Society of Mechanical Engineers, 1978, p 17-23, Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, San Francisco, California, December 10-15, 1978. 6 refs Phettenlace. G. Phetteplace, G.

40-1267

40-126/ HEAT TRANSMISSION, WATER PIPES, WATER TEMPERATURE, FLUID FLOW, HEAT FLUX, HEAT LOSS, FLOW RATE, METEOROLOGICAL FACTORS, PRESSURE, COMPUTER APPLICA-TIONS, DESIGN.

A methodology for design of heat transmission lines is presented. It is based on finding the pipe diameter which yields the lowest total cost. Cost factors considered are cost of energy lost in the form of heat, cost of energy to produce pumping work, and cost of capital to construct the system. The methodology has been developed into a computer code which allows for rapid analysis of alternatives. Results are presented, based on certain assumptions, for various parameters of interest.

THEORY OF NATURAL CONVECTION IN

Powers, D., et al, Oct. 20, 1985, 90(D6), p.10,641-10,649, 31 refs. O'Neill, K., Colbeck, S.C.

40-1224 SNOW 40-1224
SNOW PHYSICS, CONVECTION. THERMAL
CONDUCTIVITY, HEAT TRANSFER, MASS
TRANSFER, PHASE TRANSFORMATIONS,
POROUS MATERIALS, WATER VAPOR, LATENT HEAT, MATHEMATICAL MODELS,
THEODIES THEORIES.

THEORIES.

THEORIES.

Buoyancy-driven flows of air in snow are modeled including the effects of phase change and inclination. Phase change between water vapor and uce is important because of latent heat terms in the energy equation. Upper boundaries of the snow are taken as either permeable or impermeable, with temperature or heat flux specified at the lower boundary. When the ratio of thermal to mass diffusivity is greater than 1, phase change intensifies convection. When this ratio is less than 1, phase change admps convection. The effects of permeable top and uniform heat flux bottom boundary conditions on heat transfer are quantified and described as linear functions of Ra/Ra(cr), where Rs is the Rayleigh number and cr refers to the critical value for the onset of Benard convection. The slope of each function depends only on the thermal boundary condition at the lower boundary for any nonzero Rayleigh number. Velocity profiles for flows in inclined layers with permeable tops are derived, and it is found that velocity is proportional to Ra sin phi, where phi is the angle of inclination from the horizontal. The numerical results for different boundary conditions compare reasonably well with experimental results from the hierature.

MP 1958 MP 1958
FORWARD-SCATTERING CORRECTED EX-TINCTION BY NONSPHERICAL PARTICLES.
Bohren, C.F., et al, Apr. 1, 1985, 24(7), p.1023-1029,
For another source see 39-2966. 16 refs. Koh. G

SNOWFLAKES, LIGHT SCATTERING, SNOW CRYSTAL STRUCTURE, PARTICLES, ICE NEEDLES, ANALYSIS (MATHEMATICS).

DLES, ANALYSIS (MATHEMATICS).

Measured extinction of light by particles, especially those larger than the wavelength of the light illuminating them, must be corrected for forward-scattered light collected by the detector. Near-forward scattering by arbitrary nonsiberical particles is, according to Fraunhofer diffraction theory, more sharply peaked than that by spheres of equal projected area. The difference between scattering by a nonsphenical particle and that by an equal-area sphere is greater the more diffusely the particle's projected area is distributed about its centroid. Snowlakes are an example of large atmospheric particles that are often highly nonspherical Calculations of the forward-scattering correction to extinction by ice needles have been made under the assumption that they can be approximated as randomly oriented prolate spheroids (aspect ratio 10 1) The correction factor can be as much as 20% less than that for equal-area spheres depending on the detector's acceptance 2 gle and the wavelength. Randomly oriented oblate-spheroids scatter more nearly like equal-area spheres. area spheres.

MP 1959 PEBBLE FABRIC IN AN ICE-RAFTED DIAMIC-

Domack, E.W, et al, Sep. 1985, 93(5), p.577-591, Refs. p.589-591. Lawson, D.E.

Lawson, D.E.
40-1222
ICE RAFTING, GLACIAL DEPOSITS, SEDIMENTATION, MORAINES, STRATIGRAPILY, FOSSILS, ORIGIN, GLACIER FLOW.
Pebble fabric studies on ice-rafted diamictors have been imited to general observations, with authors noting preferences toward vertical, random, or horizontal ericinations. To clarify such observations, pebble fabric data were collected from a fossiliferous diamiction of late Pleistocene age located on Whidely Island, Washington. The ice-raftled origin of this unit is supported by several independent characteristics including in situ macrofauna and microfauna, conformity with subaquieous lithofacies containing dropstones, lower bulk densities and higher void ratios than associated tills, soft sedimer, deformation structures suggestive of iceberg dumping, textural gradations, and facies relationships. Analysis using the eigenvalue method indicates that ice-rafted fabrics are nearly random with little consistency of vector orientations between sites and without any relationship to the probable direction of glacial flow. The weak fabric is mainly the product of settling through the sater column and impact with, or penetration of, the bed. Samples that possess a weak preferred long axis orientation with a low angle of dip, including those from laminated muds, can best be explained by the intermittent effects of bottom currents, a resistant substrate at the time of deposition and post depositional flowage. Comparisons of pebble fabrics from basal tills, recent sediment flow deposits and basal, debrished in the of explaining the rafter deformation and post of existent flow diamictons lee-rafted diamictons appear, however, to contain a greater

number of elongate stones, with long axis plunge angles exceeding 45 deg, than other glacigenic diamictons

MP 1960 AUDIBILITY WITHIN AND OUTSIDE DEPOS-ITED SNOW.

Johnson, J.B., 1985, 31(108), p 136-142, 12 refs., In English with French and German summaries.

40-1320 SNOW COVER EFFECT, SNOW ACOUSTICS, SOUND TRANSMISSION, NOISE (SOUND).

Factors which control the audibility within and outside deposited show are described and applied to explain the preferential detection of sound by persons buried under avalanche debris as compared to persons on the overlying snow surface. Strong attenuation of acoustic waves in snow and the small acoustic impedance differences between snow and air are acoustic impedance differences between snow and air are responsible for the strong absorption and transmission-loss characteristics that are observed for snow. The absorption and transmission-loss characteristics are independent of the direction of propagation of acoustic signals through the snow. The preferential detection of sound by a person buried under snow can be explained by the relatively higher level of background acoustic noise that exists for persons above the snow can be called the control of the co sanw surface as compared to an avalanche burial victim. This noise masks sound transmitted to persons on the snow surface, causing a reduction of hearing sensitivity as compared to the burial victim. Additionally, the listening concentration of a buried individual is generally greater than for persons working on the snow surface, increasing their subjective awareness of sound. (Auth)

MP 1961 STATISTICAL RELATIONSHIPS BETWEEN COLD REGIONS SURFACE CONDITIONS AND CLIMATIC PARAMETERS.

Bilello, M.A., Conference on Probability and Statistics in Atmospheric Sciences, 9th, Virginia Beach, VA, Oct. 9-11, 1985. Proceedings, 1985, p.508-517, Reprint from preprint volume. 40-1420

40-1420 SNOW PHYSICS, ICE PHYSICS, SURFACE PROPERTIES, CLIMATIC FACTORS, ICE COVER THICKNESS, SNOW DENSITY, DE-GREE DAYS, FROST.

MP 1962 EMITTANCE: A LITTLE UNDERSTOOD IMAGE DECEPTION IN THERMAL IMAGING AP-PLICATIONS.

Munis, R.H., et al, Apr. 1985, Vol 549, p 72-78, 6 refs. Marshall, S.J.

THERMAL RADIATION, THERMAL PROPERTIES, MATERIALS, RADIOMETRY, TEMPERATURE MEASUREMENT.

TURE MEASUREMENT.

Irrage contrast enhancement sometimes complicates image understanding A seen that consists of slightly dissimilar target and background emittances may not be readily identifiable without image enhancement. Even if the emittance differential can be sharply contrasted, those image surface patterns that convey subsurface thermal information may not be visible because of the wide dynamic range that must be accommodated by the thermal imaging system. This paper describes how emittance complicates the interpretation of thermal images. High and low emittance values affect the logic required for understanding thermal scenes. Thermal scenes containing emittance differentials are easier to interpret if there is a large contrast between the object and the background

MP 1963 THERMAL EMISSIVITY OF DIATHERMA-NOUS MATERIALS.
Munis, R H, et al, Sep.-Oct 1985, 24(5), p.872-878,

10 refs.

Marshall, S J. 40-1422

RADIOMETRY, OPTICAL PROPERTIES, FRARED PHOTOGRAPHY, TEMPERATURE MEASUREMENT, ABSORPTION, MATERIALS. Thermal (20 to 56 micron) measurements of the normal emissivity of several disthermanous materials having slightly different refractive indices were made at 152 C, 49 C, and -5.6 C. Calculations of the total hemispherical emissivity and 5.6 C. Calculations of the total hemispherical emissivity were made from normal emissivity and plotted against the optical depth. A comparison of these data with a model proposed by R. Gardon J. Am. Ceram. Soc. 39(8), 278. (1956), indicates that at near-ambient temperatures they agree very closely. This comparison presumes that the narrow range of refractive indices about n=15 associated with these specimens would not preclude them from being treated as having a value of 15. MP 1964

STRATEGIES FOR WINTER MAINTENANCE OF PAVEMENTS AND ROADWAYS. Minsk, L.D., et al, 1984, Vol.431, p.155-167, 14 refs.

Eaton, R.A.

Eaton, K.A.
40-1427
WINTER MAINTENANCE, ROAD MAINTENANCE, SNOW REMOVAL, ICE REMOVAL,
PAVEMENTS, FREEZE THAW CYCLES, CLI-MATIC FACTORS, SNOW DEPTH, COST ANAL-

MP 1965

STRUCTURE, SALINITY AND DENSITY OF MULTI-YEAR SEA ICE PRESSURE RIDGES. Richter-Menge, J.A., et al, Dec 1985, 107(4), p.493-497, For another source and abstract see 39-2413 (MP 1857). 11 refs. Cox, G.F.N. 40-1444

PRESSURE RIDGES, ICE STRUCTURE, ICE SALINITY, ICE DENSITY, ICE PHYSICS, ICE LOADS, SEA ICE, BEAUFORT SEA

MP 1966

IN-ICE CALIBRATION TESTS FOR AN ELON-GATE, UNIAXIAL BRASS ICE STRESS SEN-SOR.

Johnson, J.B., Dec. 1985, 107(4), p.506-510, For another source and abstract see 39-2420 (MP 1859). 8 refs.

ICE COVER STRENGTH, ICE SOLID INTER-FACE, ICE LOADS, STRESSES, MEASURING IN-STRUMENTS, TESTS.

MP 1967

EXPERIMENTAL MEASUREMENT OF CHAN-NELING OF FLOW IN POROUS MEDIA, Oliphant, J.L., et al, May 1985, 139(5), p.394-399, 10

Tice, A.R. 40-1481

SOIL WATER, WATER FLOW, POROUS MATERIALS, CHANNELS (WATERWAYS), HY-DRAULICS, VISCOUS FLOW, LAMINAR FLOW, DIFFUSION.

DIFFUSION.

By comparing experimental measurements of the hydraulic conductivity and the effective self-diffusivity of water in porous media, a channeling parameter, c, is defined. This parameter measures the degree of division of flow paths in the media, but does not depend on the tortuosity of the paths or surface effects on the viscosity of the water. Values of c are obtained for Na-saturated montmortillomites containing from 0.82 to 7.7 g of water per g of clay and for Fairbanks silt containing from 0.135 to 0.23 g of water per g of silt. Values for the montmortillomites remain relatively close to the theoretically predicted value of 1/3 at all water contents, indicating maximally divided flow paths Values for the silt vary from 100 to over 2000, indicating highly channeled flow

SOME RECENT DEVELOPMENTS IN VIBRAT-ING WIRE ROCK MECHANICS INSTRUMEN-TATION.

Dutta, P.K., 1985, 12p., 20 refs
26th U.S Symposium on Rock Mechanics, Rapid City, SD, June 26-28, 1985. 40-1490

ROCK MECHANICS, COLD WEATHER OPERA-TION, MEASURING INSTRUMENTS, VIBRA-TION, STRESSES, MODELS, ACCURACY.

BRITTLENESS OF REINFORCED CONCRETE STRUCTURES UNDER ARCTIC CONDITIONS. Kivekas, L., et al, 1985, No.369, 28 + 14p, In Finnish with English summary.

Korhonen, C.

WINTER CONCRETING, CONCIDENCES, LOADS (FORCES), RFIN (CED CONCRETES, CONCRETE STRUCKES), FRACTURING, IMPACA STRENGTH, TEMPERATURE EFFECTS

TEMPERATURE EFFECTS
When plain reinforcing bars are tested under impact load according to the steel standards their failure becomes brittle already at the arctic temperature region. However, when reinforced concrete structures are loaded with an impact load, the reinforcing bars are subjected to loading conditions very different from the test with the plain rebars, and this has a significant effect on the transition temperature.

MP 1970

MP 1970
ION AND MOISTURE MIGRATION AND FROST HEAVE IN FREEZING MORIN CLAY.
Qiu, G., et al, Mar. 1986, 8(1), p.1014, 9 refs., In Chinese with English summary.
Chamberlain, E.J., Iskandar, I.K.

FROST HEAVE, SOIL WATER MIGRATION, IONS, CLAY SOILS, SOIL CHEMISTRY, WATER CONTENT, FREEZING RATE, TESTS.

CONTENT, PREBZING RATE, 1ESTS.

Staten specimens made of Morin Clay with a saturation percentage of 86% were subjected to freezing tests in open system fed by distilled water, NaCl solution, CaCl(2) solution and Na(2)SO(4) solution respectively. Before freezing test, specimens were homogeneous in water content but heterogenespecimens were nomogeneous in water content out neterogene-ous in chemical composition with a vertical concentration gradient. After freezing test, both water content and the dominant-anion content in frozen part of the soil samples increase, this means that not only moisture but also ions were migrating toward the freezing zone during tests.

TENSILE STRENGTH OF FROZEN SILT.

Zhu, Y., et al, Mar. 1986, 8(1), p.15-28, 9 refs., In Chinese with English summary. Carbee, D.L.

40-463

40-40-35 FROZEN GROUND STRENGTH, TENSILE PROPERTIES, STRAIN TESTS, SEDIMENTS, SOIL COMPACTION, DENSITY (MASS/-VOLUME), TEMPERATURE EFFECTS.

VOLUME), TEMPERATURE EFFECTS.

Constant strain-rate tension tests were conducted on remolded saturated frozen Fairbanks silt at various temperatures, strain rates and densities. It is found that the critical strain rate of the ductile-brittle transition does not depend upon temperature, but varies with density It has a value of 0.01/s for the silt with medium density and 0.005/s for low density. The peak tensile strength considerably decreases with decreases with increasing strain rate for brittle fracture. The failure strain remains almost the same for temperatures lower than about -2C, but it varies with density and strain rate. The initial tangent modulus is found not to depend upon strain rate, but increases with decreasing temperature and density.

MP 1972
ICE BLOCK STABILITY.
Daly, S.F., Water for resource development, Proceedings of the ASCE Hydraulics Division Specialty Conference, edited by D.L. Schreiber, New York, American Society of Civil Engineers, 1984, p.544-548, 5 refs. 40-1548

40-1548
RIVER ICE, ICE FLOES, ICE PRESSURE.
In this paper a simple formulation of the forces acting on an ice block in contact with an intact ice cover is presented. Underturning of the ice block is the assumed mechanism by which the block is swept under the ice cover. The data can be divided into two separate cases, a shallow water case and a deep water case. The conditions of instability for each case are determined empirically. The resultant prediction of the velocity at which the block is swept under the cover reproduces the data very well over the entire range of nondimensional ice block thicknesses The "nospill" condition used in earlier formulations is not required.

MATHEMATICAL MODELING OF RIVER ICE PROCESSES.

Shen, H.T., Water for resource development, Proceedings of the ASCE Hydraulics Division Specialty Conference, edited by D.L. Schreiber, New York, American Society of Civil Engineers, 1984, p.554-558, 16

40-1550

RIVER ICE, ICE FORMATION, ICE BREAKUP, ANALYSIS (MATHEMATICS)

Computer modeling of flow and ice conditions in a river is an important element in the planning of water resources projects in worthern regions. In this paper, a brief review on the present knowledge of formulating nier ice process

MP 1974

MITIGATIVE AND REMEDIAL MEASURES FOR CHILLED PIPELINES IN DISCONTINU-OUS PERMAFROST.

Sayles, FH, Seminar on Pipelines and Frost Heave, Caen, Apr. 25-27, 1984. Proceedings English version Edited by S.R. Dallimore and P.J. Williams Ottawa, Carleton University, July 1984, p 61-62. 30.3040

DISCONTINUOUS PERMAFROST. HEAVE, UNDERGROUND PIPELINES, SHEAR PROPERTIES, FROST ACTION, PERMAFROST BENEATH ROADS, FROST PENETRATION, DAMAGE, DESIGN CRITERIA.

MP 1975 USING LANDSAT DATA FOR SNOW COVER/-VEGETATION MAPPING.

Merry, C.J., et al, Annual Department of Defense Mapping, Charting, and Geodesy Conference, 9th, 1984. Report, Washington, D.C., Defense Mapping Agency, 1984, p.II(140)-II(144), 7 refs. McKim, H.L.

SNOW COVER DISTRIBUTION, REMOTE SENS.
ING. VEGETATION, LANDSAT, MAPPING MAPPING ING, VEGETATION, LANDSAT, MAPPING SNOW DEPTH, SNOW WATER EQUIVALENT.

MP 1976 HEATING ENCLOSED WASTEWATER TREAT-MENT FACILITIES WITH HEAT PUMPS.

Martel, C.J., et al, Dec. 1982, EPS 3-WP-82-6, Symposium on Utilities Delivery in Cold Regions, 3rd, Edmonton, Alta., May 25-26, 1982. Proceedings. Compiled by D.W Smith, p.262-280, 13 refs. Phetteplace, G.

42-1727
WASTE TREATMENT, WATER TREATMENT, HEATING, SANITARY ENGINEERING, UTILITIES, PUMPS, COST ANALYSIS, WINTER MAINTENANCE.

MP 1977

COMPARATIVE FIELD TESTING OF BURIED

UTILITY LOCATORS.

Bigl, S.R., et al, Hanover, NH, U.S.A CRREL, (1984), 25p., Presented at the APWA Public Works Conference and Equipment Show, Edmonton, Alberta, May 13-15, 1984. Unpublished manuscript. 1

Phetteplace, G., Henry, K.S.

UNDERGROUND "ACILITIES, UTILITIES, MAGNETIC SURVEYS, MAINTENANCE, DETECTION, DAMAGE, TESTS, RADAR ECHOES. TECTION, DAMAGE, TESTS, RADAR ECHOES. Locating buried utilities for repair, servicing or prevention of damage is often necessary when excavation is to be conducted in a particular area. The most widely used methods for detection of burned facilities are magnetic induction, magnetometry, and radiofrequency tracking. Downward-looking radar units designed specifically for utility location are in the development stages. Comparative field tests of eight locators were conducted at West Point and Newburgh, New York, over various types of buried utilities including iron and steel pipe, cable, vitreous tile pipe and plastic pipe. plastic pipe.

MP 1978

HEAT RECOVERY FROM PRIMARY EFFLU-ENT USING HEAT PUMPS

Phetteplace, G., et al, CLIMA 2000 Conference, Copenhagen, Aug. 1985. Proceedings, Vol.6, (1985), p.199-203, 1 ref. Ueda, H.T., Martel, C.J.

40-1682

HEAT RECOVERY, WASTE TREATMENT, WATER TREATMENT, SEWAGE, HEATING.

MP 1979

MF 1979
SIMPLIFIED DESIGN PROCEDURES FOR HEAT TRANSMISSION SYSTEM PIPING.
Phetteplace, G., CLIMA 2000 Conference, Copenhagen, Aug 1985
Proceeding, Vol 6, (1985), p 451-456, 5 refs.

40-1686

HEAT TRANSMISSION, UNDERGROUND PIPELINES, WATER PIPELINES, HEAT LOSS, DESIGN, COST ANALYSIS, ANALYSIS (MATH-UNDERGROUND EMATICS).

MP 1980

ANALYSIS OF HEAT LOSSES FROM THE CEN-TRAL HEAT DISTRIBUTION SYSTEM AT FORT WAINWRIGHT.

Phetteplace, G., (1982), 20p., Unpublished manuscript; presented at the Symposium on Utilities Delivery in Cold Regions, Edmonton, Alberta, May 25-26, 5 refs.

40-1660 HEAT TRANSMISSION, HEAT LOSS, HEATING, HEAT SOURCES, DEGREE DAYS, TEMPERATURE EFFECTS, ANALYSIS (MATHEMATICS), UNITED STATES—ALASKA—FAIRBANKS

MP 1981

AIRBORNE-SNOW CONCENTRATION MEA-

SURING EQUIPMENT.
Lacombe, J., June 1982, 82-17, Snow Symposium, 1st.
Hanover, NH. Aug 1981 Proceedings, p 17-46. ADB-091 442, 12 refs

SNOWFALL SNOWFLAKES, FALLING BO-DIES, MEASURING INSTRUMENTS, VISIBILI-TY, AIRBORNE EQUIPMENT, ACCURACY, TRANSMISSION

A brief introduction to the function of the Airborne-Snow Concentration Measuring Equipment (ASCME) and its usefulness for characterizing the winter environment is given. The deficiencies of alternative systems are identified. ASCME hardware and basic system operation are described in detail nardware and basic system operation are described in detail The governing design equation and choice of design parameters are discussed, along with estimates of system accuracy. Evidence of ASCME's satisfactory performance during its imaugural operation at SNOW-ONE is presented and design improvements to be incorporated and used during SNOW ONE-A are mentioned Snowfall rate and airborne-snow concentration data are also compared, showing a weak correlation between the two premiers at low concentration land. between the two parameters at low concentration levels

MP 1982 SNOW AND FOG PARTICLE SIZE MEASURE. MENTS

Berger, R.H., June 1982, 82-17, Snow Symposium, 1st, Hanover, NH, Aug. 1981 Proceedings, p.47-58, ADB-091 442, 6 refs.

40-1930 SNOWFLAKES, FOG, PARTICLE SIZE DISTRI-BUTION, ELECTROMAGNETIC PROSPECT-ING, TRANSMISSION, SNOW CRYSTAL STRUCTURE, LIGHT SCATTERING, INFRA-RED RADIATION, FALLING BODIES, DATA PROCESSING.

During the SNOW-ONE field measurements Knollenberg During the SNOW-ONE field measurements Knollenberg 2-D grey imaging probes were used to characterize airborne snow. This application of the probes presents problems due to the shape and orientation of the snow particles. The techniques used to surmount these problems are described Results are presented in a comparison between the total snowflake area concentration and the transmittance in the visible and infrared.

METEOROLOGY AND OBSERVED SNOW CRYSTAL TYPES DURING THE SNOW-ONE EXPERIMENT.

Bilello, MA, June 1982, 82-17, Snow Symposium, 1st, Hanover, NH, Aug 1981 Proceedings, p 59-75, ADB-091 442, 8 refs. 40.1931

40-1951
SNOW CRYSTAL STRUCTURE, SNOWFALL,
METEOROLOGICAL FACTORS, SNOWFLAKES, FALLING BODIES, ELECTRICAL
MEASUREMENT, OPTICAL PROPERTIES, SNOWSTORMS.

SNOWSTORMS.

A survey of the surface pressure systems, weather fronts, and air masses that influenced northern Vermont during the periods of snowfall in January and February 1981 was conducted. Vertical profiles of the temperature and moisture, and observations of the falling snow crystals made at the SNOW-ONE site were also retrieved for the same time period. This information was used to conduct a study on associations between meteorological conditions and observed snow crystal characteristics. Examples of the results obtained from the various snowfall events that occurred during the field test period are presented. This study was conducted with the ultimate objective of associating large-scale weather patterns with the on-site force particle characterization measurements, and the data obtained concurcharacterization measurements, and the data obtained concur-rently by the electro-optical sensor systems

MP 1984 METEOROLOGICAL MEASUREMENTS AT CAMP ETHAN ALLEN TRAINING CENTER, VERMONT.

Bates, R., June 1982, 82-17, Snow Symposium, 1st, Hanover, NH, Aug. 1981. Proceedings, p.77-112, ADB-091 442, 4 refs. 40-1932

METEOROLOGICAL INSTRUMENTS, SNOW-FALL, PRECIPITATION GAGES, AIR TEMPER-ATURE, SNOWSTORMS, DEW POINT, HUMIDI-TY, WIND VELOCITY, WIND DIRECTION, SNOW WATER EQUIVALENT, VISIBILITY, SNOW DEPTH.

This paper contains a detailed description of the meteorological instruments used by CRREL at SNOW ONE, together with information on their performance and reliability. Some of the data collected are discussed and analyzed. Redfield (1981) presented a substantial amount of the meteorological data obtained by CRREL during SNOW-ONE, including the hourly summaries of observations recorded by a meteorological property of the proper logical team from the Atmospheric Sciences Laboratory (ASL).
Maynard, Messachusetts

MP 1985

GEOMETRY AND PERMITTIVITY OF SNOW. Colbeck, S.C., June 1982, 82-17, Snow Symposium. 1st, Hanover, NH, Aug 1981 Proceedings, p.113-131, ADB-091 442, 37 refs.

SNOW PHYSICS, ELECTROMAGNETIC PROPERTIES, SNOW ELECTRICAL PROPERTIES, SNOW CRYSTAL STRUCTURE, POROSITY, SNOW WATER CONTENT, UNFROZEN WATER CONTENT.

The geometry and porosity of dry snow varies widely depending The permittivity of dry on the history of conditions

snow increases with increasing ice content but is not greatly affected by the shapes of the ice particles. In wet snow the permittivity increases with liquid content and the geometry is very important. However, the liquid-like layer has little effect on permittivity. The permittivity is described using is very important However, the liquid-like layer has little effect on permittivity The permittivity is described using Polder and van Santeen's mixing formulae and approximations of the geometries at high and low liquid contents. It is shown that the common assumption of liquid shells over ice spheres is both physically incorrect and leads to large

SNOW CALORIMETRIC MEASUREMENT AT SNOW-ONE.

Fisk, D., June 1982, 82-17, Snow Symposium, 1st, Hanover, NH, Aug 1981. Proceedings, p.133-138, ADB-091 442. 40-1934

SNOW THERMAL PROPERTIES, SNOW WATER CONTENT, UNFROZEN WATER CONTENT, CALORIMETERS, TEMPERATURE MEASUREMENT, SNOW MELTING, FREEZING, ACCURACY, TESTS.

Free water content of fallen snow was measured near the surface and with depth during the SNOW-ONE Field Experiment using both freezing and melting calonmetric methods. The principles and procedures of each method are described. Test data are presented, possible sources of error are examined, and the problems and relative merits of each method are discussed

Subsequent work and future plans are described.

MP 1987 PROBLEMS IN SNOW COVER CHARACTERI-

O'Brien, H.W., June 1982, 82-17, Snow Symposium, 1st, Hanover, NH, Aug. 1981. Proceedings, p.139-147, ADB-091 442, 5 refs. 40-1935

SNOW OPTICS, SNOW PHYSICS, INFRARED SPECTROSCOPY, LIGHT TRANSMISSION, UN-FROZEN WATER CONTENT, GRAIN SIZE, MILITARY OPERATION, REFLECTIVITY, AVE PROPAGATION, SNOW COVER, SNOW DENSITY, SNOWFLAKES.

Comparison of spectral reflectance measurements of snow cover with theoretical predictions based on hypothetical snow grain size indicate that the appropriate dimensions for commensuration may be illusive indeed. Measurements of nearsuration may be illusive indeed. Measurements of nea infrared reflectance of snow covers in situ are presente in illustration and some potential ramifications inferred

MP 1988

ACOUSTIC AND PRESSUREMETER METH-ODS FOR INVESTIGATION OF THE RHEO-LOGICAL PROPERTIES OF ICE.
Fish, A.M., Hanover, NH, USA CRREL, 1978, 196p.,

Ph.D. thesis. Refs. p.181-196 40-1843

ICE CREEP, RHEOLOGY, ICE STRENGTH, ACOUSTIC MEASUREMENT, CRACKING (FRACTURING), COMPRESSIVE PROPERTIES, PRESSURE, ICE CRYSTAL STRUCTURE, ICE MECHANICS, TIME FACTOR, MEASURING IN-STRUMENTS, SETTLEMENT (STRUCTURAL).

TRUMENTS, SETTLEMENT (STRUCTURAL).

Theoretical and experiment studies of time-dependent deformation and failure of columnar-grained ice are presented Laboratory uniaxial compression tests at constant and steadily increasing stresses were accompanied by simultaneous recording of acoustic emissions. Strength criteria and constitutive equations were established, describing grain disintegration, microcrack initiation and acoustic emission dynamics during creep, and their relationship to the rheological properties of ice. The rheological properties of ice were studied under laboratory and field conditions using a pressuremeter, leading to the development of an in situ method for determining the mechanical properties of ice taking into account the the mechanical properties of ice taking into account the time factor. The results of the studies were applied in analyses of settlements of foundations on high-ice-content soils and ground ice Based on the comparison of experimen-tal data with calculated settlements, it is shown that the characteristics of ice used in the analysis can be determined either from laboratory tests or in situ, by means of a pressureme-

MP 1989

VIBRATION ANALYSIS OF THE YAMA-CHICHE LIGHTPIER.

Haynes, F.D., International Modal Analysis Conference, 4th, Los Angeles, CA, Feb. 3-6, 1986, Proceedings, Vol.1, Schenectady, N.Y., Union College, 1986, p 238-241, 11 refs 40-1881 DIERS, VIBRATION,

PIERS. VIBRATION, ICE LOADS, SHEAR STRENGTH, MATHEMATICAL MODELS, COM-PUTER APPLICATIONS.

To determine its dynamic characteristics, the Yamachiche lightp.cr located in Lac St Pierre, Quebec, was instrumented with geophones, accelerometers, and an inclinometer Fifteen breakable bolts with failure strengths from 45,000 to 450,000 N were used to apply a step unloading force on the pier. The damping and suffness were obtained from the data in the time domain. The natural frequencies The natural frequencies and mode shapes were obtained from the data tran

into the frequency domain. A modal analysis computer program was used to verify the natural frequencies and mode shapes. A mathematical model was developed that includes translation, rotation, and shear beam deformation

MP 1990 SOIL FREEZING RESPONSE: INFLUENCE OF TEST CONDITIONS.

McCabe, E.Y., et al, June 1985, 8(2), p.49-58, 22 refs. Kettle, R.L.

SOIL FREEZING, FROST HEAVE, SOIL COM-PACTION, FROST RESISTANCE, SOIL PRES-SURE, TEMPERATURE GRADIENTS, TESTS.

SURE, TEMPERATURE GRADIENTS, TESTS. The response of soils to freezing has been assessed in terms of frost heave, and the heaving pressure developed when the specimen is restrained. As both techniques have been suggested for assessing frost susceptibility, it was considered essential to determine the influence of the test conditions on the soil response. This investigation was concerned with specimen preparation, specimen size, and freezing procedure. The test material consisted of an artificially produced matrix, into which controlled amounts of coarse aggregate could be blended. This reduced the likelihood of variation in the results because of random changes in the test materials. The results clearly demonstrated the sensitivity of both heave and heaving pressure to the test conditions. When modified or new test methods are being formulated, it is essential to consider the influence of such factors, particularly when making comparisons between different testing techniques Such modifications may also require changes in the particular criteria used to assess frost susceptibility

MP 1991

FIELD OBSERVATIONS OF ELECTROMAGNETIC PULSE PROPAGATION IN DIELEC-TRIC SLABS.

Arcone, S.A., Oct. 1984, 49(10), p.1763-1773, 15 refs. 40-1959

ELECTROMAGNETIC PROPERTIES, COVER EFFECT, WAVE PROPAGATION, DIE-LECTRIC PROPERTIES, ICE SHEETS, PRO-FILES, VELOCITY, REFLECTION, REFRAC-TION.

TION.

The propagation of electromagnetic pulses in naturally occurring dielectric surface layers has been examined. Pulse duration used in field experiments reported here has been on the order of nanoseconds with pulse bandwidths in the high VHF to low UHF band. The layers were sheets of fresh water ice and grante at thicknesses ranging between 4 and 4 m. Both transverse electric (TE) and transverse magnetic (TM) modes were attempted but only the TE propagation could be interpreted. Analog recordings of wide-angle reflection and refraction (WARR) profiles were taken and recorded in a continuous graphic display. The displays allowed easy identification of phase fronts thereby facilitating study of the dispersion of the pulses. The phase and group velocities of the wave-group packets agree well with the velocities predicted from dispersion curves derived from the modal waveguide equation. In one case the Airy phase of wave-packet propagation occurred. The best measure of the dielectric constant of the layer was the frequency of the air wave. the frequency of the air wave

SHOPPER'S GUIDE TO ICE PENETRATION. Mellor, M., Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984. Proceedings, p.1-35, ADB-093880, 11 refs. 40-1962

ICE DRILLS, ICE COVER THICKNESS, PENE-TRATION, ICE COVER TRICKNESS, PENETRATION, ICE COVER STRENGTH, ROTARY DRILLS, PROJECTILE PENETRATION, HYDRAULIC JETS, PERCUSSION DRILLS, LASERS, THERMAL DRILLS, EXPLOSION EFECTS, ANALYSIS (MATHEMATICS), ICE BLASTING.

MP 1993 SEA ICE CHARACTERISTICS AND ICE PENE-TRATION PROBABILITIES IN THE ARCTIC OCEAN

Weeks, W.F., Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984. Proceedings, p.37-65, ADB-093880, 21 refs 40-1963

ICE DISTRIBUTION, PACK ICE, DRIFT, ICE COVER THICKNESS, ICE CRYSTAL STRUCTURE, ICE SALINITY, ICE TEMPERATURE, ICE DEFORMATION, ARCTIC

MP 1994

MODELING OF ARCTIC SEA ICE CHARAC-TERISTICS RELEVANT TO NAVAL OPERA-TIONS

Hibler, W.D., III, et al, Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984. Proceedings, p.67-91, ADB-093880, 21 refs.

Weeks, W.F. 40-1964

ICE NAVIGATION, SEA ICE DISTRIBUTION, ICE MECHANICS, DRIFT, ICE COVER THICK-NESS, SURFACE ROUGHNESS, ICE SURFACE, ICE ELECTRICAL PROPERTIES, ICE LOADS, ICE STRENGTH, MODELS, RHEOLOGY, VELOCITY.

MP 1995

PENETRATION OF SHAPED CHARGES INTO ICE.

Mellor, M., Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984. Proceedings, p.137-148, ADB-093 880, 7 refs.

ICE COVER STRENGTH, MILITARY OPERA-TION, PENETRATION TESTS, EXPLOSIVES, ICE DEFORMATION.

ICE DEFORMATION.
Shaped charges fired from air into ice give holes of typical form for cohesive solids. There are only a few reported results from test shots in ice, but supplementary data can be obtained by adjusting the results from tests in ice-bonded soil in accordance with target density. Present indications are that charges with narrow angle cones (appr. 45 deg) can penetrate about 16 cone diameters, giving a hole diameter near mid-depth of about 1/3 of the cone diameter. Charges with wide-angle cones (60-90 deg) might penetrate about 12 cone diameters, giving a hole diameter near mid-depth of about 2/3 cone diameters. Optimum standoff in air seems to be around 4 cone diameters. So far, we have no data for shaped charges fired into ice under water.

ICE PENETRATION TESTS.

Garcia, N.B., et al, Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984. Proceedings, p.209-240, ADB-093 880, 6 refs. Farrell, D., Mellor, M.

40-1974
PENETRATION TESTS, ICE STRENGTH,
GRAIN SIZE, FLEXURAL STRENGTH, BRITTLENESS, IMPACT STRENGTH, VELOCITY,
ICE DENSITY, PROJECTILE PENETRATION,
ICE TEMPERATURE.

MP 1997 MECHANICS OF ICE COVER BREAK-THROUGH.

Kerr, A.D., Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984 Proceedings, p.245-262, ADB-093 880, 12 refs.

40-1975
ICE COVER STRENGTH, ICE BREAKING,
PENETRATION TESTS, IMPACT STRENGTH,
LOADS (FORCES), FLOATING ICE, BEARING
STRENGTH, TIME FACTOR, MILITARY OPER-ATION, ANALYSIS (MATHÉMATICS).

SURFACING SUBMARINES THROUGH ICE. Assur, A., Dec. 1984, SR 84-23, Workshop on Penetration Technology, Hanever, NH, June 12-13, 1984. Proceedings, p.309-318, ADB-093 880, 8 refs 40-1978

SUBMARINES, ICE COVER EFFECT, PENETRA-TION, ICE MECHANICS, ICE BREAKING, STRESSES, STRAINS, SEA ICE, ANALYSIS (MATHEMATICS), LOADS (FORCES).

MP 1999

ICE DRILLING AND CORING SYSTEMS-A

ICE DRILLING AND CORING SYSTEMS—A RETROSPECTIVE VIEW. Sclimann, P.V., et al, Dec. 1984, SR 84-33, Workshop on Penetration Technology, Hanover, NH, June 12-13, 1984. Proceedings, p.125-127, ADB-093 880 Rand, J.H 40-1966

ICE CORES, ICE DRILLS, ICE CORING DRILLS, EQUIPMENT, PENETRATION.

MP 2000

TECHNIQUES FOR MEASUREMENT OF

TECHNIQUES FOR MEASUREMENT OF NOW AND ICE ON FRESHWATER.
Adams, W.P., et al, International Northern Research Basins Workshop/Symposium, 6th, Jan. 26-30, 1986.
Proceedings, Vol.2, Houghton, Michigan Technological University, [1986], p.174-222, Refs. p.219-222.
Prowse, T.D., Bilello, M.A.

40-2138 ICE SURVEYS, SNOW SURVEYS, FLOATING ICE, LAKE ICE, RIVER ICE, ICE VOLUME, MEASUREMENT, FREEZEUP, ICE BREAKUP, ICE MECHANICS.

ICE MECHANICS.

Information on routine snow and ice survey programs in Finland, Iceland, Norway, Sweden, Canada and the United States is juxtaposed in this paper. Standard methods of ice and snow measurement and practical alternative methods are described with information on reporting procedures and data storage. In each case, points of contact are provided for those seeking data on floating snow and ice. The purpose of the paper is to improve the flow of information between those responsible for winter lake and river programs in circumpolar countries.

MODELING SEA-ICE DYNAMICS.
Hibler, W.D., III, 1985, Vol.28, Issues in atmospheric and oceanic modeling Pt. A. Climate dynamics. Edited by S. Manabe, p.549-579, 44 refs. 40-2217

40-21/1
ICE MECHANICS, SEA ICE DISTRIBUTION, ICE
MODELS, DRIFT, ICE COVER THICKNESS, ICE
COVER STRENGTH, FREEZE THAW CYCLES,
RHEOLOGY, PLASTIC FLOW, ICE WATER INTERFACE, AIR WATER INTERACTIONS, SEA-SONAL VARIATIONS.

MP 2002 SURVEY OF AIRPORT PAVEMENT DISTRESS IN COLD REGIONS.

Vinson, T.S., et al, International Conference on Cold Regions Engineering, 4th, Anchorage, Alaska, Feb. 24-26, 1986. Proceedings. Edited by W.L. Ryan, New York, American Society of Civil Engineers, 1986, p.41-50, 5 refs.

Zomerman, I., Berg, R, Tomita, H. 40-2429

AIRPORTS, PAVEMENTS, FREEZE THAW CY-CLES, CRACKING (FRACTURING), DAMAGE, CLIMATIC FACTORS, DESIGN.

CLIMATIC FACTORS, DESIGN.
In early fall 1984, USACRREL conducted a study of airport pavements in cold regions of the United States. The most common pavement problems were associated with nontraffic related phenomena and include (1) pre-existing cracks reflecting through asphalt concrete overlays (in two years or less), (2) thermal cracking, and (3) longitudinal cracking (at a construction joint). Most of the airports experienced (1) water pumping up through cracks and joints in the pavements during spring thaw, or (2) additional roughness due to differential frost heave in the winter, or both problems Many airport managers reported that debris was generated at cracks during the winter and spring. Several airports experienced problems with lighting in the winter and spring. Many pavement problems can be traced to the evolutionary history of general aviation airports and the lack of consideration for site drainage.

LESSONS LEARNED FROM EXAMINATION OF MEMBRANE ROOFS IN ALASKA.
Tobiasson, W., et al. International Conference on Cold

Regions Engineering, 4th, Anchorage, Alaska, Feb. 24-26, 1986. Proceedings. Edited by W.L. Ryan, New York, American Society of Civil Engineers, 1986, p.277-290, 10 refs.

Osgood, S. 40-2449

ROOFS, MOISTURE DETECTION, FREEZE THAW CYCLES, DAMAGE, THERMAL EXPANSION, THERMAL EFFECTS.

SION, THERMAL EFFECTS.

During 1984 and 1985 airborne infrared roof moisture surveys were conducted of membrane roofs at army installations in Alaska. Many of these roofs were also visually inspected and cored to verify infrared findings. Numerous areas of wet invulation were found but often they were small enough and the surrounding roofing system was in good enough condition to warrant removal and replacement of just the wet areas. Essentially all moisture entered from the exterior through flaws in the membrane and flashings. The lack of problems from internal moisture indicates that current vapor retarders, even though imperfect, are adequated some "cold regions" appurtenances such as membrane control joints, and insulation breather vents appear to do more harm than good. The protected membrane (upside-down) roofing system is well sunted to Alaska but some problems have occurred when the membrane lacks slope to drain. Low strength concrete pavers used for roof ballast have been deteriorated by freeze-thaw action.

ICE COVER RESEARCH—PRESENT STATE AND FUTURE NEEDS.

Kerr, A.D, et al, International Conference on Cold Regions Engineering, 4th, Anchorage, Alaska, Feb. 24-26, 1986. Proceedings Edited by W.L. Ryan, New York, American Society of Civil Engineers, 1986, p.384-399, Refs. p.392-399 Frankenstein, G.E.

40-2458

40-2488
ICE COVER STRENGTH, FI.OATING ICE, ICE LOADS, ICE PRESSURE, OFFSHORE STRUCTURES, DYNAMIC LOADS, BEARING STRENGTH, ENGINEERING, ICE COVER THICKNESS, STRESSES.

THICKNESS, STRESSES.

Presentation reviews, at first, a number of problem areas in ice engineering, such as the determination of vertical and horizontal forces floating ice covers exert on fixed structures, the bearing capacity of ice covers subjected to loads of short or long duration, and the response of ice covers subjected to moving loads

The analytical fundamentals are then briefly reviewed and their relationship to actual field conditions is discussed. The presentation concludes with a discussion of problems encountered in laboratory tests. Throughout the presentation areas that require further study and clarification are indicated.

MP 2005

UPPER DELAWARE RIVER ICE CONTROL—A CASE STUDY.

Zufelt, J.E., et al, International Conference on Cold Zuieli, J.E., et al, International Conference on Cold Regions Engineering, 4th, Anchorage, Alaska, Feb. 24-26, 1986. Proceedings. Edited by W.L. Ryan, New York, American Society of Civil Engineers, 1986, p.760-770, 7 refs.

40.2487

ICE CONTROL, RIVER ICE, ICE JAMS, ICE CONDITIONS, ICE BOOMS, DRIFT, ICE ME-CHANICS, FLOODING, COUNTERMEASURES.

CHANICS, FLOODING, COUNTERMEASURES.

The upper one-third of the Delaware River is characterized by a steep gradient with a general infle/pool sequence. Due to seasonal low flows, a considerable volume of ice is generated and transported throughout the winter months During February 1981 a catastrophic breakup ice jam occurred along a reach of the Delaware River near Port Jervis, NY, causing \$145 million in damages In February 1982 another breakup ice jam occurred at the same location, causing much concern but minimal flording and damages These events prompted the Philadelphia District, US Army Corps of Engineers, to conduct an investigation of the Upper Delaware River to determine if some form of ice control structure could be implemented in order to reduce ice jam-induced flooding This paper focuses on the field investigations and analyses performed by the US Army Corps of Research and Engineering Laboratory for the Philadelphia District during the period 1983-1985. The study included both on site and remote monitoring of ice conditions and hydraulic analysis of several ice control structure alternatives

MP 2006

EXPERIMENTS ON THERMAL CONVECTION

Powers, D., et al, 1985, Vol 6, Symposium on Snow and Ice Processes at the Earth's Surface, Sapporo, Ja-pan, Sep. 2-7, 1984. Proceedings, p.43-47, 16 refs. Colbeck, S.C., O'Neill, K 40-2306

SNOW PHYSICS, CONVECTION, HEAT TRANS-FER.

Thermal convection is observed in snow and in a compact of water-saturated glass beads

permeability of the snow limits our ability to compare the observed and calculated onset of convection, agreement between the observed and calculated onset of convection, agreement between the observed and calculated of effects of convection on heat transfer in snow is good with glass beads agree with both the calculated onset of and heat transfer by convection

Attempts are made to assess the effects of convection on snow metamorphism While much is still uncertain about the significance of thermal convection in snow, it is clear that the phenomenon does occur.

MP 2007

MODELLING A SNOWDRIFT BY MEANS OF

ANOUNCELLING A SNOWDRIFT BY MEANS OF ACTIVATED CLAY PARTICLES.

Anno, Y, 1985, Vol 6, Symposium on Snow and Ice Processes at the Earth's Surface, Sapporo, Japan, Sep 2-7, 1984. Proceedings, p.48-52, 12 refs 40-2307

SNOWDRIFTS, SNOW MECHANICS, WAIER CONTENT, MODELS, WIND VELOCITY, CLAY SOILS, SNOW FENCES.

ACIDITY OF SNOW AND ITS REDUCTION BY ALKALINE AEROSOLS.

Kumai, M, 1985, Vol.6, Symposium on Snow and Ice Processes at the Earth's Surface, Sapporo, Japan, Sep. 2-7, 1984. Proceedings, p.92-94, 9 refs.

40-2317
SNOW COMPOSITION, CHEMICAL PROPERTIES, AEROSOLS, COUNTERMEASURES, SCANNING ELECTRON MICROSCOPY, HYDROGEN ION CONCENTRATION.

DROGEN ION CONCENTRATION.

Snow crystals scavenge aerosols in the atmosphere during the processes of growth and precipitation

Several kinds of flyssh are found in acid snow by scanning electron microscope examination

Flyssh particles from coal fired electric power plants in Fairbanks, Alaska, were found to be spherical or irregular in shape with a 0.2 to 50 micron diameter, and were rich in calcium, siltoon, aluminum and iron

Fly Hof 35 snow samples in Fairbanks ranged from 560 to 748

The acid snow was changed to alkaline snow by dry failout of calcium-rich flyssh from the electric power plants, which were using calcium-rich Alaskan coal

ICE ACCRETION UNDER NATURAL AND LABORATORY CONDITIONS.

Laboratory Combittons. Itagaki, K, et al, 1985, Vol.6, Symposium on Snow and Ice Processes at the Earth's Surface, Sapporo, Japan, Sep. 2-7, 1984. Proceedings, p.225-228, 13 refs. Lemieux, G.E., Bosworth, H.W. 40-2351

40-2351 AIRCRAFT ICING, ICE ACCRETION, WIND TUNNELS, UNFROZEN WATER CONTENT, TEMPERATURE FACTORS, HUMIDITY, PRO-PELLERS.

To compare results of icing studies conducted in wind tunnels To compare results of icing studies conducted in wind tunnels with natural icing conditions, a series of rotor icing studies were mach on top of Mt Washington, New Hampshire The results indicated that considerable differences exist between the two under conditions of similar liquid water content and temperature. The wet-to-dry growth transition temperature, for instance, with comparable temperature and liquid water content, may be more than 10 C higher under natural conditions than in wind tunnel studies. The possible cause of such discrepancies was found to be the vapor saturation existing in most laboratory experiments. The transition existing in most laboratory experiments. The transition comperature of ice accretion measured in natural fog on board an aircraft agreed better with the results of the Mt Washington study.

MP 2010

MEASUREMENT OF ICING ON OFFSHORE STRUCTURES.

Minsk, L.D., International Workshop on Offshore Minsk, L.D., International Workshop on Offshore Winds and Icing, Halifax, Nova Scotia, Oct. 7-11, 1985 Proceedings Edited by T.A. Agnew and V.R. Swail, Downsview, Ontario, Atmospheric Environment Service, 1985, p.287-292, 3 refs. 40-2509

40-2509 ICING, OFFSHORE STRUCTURES, ICE ACCRETION, SEA SPRAY, SHIP ICING, SUPERSTRUCTURES, ICE DETECTION, PRECIPITATION (METEOROLOGY), LASERS.

MP 2011

WETTING OF POLYSTYRENE AND URE-THANE ROOF INSULATIONS IN THE LABORATORY AND ON A PROTECTED MEM-BRANE ROOF.

Tobiasson, W, et al, 1988, No.922, p 421-430, Revision of 40-2549. 13 refs

Greatorex, A., Van Pelt, D

ROOFS, THERMAL INSULATION, POLYMERS, CELLULAR PLASTICS, MOISTURE, TEMPERATURE GRADIENTS, TESTS.

TURE GRADIENTS, TESTS.

When subjected to a sustained temperature gradient in the presence of monsture in laboratory wetting tests, urefinance and expanded polystyrene roof invulstions accumulate enough moisture to reduce their invulsting ability significantly. Extruded polystyrene is quite resistant to moisture in such tests. But the vapor drive is not as great in actual roofs, and it may reverse direction, thereby seasonally drying the insulation. To determine how well the laboratory tests could predict the wetting rate of invulation in actual protected membrane roofs, extruded and expanded polystyrene and urethane insulations were installed in a protected membrane roof, extruded and expanded polystyrene and it still retained expensively accumulated in invulsting ability. Moisture progressively accumulated in 16-kg cum (1-b cu (t) and 30 kg cum (1-9-lb cu (t) expanded polystyrene invulations, and at the end of the text they retained only about 30 and 40°, of their initial thermal resistance, respectively. The urethane accumulated enough moisture to reduce its insulating ability to about 30°, of its dry value. The laboratory tests provided a valuable indication of the potential long-term moisture gain of these invultions when installed in protected membrane roofs in cold regions.

MP 2012

MOBILITY OF WATER IN FROZEN SOILS. Lunardini, V.J., et al, Army Science Conference, June 15-18, 1982. Proceedings, [1982], c15p., 32 refs. Berg, R., McGaw, R., Jenkins, T.F., Nakano, Y., Oliphant, J.L., O'Neill, K., Tice, A.R.

FROZEN GROUND PHYSICS, SOIL WATER MI-GRATION, THAW WEAKENING, FROST HEAVE, UNFROZEN WATER CONTENT, GROUND ICE, SOIL TEMPERATURE, MATH-EMATICAL MODELS.

MP 2013

CONSTRAINTS AND APPROACHES IN HIGH LATITUDE NATURAL RESOURCE SAMPLING AND RESEARCH.

Slaughter, C.W., et al, Inventorying forest and other vegetation of the high latitude and high altitude reregetation of the night intitude and night altitude regions; Proceedings of an international symposium, Fairbanks, AK, July 23-26, 1984. Edited by V.J. LaBau and C.L. Kerr, Bethesda, MD, Society of American Poresters, 1984, p.41-46, 37 refs. Werner, R.A., Haugen, R.K.

NATURAL RESOURCES, SNOW COVER EF-FECT, PERMAFROST, METEOROLOGICAL FACTORS, REMOTE SENSING, SEASONAL VARIATIONS, AERIAL SURVEYS.

MP 2014

MP 2014 ICE PENETRATION TESTS. Garcia, N B , et al, Nov 1985, 11(3), p.223-236, 6 refs. Farrell, D., Mellor, M. 40-2611

40-2011 ICE COVER STRENGTH, MILITARY RE-SEARCH, PROJECTILE PENETRATION, IM-PACT STRENGTH, FLEXURAL STRENGTH, BRITTLENESS, PENETRATION TESTS.

BRITTLENESS, PENETRATION TESTS.
Exploratory tests of ice penetration were made by driving small blunt cylinders into semi-infline ice at normal incidence. Three types of laboratory tests were made (1) drop-weight impact (impact speed 1 4-3 1 m/s), (2) high-speed ballistic penetration (impact speed 83-434 m/s), (3) deep penetration at low speed (0 42-4 23 m/s). Penetration by indenters and projectiles could be characterized by the energeties of the process, with little variation of specific energy as penetration speed changed by orders of magnitude. For blunt penetrators entering ice at -5 C, specific energy was typically in the range 15-15 MJ/cu m. Low speed tests provided data on penetration force (and energy) as a function of displacement. The test results were compared with other published laboratory data, and with field tests results for bigger projectiles. pigger projectiles

MP 2015

STATISTICS OF COARSENING IN WATER-SATURATED SNOW. Colbeck, S.C., Mar. 1986, 34(3), p.347-352, With French and German summaries. 14 refs.

SNOW WATER CONTENT, PARTICLE SIZE DISTRIBUTION, SLUSH, WET SNOW, SATURATION, STATISTICAL ANALYSIS

HON, STATISTICAL ANALYSIS

The particle size distributions in water-saturated snow are distinctly log-normal at all times. The rate of increase of the average volume decreases somewhat with time. Both of these conclusions are contrary to the LSW theory, which should apply to this system. Also, the particles are distinctly spheroidal probably prolate. These discrepancies might be explained by extending the LSW theory to nonspherical particles with interparticle contacts. When normalized to the mean the distribution is invariant with only the mean the mean the distribution is invariant with only the mean with time

MP 2016

SYSTEM FOR MOUNTING END CAPS ON ICE SPECIMENS.

Cole, D.M. et al, 1985, 31(109), p. 362-365, 3 refs, With French and German summaries

Gould, L.D., Burch, W B. 40-2694

ICE CORES, ICE SAMPLING, EQUIPMENT, FREEZING, WATER TEMPERATURE, COMPRESSIVE PROPERTIES.

PRESSIVE PROPERTIES.

This short note describes the equipment and procedures developed to mount end caps on icc-core specimens. The system typically achieves end-plaine parallelism within 0.5 micron/min of specimen diameter (i.e. a total indicator runout of 0.002 in for a 4.0 in diameter specimen). The essential elements of the system are a holder and an alignment fixture. The holder firmly grips the icc core about its circumference by the compression of two series of 0-rings. The alignment fixture clamps the holder to align the icc core precisely with the end caps. To bond the ice to the end cap we form a layer of 0.0 water on the end cap, the water freezes immediately upon contact with the ice and forms a strong intimate bond. To date, this system has been used to install phenolic end caps on 10.16 min diameter cores of saline ice. A somewhat better tolerance was obtained with the aluminum caps, due primarily to the geometric stability of that material under the prevailing

conditions. These specimens have been successfully tested in uniaxial and triaxial compression, and with appropriate end caps the system should be suitable for preparing tension

MP 2017 DETERIORATED BUILDING PANELS AT SON-DRESTROM, GREENLAND.

Korhonen, C., Spring 1985, 17(1), p.7-10, 4 refs. 40-1537

FROST ACTION, BUILDINGS, REINFORCED CONCRETES, THERMAL INSULATION, STRAINS, DAMAGE, WALLS, TEMPERATURE ARIATIONS, VAPOR PRESSURE, MOISTURE, GREENLAND.

CHARACTERISTIC FREQUENCY OF FORCE VARIATIONS IN CONTINUOUS CRUSHING OF SHEET ICE AGAINST RIGID CYLINDRICAL STRUCTURES.

Sodhi, D.S., et al, Feb. 1986, 12(1), p.1-12, 20 refs. Morris, C.E.

40-2769

40-2769
ICE LOADS, OFFSHORE STRUCTURES, ICE
COVER STRENGTH, ICE SOLID INTERFACE,
ICE PRESSURE, PILES, ICE BREAKING,
VELOCITY, ICE COVER THICKNESS, TESTS, DAMAGE.

DAMAGE.
The ice forces generated during continuous crushing of an ice sheet against a cylindrical vertical structure vary with time, according to the resistance offered by ice as it fails and clears from the path of the structure. Small-scale experiments were performed to measure the ice forces by pushing rigid cylindrical structures of different diameters at different velocities through an ice sheet. The dominant frequency of ice force variations, defined as the characteristic frequency, was determined from the frequency spectra of the force records The characteristic frequency plot with respect to the velocity-to-thickness ratio reveals a linear relationship, which implies that the average length of the damage zone is proportional to the ice thickness. On the basis of the data presented here, the average length of the damage zone is about one-third of the ice thickness

WAVELENGTH-DEPENDENT EXTINCTION BY FALLING SNOW.

Koh, G., Feb. 1986, 12(1), p.51-55, 9 refs.

SNOWFALL, LIGHT TRANSMISSION, INFRA-RED RADIATION, LIGHT SCATTERING, VISI-BILITY, WAVE PROPAGATION, PARTICLES.

Wavelength-dependent extinction in the visible and infrared Wavelength-dependent extinction in the visible and infrared regions of the electromagnetic spectrum has been observed during studies of transmission through falling snow. The wavelength dependence was particularly noticeable during periods of light snowfall. Particles comparable in size to the wavelengths were also present during these periods. These particles were assumed to be water droplets, and their extinction cross-sections were determined from Mie scattering calculations. The calculations suggest that these particles were responsible for the wavelength-dependent extinction observed during snowfall

MP 2020 ELECTROMAGNETIC MEASUREMENTS OF MULTI-YEAR SEA ICE USING IMPULSE RA-DAR.

et al, Feb. 1986, 12(1), p 67-93, 11 refs. Morey, R.M. 40-2775

SEA ICE, ICE BOTTOM SURFACE, ELECTRO-MAGNETIC PROPERTIES, ICE STRUCTURE, BRINES, AIR ENTRAINMENT, RADIO ECHO SOIJNDING, DIELECTRIC PROPERTIES, ICE PHYSICS, RADAR ECHOES

PHYSICS, RADAR ECHOES
Sounding of multi-year sea ice, using impulse radar operating in the 80- to 500-MHz frequency band, has revealed that the bottom of this ice cannot always be detected. This paper discusses a field program aimed at finding out why list is so, and at determining the electromagnetic (EM) properties of multi year sea ice. It was found that the bottom of the ice could not be detected when the ice structure had a high brine content. Because of brine's high conductivity, brine volume dominates the loss mechanism in first-year sea ice, and the same was found true for multi-year ice. A two-phase dielectric mixing formuls, used by the authors to describe the EM properties of first-year sea ice, was modified to include the effects of the gas pockets found in the multi-year ice. This three-phase mixture model was found to estimate the EM properties of the multi-year ice.

MP 2021

THERMAL ANALYSIS OF A SHALLOW UTILI-DOR.

Phetteplace, G., et al, r19861, 10p., 4 refs. Prepared for presentation at the 77th Annual Conference of the International District Heating and Cooling Association, June 8-12, 1986, Ashville, NC. Richmond, P.W., Humiston, N.

40-3359

WASTE DISPOSAL, THERMAL PROPERTIES, UTILITIES, THERMAL CONDUCTIVITY, HEAT-ING, WATER PIPELINES, AIR TEMPERATURE, DESIGN, COUNTERMEASURES, FREEZING.

MP 2022 AERIAL ROOF MOISTURE SURVEYS. Tobiasson, W., Aug. 1985, 77(502), p.424-425. ROOFS, MOISTURE DETECTION, INFRARED PHOTOGRAPHY, PENETRATION, SURVEYS.

MP 2023 EVALUATING TRAFFICABILITY.

McKim, H.L., Aug. 1985, 77(502), p.474-475. 40-2855 TRAFFICABILITY, SOIL WATER, FROST PENE-TRATION, WATER CONTENT, TRACKED TRATION, VEHICLES.

MP 2024 COLD FACTOR.

Abele, G., Aug. 1985, 77(502), p.480-481. 40-2857

COLD WEATHER CONSTRUCTION, COLD WEATHER OPERATION, MILITARY ENGINEERING, TEMPERATURE EFFECTS, WIND VELOCITY, SNOWFALL, TIME FACTOR, WIND CHILL, ENVIRONMENTS.

MP 2025

GEOTECHNICAL PROPERTIES AND FREE ZE/THAW CONSOLIDATION BEHAVIOR OF SEDIMENT FROM THE BEAUFORT SEA. ALASKA.

Lee, H.J., et al, Oct. 1985, 85-612, 83p, 23 refs Winters, W.J., Chamberlain, E.J.

40-2000 BOTTOM SEDIMENT, FREEZE THAW CYCLES, SOIL COMPACTION, SUBSEA PERMAFROST, GROUND ICE, ICE SCORING, OCEAN BOT-TOM, SEASONAL FREEZE THAW, OFFSHORE STRUCTURES.

MP 2026 SEA ICE MICROBIAL COMMUNITIES IN AN-TARCTICA

Garrison, D.L., et al. Apr. 1986, 36(4), p.243-250, 38

Sullivan, C.W., Ackley, S.F. 40-2922

SEA ICE, MICROBIOLOGY, BACTERIA, MA-RINE BIOLOGY, CRYOBIOLOGY, ANTARC-TICA—MCMURDO SOUND, ANTARCTICA -WEDDELL SEA.

The role of sea rec community inhabitants as the sub-bottom element in the antarctic food web is reviewed. Sea ice formation is described and the several denizers of this habitat are identified. They serve as food for krill which have been found in brine channels in the ice of McMurdo Sound and the Weddell Sea. Their behaviors, geographic distributions, and populations in antarctic waters are the objects of continuing long term studies.

MP 2027 TOPICAL DATABASES: COLD REGIONS TECH-

NOLOGY ON-LINE.
Liston, N., et al, Jan 1986, p 12-15, Also presented at the Arctic Offshore Technology Conference and Exposition, Anchorage, Alaska, Sep 3-5, 1985 Proceedings.

Winiarski, M E.

40-2996 ICE SURVEYS, COMPUTER APPLICATIONS. SNOW SURVEYS, OFFSHORE STRUCTURES, OFFSHORE DRILLING, BIBLIOGRAPHIES, PERMAFROST, ORGANIZATIONS, ENGI-

MP 2028
EFFECT OF FREEZING ON THE LEVEL OF
CONTAMINANTS IN UNCONTROLLED HAZARDOUS WASTE SITES. PART 1. LITERATURE REVIEW AND CONCEPTS.
Iskandar, I.K., et al, Annual Research Symposium on

Ohio, Apr. 29-May 1, 1985. Proceedings, Cincinnati, OH, U.S. Environmental Protection Agency, 11985₁, p.122-129, 21 refs. Houthoofd, J.M.

40-2952

WASTE TREATMENT, WASTE DISPOSAL, SOIL FREEZING, ARTIFICIAL FREEZING, ION DIFFUSION, FROST ACTION, SLUDGES, COUNTERMEASURES, SOIL POLLUTION, ENVIRON-MENTAL PROTECTION.

A literature search indicated that natural freezing may have A literature search indicated that natural freezing may have detrimental effects at uncontrolled hazardous waste sites in the cold-dominated areas because of frost action on buried materials and ion movement in soils Natural and artificial freezing, however, can be used beneficially to concentrate effluents, and to dewater sludges, contaminated sediment and soils The process of artificial ground freezing can also be used as an alternative to temporarily immobilize contaminant transport and potentially for decontamination of soils, sediments and sludges. A cost and economic analysis procedure was developed and used to evaluate ground freezing.

MP 2029 POTENTIAL USE OF ARTIFICIAL GROUND FREEZING FOR CONTAMINANT IMMOBILI-ZATION.

Iskandar, I.K., et al, (1985), 10p., Reprinted from International Conference on New Frontiers for Hazardous Waste Management, Pittsburgh, PA, Sep. 15-18, 1985. P. Jenkins, T.F. 40-2951 Proceedings. 14 refs.

WASTE TREATMENT, ARTIFICIAL FREEZING, SOIL FREEZING, FREEZE THAW CYCLES, SOIL POLLUTION, COUNTERMEASURES, WASTE DISPOSAL, ENVIRONMENTAL PROTECTION. DISPOSAL, ENVIRONMENTAL PROTECTION. This paper summarizes a preliminary investigation of the toptential use of ground freezing technology for contaminant immobilization. Freezing and thawing were found to significantly decrease the volume of soil slurry and increase the permeability of soils Frozen metal-contaminated soils climinated metal leaching to groundwater under the site Freezing and thawing soils contaminated with moderately volatile organics significantly reduced the soil concentrations of these organics. Freezing the soil from the bottom apparently enhanced upward movement of the organics to the soil surface where losses occurred by volatilization. The amount lost depended on the mobility of the specific volatile component and was as high as 90% for chloroform, benzene and toluene and as loward staff for textrachlorosthylene. Input to groundwater during freezing and thawing of these organics was much less than the unfrozen (control) freatment. Artificial ground freezing for decontamination of soils and for immobilization of contaminants is now being tested on a larger scale.

MP 2030 ECONOMICS OF GROUND FREEZING FOR MANAGEMENT OF UNCONTROLLED HAZARDOUS WASTE SITES.

Sullivan, J.M., Jr., et al., [1985], 15p., National Conference on Management of Uncontrolled Hazardous Waste Sites, 5th, Washington, D.C., Nov. 7-9, 1984. Proceedings. 26 refs.

Lynch, D.R., Iskandar, I K. 40-2950

WASTE TREATMENT, SOIL FREEZING, ARTIFICIAL FREEZING, WASTE DISPOSAL, SOIL WATER, THERMAL PROPERTIES, LATENT HEAT, ENVIRONMENT PROTECTION, RE-FRIGERATION

FRIGERATION

Ground freezing for hazardous waste containment is an alternative to the traditional and expensive slurry wall or grout curtain barrier technologies. The parameters quantified in this analysis of it include thermal properties, refrigeration line spacing, equipment mobilization and freezing time constraints. The economics of the process is discussed based on the Poetsch method for ground freezing. Vertical drill holes with concentric refrigeration lines are spaced along the desired freezing line. A header or manifold system provides coolant to an interior pipe, with the return line being the outer casing. A self-contained refrigeration system pumps coolant around the freezing loop. Temperature-measuring instrumentation is appropriately placed to monitor the progress of the freeze front.

PROCEEDINGS.

International Offshore Mechanics and Arctic Engimeemauonai Uisnore Mechanics and Arctic Engineering Symposium, 5th, Tokyo, Apr. 13-18, 1986, New York, American Society of Mechanical Engineers, 1986, 4 vols, Refs. passim. For selected papers see 40-3104 through 40-3199.

Chung, J.S., ed. 40-3103

OFFSHORE STRUCTURES, OFFSHORE DRILL-ING, ICE LOADS, ICE CONDITIONS, ENGINEERING, MEETINGS, ICE MECHANICS, ICE SOLID INTERFACE, IMPACT STRENGTH, ICE STRENGTH.

MP 2032 ICE PROPERTIES IN A GROUNDED MAN-MADE ICE ISLAND.

Cox, G.F N, et al, International Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr. 13-18, 1986. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1986, p.135-142, 19 refs. Utt, M.E. 40,3120

40.3120

ICE ISLANDS, GROUNDED ICE, ICE SALINITY, ICE TEMPERATURE, ICE DENSITY, SHEAR STRENGTH, ICE LOADS, ARTIFICIAL IS-LANDS, TESTS, OFFSHORE STRUCTURES.

LANDS, TESIS, OFFSHORE STRUCTURES.
Salinity, temperature, density, and shear strength tests were performed on the confined flooded ice in the 1976-77 East Harrison Bay grounded ice island. The constructed ice had a mean salinity of 138 ppt, a mean density of 877 kg/cu m, and a mean horizontal shear strength of 0.74 MPa. The shearing resistance of the constructed ice and the sliding resistance of the island on the sea floor were sufficient to prevent the island from being pushed off location by the movement. by ice movement

MP 2033

FREE AND FORCED CONVECTION HEAT TRANSFER IN WATER OVER A MELTING HORIZONTAL ICE SHEET.

Lunardini, V.J, International Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr. 13-18, 1986. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1986, p.227-236, 24 refs

ICE MELTING, HEAT TRANSFER, WATER FLOW, ICE TEMPERATURE, ICE SHEETS, WATER TEMPERATURE, CONVECTION.

WATER TEMPERATURE, CONVECTION.

Experiments were conducted to study the melting of a horizontal ice sheet with a flow of water above it. The experiments were conducted in a refrigerated flume 35 m long with a cross section of 12 x 12 m. Water depth, temperature, and velocity were varied as well as the temperature and initial surface profile of the ice sheet. It was found that the heat transfer regimes consisted of forced turbulent flow at high Reynolds numbers with a transition to free convection heat transfer at lower Reynolds numbers. There was no convincing evidence of a forced laminar regime

MP 2034

HEAT TRANSFER CHARACTERISTICS OF THERMOSYPHONS WITH INCLINED EVAPORATOR SECTIONS.

Haynes, F.D., et al, International Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr 13-18, 1986 Proceedings, Vol 4, New York, American Society of Mechanical Engineers, 1986, p.285-292, 21 rcfs.

Zarling, J.P. 40-3150

HEAT TRANSFER, EVAPORATION, PERMA-FROST THERMAL PROPERTIES, THERMAL CONDUCTIVITY, PERMAFROST BENEATH STRUCTURES, FOUNDATIONS, WIND VELOCITY, AIR TEMPERATURE, TESTS. THAW DEPTH

THAW DEPTH

Laboratory tests were conducted on two commercial fullsize thermosyphons, one charged with carbon dioxide and
one with ammonia. The test variables were evaporator
inclinational angle, wind speed and ambient air temperature
Empirical expressions are presented for thermal conductance
as a function of these test variables. The laboratory test
results were used in finite element simulations run on an
IBM-PC microcomputer to study three design parameters
influencing the thermal regime below slab-on-grade foundations
in a permafrost location. Insulation thickness, thermosyphon conductance and vertical placement were varied in
these simulations. The effect of these variables on the
maximum depth of thaw are given

CONFINED COMPRESSIVE STRENGTH OF MULTI-YEAR PRESSURE RIDGE SEA ICE

Cox, G.F.N., et al, International Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr. 13-18, 1986. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1986, p.365-373, 17 refs.
Richter-Menge, J.A.

40-3162

PRESSURE RIDGES, ICE STRENGTH, COM-PRESSIVE PROPERTIES, LOADS (FORCES), SEA ICE, STRAIN TESTS, TEMPERATURE EF-FECTS, PRESSURE, STRESSES.

Fifty-five constant-strain-rate triaxial tests were performed on vertically oriented multi-year pressure ridge samples from the Beaufort Sea. The tests were performed on a closed-loop electrohydraulic testing machine at two nominal strain rates (1/100,000 and 1/1,000 per sec) and two temperatures (-20 and -5 C) In all of the tests the confining pressure was ramped in constant proportion to the applied axial stress. This paper summarizes the sample preparation and testing techniques used in this investigation and presents data on the confined compressive strength and failure strain of the ice. Uniaxial data are also included for comparison

MP 2036 SOME EFFECTS OF FRICTION ON ICI FORCES AGAINST VERTICAL STRUCTURES. Kato, K., et al. International Offshore Mechanics and Aato, K., et al, international Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr. 13-18, 1986. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1986, p.528-533, 17 refs.

Sodhi, D.S., Haynes, D.

ICE LOADS, ICE FRICTION, OFFSHORE STRUCTURES, ICE BREAKING, ICE SOLID IN-TERFACE, ICE CONDITIONS.

The contributions of frictional forces to the overall ice forces certifications of incutonal torces have been studied before, but their effect on the ice forces against vertical structures has not yet been studied. In this paper, the influence of frictional resistance on the crushing and buckling failure loads of ice sheets against flat, vertical structures is discussed loads of ice sheets against flat, vertical structures is discussed Small-scale experiments were conducted to compare experimental results to those from theoretical formulations. The main conclusions of this study are: a) the crushing ice forces increase with increasing coefficient of friction between ice and structure, and b) the buckling failure loads also increase due to changes in boundary condition induced by increasing frictional resistance at the ice/structure interface MP 2037

IMPACT ICE FORCE AND PRESSURE: AN EX-PERIMENTAL STUDY WITH UREA ICE.

Sodhi, D.S., et al, International Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr 13-18, 1986. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1986, p.569-576, 10 refs. Morris, C.E.

40-3190 ICE L ICE LOADS, ICE PRESSURE, OFFSHORE STRUCTURES, IMPACT STRENGTH, PILES, VELOCITY, UREA, EXPERIMENTATION, COMPRESSIVE PROPERTIES.

PRESSIVE PROPERTIES.

An experimental study was undertaken of the total force and local pressure generated during the impact of a vertical cylindrical structure against the edge of an ice sheet. The test structure was an instrumented cylindrical pile that protruded under a massive ram suspended from two cranes in the form of a bifliar pendulum. Measurements were made of impact velocity, total ice force, and pressure at a point on the pile. The dependence of normalized maximum net forces with respect to aspect ratio has the same tiend as that for the crushing failure of an ice sheet against a vertical structure. The results of this study indicate that the instantaneous maximum pressure can be an order of magnitude higher than the unconfined compressive strength of ice.

ICE FLOE DISTRIBUTION IN THE WAKE OF A SIMPLE WEDGE.

Tatinclaux, JC, International Offshore Mechanics and Arctic Engineering (OMAE) Symposium, 5th, Tokyo, Apr 13-18, 1986 Proceedings, Vol 4, New York, American Society of Mechanical Engineers, 1986, p.622-629, 6 rcfs

40-3198
ICE BREAKING, ICE WEDGES, ICE FLOES, SEA
ICE DISTRIBUTION, ICEBREAKERS, ICE
STRENGTH, ICE COVER THICKNESS, ICE
MODELS, ICE CONDITIONS, TESTS.

Tests in level ice on an idealized techreaker how in the shape of a simple wedge were conducted and the floe size distribution in its wake was observed. The ice floe length and ice floe area were found to follow log normal probability distributions defined by the length average and area average, and corresponding standard deviations.

MP 2039 CONDENSATION CONTROL IN LOW-SLOPE

Tobiasson, W., Moisture Control in Buildings: Workshop proceedings, Sep. 25-26, 1984. Edited by E. Bales and H. Trechsel, Washington, D.C., Building Thermal Envelope Coordinating Council, (1985), p.47-59, 47 refs. 40-3204

ROOFS, CONDENSATION, MOISTURE, VAPOR TRANSFER, AIR FLOW, COUNTERMEASURES BUILDINGS, DAMAGE, CONSTRUCTION MATERIALS, MAINTENANCE. CONSTRUCTION

Excessive moisture can damage wood, metal, and concrete roof decks, cause bituminous membranes to wrinkle, shrink, split, delaminate and blister and significantly reduce the insulating ability of most roof insulations. Low-sloped wood-frame roofs with below-deck insulation have encountered wood-frame roofs with below-deck insulation have encountered a significant number of condensation problems. Few such problems occur for compact membrane roofs without intervening air spaces. Air leakage control probably explains the difference. However, serious condensation problems occur in some compact membrane roofs, particularly in cold regions. For most roofs, upward vapor flow in cold weather is generally exceeded by downward vapor flow in warm weather. Thus, the objective is to install "ir-vapor retarders to reduce winter wetting to an acceptable, level. Ventilation of the space between the membrane and the retarder is also practiced.

ROOF MOISTURE SURVEYS: YESTERDAY, TODAY AND TOMORROW.

Tobiasson, W, et al, International Symposium on Roofing Technology, 1985 Proceedings A decade of change and future trends in roofing, Chicago, IL, National Roofing Contractors Association, [1985], .438-443 + figs., 45 refs.

Korhonen, C.

ROOFS, MOISTURE DETECTION, THERMAL INSULATION, CONDENSATION, MEASURING INSTRUMENTS.

INSTRUMENTS.

Roof moisture surveys are conducted with nuclear meters, capacitance meters or infrared scanners. Nuclear meters and capacitance meters take readings at the spots on the roof with points spaced from 5 to 10 feet apart. Nuclear meters sense the amount of hydrogen in the roofing system at each spot. Since most dry roofs contain hydrocarbons, they do not give zero readings. When water also is present on the roof, nuclear readings increase since water is part hydrogen. Capacitance meters create an alternating current electrical field in the roofing system below. When there is water in the roof, its dielectric properties change and the reading on the capacitance meter increases. Capacitance meters do not "see" deeply (a few inches at most) into the roofing system. An infrared scanner senses the temperature of the surface of the roof. Wet insulation changes the ability of the roofing system to store and conduct thermal energy, thereby causing changes in its surface temperature which the infrared scanner can detect. Instead of a meter reading, the infrared results are presented as shades of brightness on a video monitor. This qualitative visual image provides information about every square inch of the roof, but the information is more subjective than the numbers generated at grid points by nuclear or capacitance meters.

VAPOR DRIVE MAPS OF THE U.S.A.

Tobiasson, W., et al, Hanover, NH, Cold Regions Research and Engineering Laboratory, 11986, 7p. + graphs, 9 refs. Presented at the ASHRAE/DOE/B-TECC Conference "Thermai Performance of the Exterior Envelopes of Buildings III", Clearwater Beach, ISBN 1088 FL, Dec. 1985 Harrington, M.

THERMAL INSULATION, CONDENSATION, MOISTURE, WATER VAPOR, MAPS, BUILDINGS, METEOROLOGICAL FACTORS, DESIGN CRITERIA, SEASONAL VARIATIONS

CRITERIA, SEASONAL VARIATIONS

The thermal performance of most insulations used in building envelopes will be seriously degraded if the insulation becomes wet Problematic mosture can come from within the building envelope Guidance on when to use "air-retarders" needs improvement. As a step in this direction, weather records have been analyzed and two series of maps have been made that relate the relative humidity within a building to the vapor pressure gradients across the building envelope. Lach map in the first series is for a specific ratio of cold weather wetting potential to warm weather drying potential Each map in the second series is for a specific cold weather wetting potential.

HEAT FLOW SENSORS ON WALLS—WHAT CAN WE LEARN.

Flanders, S.N., 1985, No 885, p.140-149, 10 refs. 40.3226

THERMAL INSULATION. WALLS. TRANSFER. HEAT FLUX, HEAT LOSS, BUILD-INGS. ACCURACY, THERMAL CONDUCTIVI- This paper addresses the validity of employing heat flow sensors (HFSs) on the indoor surfaces of building walls to determine thermal characteristics. It also reports on the results obtained in the field.

Some of the factors affecting HFS measurement accuracy (together with a likely percentage standard deviation attributable to that factor) are percentage standard deviation attributable to that factor) are as follows: (a) the conductivities of HFS and its surroundings (3%), (b) convection mode changing over the sensor, causing a +21% bias (26%), (c) the mismatch of HFS absorptivity with the surroundings (6%), and (d) thermal contact of the HFS with the surface (1%) A propagation-of-errors analysis indicates that the resulting standard deviation of an HFS measurement would be approximately 10% of the mean of the measurements. the measurements.

NEED FOR SNOW TIRE CHARACTERIZATION AND EVALUATION.

Yong, R.N., et al, Sep. 1985, No.SR 85-15, ISTVS Workshop on Measurement and Evaluation of Tire Performance under Winter Conditions, Alta, Utah, Apr. 11-14, 1983. Proceedings. Edited by G.L. Blaisdell and R.N. Yong, p.1-2, ADA-161 129. Blaisdell, G.L.

TIRES, COLD WEATHER PERFORMANCE, TRACKED VEHICLES, SNOW COVER EFFECT, TRACTION.

MP 2044 DESIGN AND USE OF THE CRREL INSTRU-MENTED VEHICLE FOR COLD REGIONS MO-BILITY MEASUREMENTS.

Blaisdell, G.L., Sep. 1985, No.SR 85-15, ISTVS Workshop on Measurement and Evaluation of Tire Performsnop on Measurement and Evaluation of 11re Performance under Winter Conditions, Alta, Utah, Apr. 11-14, 1983. Proceedings. Edited by G.L. Blaisdell and R.N. Yong, p.9-20, ADA-161 129, 2 refs. 40-3323

MOTOR VEHICLES, COLD WEATHER PER-FORMANCE, TRACTION, VEHICLE WHEELS, RUBBER SNOW FRICTION, RUBBER ICE FRIC-TION, DESIGN, VELOCITY, LOADS (FORCES), MEASURING INSTRUMENTS.

MEASURING INSTRUMENTS.

The U.S. Army Cold Regions Research and Engineering Laboratory has recently acquired an instrumented vehicle for the measurement of forces at the tire/surface material interface. The CRREL instrumented vehicle (CIV) is equipped with moment-compensated triaxual load cells mounted in the vertical, longitudinal (in the direction of motion) and side directions. In addition, accurate wheel and vehicle speeds and rear exit corque and speed are measured. Modifications to the vehicle (to facilitate the performance of traction and motion resistance tests) include four lock-out type hubs to allow front, rear- or four-wheel drive and a dual brake system for front-, rear- or four-wheel braking. A min-computer-based data acquisition system is installed in the vehicle to control data collection and for data processing, analysis and display. Discussion of the vehicle includes its operation and use for the evaluation of the tire performance and surface material properties of motion resistance and traction.

MP 2045 WINTER TIRE TESTS: 1980-81.

Blaisdell, G.L., et al, Sep. 1985, No SR 85-15, ISTVS Workshop on Measurement and Evaluation of Tirk Performance under Winter Conditions, Alta, Utah, Apr. 11-14, 1983. Proceedings. Edited by G.L. Blaisdell and R.N. Yong, p.135-151, ADA-161 129, 2 refs.

Harrison, W.L.

40-3333
TIRES, ICE COVER EFFECT, SNOW COVER EFFECT, MOTOR VEHICLES, COLD WEATHER PERFORMANCE, SURFACE PROPERTIES, TESTS, ROAD ICING, TRACTION

MP 2046 FIELD DEMONSTRATION OF TRACTION TESTING PROCEDURES.

Blaisdell, G L , Sep. 1985, No SR 85-15, ISTVS Workshop on Measurement and Evaluation of Tire Performance under Winter Conditions, Alta, Utah, Apr. 11-14, 1983. Proceedings Edited by G.L. Blaisdell and R.N. Yong, p 176, ADA-161 129

SNOW COVER EFFECT, TRACTION, MOTOR VEHICLES, TIRES, TESTS, MEASURING INSTRUMENTS.

MP 2047 PHYSICAL PROPERTIES OF THE SEA ICE COVER.

Weeks, W.F., Nordic seas. Edited by B.G. Hurdle, New York, Springer-Verlag, 1986, p.87-102, Refs. New Yor p.98-100.

ICE STRUCTURE, ICE COMPOSITION, SEA ICE, ICE PHYSICS, ICE COVER THICKNESS, ICE FORMATION, SNOW COVER, ICE CRYSTAL STRUCTURE, ARCTIC OCEAN.

LARGE-SIZE COAXIAL WAVEGUIDE TIME DOMAIN REFLECTOMETRY UNIT FOR FIELD

Delaney, A.J., et al, Sep 1984, GE-22(5), p 428-431, 10 refs.

Arcone, S.A.

40-3307 FROZEN GROUND PHYSICS, ICE ELECTRICAL PROPERTIES, DIELECTRIC PROPERTIES, GROUND THAWING, WAVE PROPAGATION, REFLECTION, MEASURING INSTRUMENTS.

REFLECTION, MEASURING INSTRUMENTS.
A large-diameter open-ended coaxial waveguide has been interfaced with a commercially available time domain reflectometry (TDR) unit for field measurements of the dielectric properties of frozen and thawed soils and ice. A core barrel developed by the US Army Cold Regions Research and Engineering Laboratory (CRREL) and modified for use in frozen soil was used to auger an annular slot around which the waveguide fits. Time domain traces of waveforms reflected from the sample-air interface and from a metal short are recorded in the field and later analyzed to give complex dielectric permittivity between 0.05 and 1.0 GHz.

MP 2049 REVERSED-PHASE HIGH-PERFORMANCE LIQUID CHROMATOGRAPHIC DETERMINA-TION OF NITROORGANICS IN MUNITIONS WASTEWATER.

Jenkins, T.F., et al, Jan. 1986, 58(1), p.170-175, 32

Leggett, D.C., Grant, C.L., Bauer, C.F. 40-3356

WASTE TREATMENT, WATER TREATMENT, WATER CHEMISTRY, DETECTION, WATER POLLUTION, GROUND WATER.

WAIER CHEMISIAY, DETECTION, WATER POLLUTION, GROUND WATER.
Concentrations of HMX, RDX, TNT, and 2,4-DNT are determined in munitions wastewater. Aqueous samples are diluted with an equal volume of 76/24 (v/v) methanolacetonitrile, filtered through a 0.4 micron polycarbonate membrane, and analyzed by reversed-phase HPLC using an LC 8 column with 50/38/12 (v/v/v) water-methanol-acetonitrile. The method provided linear calibration curves to at least several hundred micrograms per liter. Detection limits were conservatively estimated to be 26, 22, 14, and 10 micrograms/L for HMX, RDX, TNT, and 2,4-DNT, respectively, with corresponding standard deviations of 3.4, 33, 4, and 4.6 micrograms/L up to concentrations of 250 micrograms/L. At hisper concentrations, the percent relative standard deviation values were approximately 2% for HMX and RDX and 4% for TNT and DNT. A ruggedness test involving the major manipulative steps in the procedure indicated that consistent results required glass sample containers, preconditioning of filters, and careful maintenance of sample-to-organic solvent ratio. The method was tested with munition wastewater from several Army ammunition plants and found to perform adequately for load and pack wastewaters, wastewater from HMX/RDX manufacture, and contaminated groundwater.

INTERLABORATORY EVALUATION OF HIGH-PERFORMANCE LIQUID CHROMATO-GRAPHIC DETERMINATION OF NITROOR-GANICS IN MUNITION PLANT WASTEWA-TER.

Bauer, C.F., et al, Jan. 1986, 58(1), p.176-182, 11 refs.

Bauer, C.F., et al, Jan. 1900, 36(1), p.170-162. 11 fels. Grant, C.L., Jenkins, T.F. 40-3357 WASTE TREATMENT, WATER TREATMENT, WATER POLLUTION, CHEMICAL ANALYSIS, WATER CHEMISTRY, COUNTERMEASURES,

TESTS.

A reversed-phase HPLC method for the determination of nitroorganic compounds (DNT, TNT, RDX, HMX) in munitions wastewaters was evaluated in a collaborative study line laboratories analyzed four aducous matrices, including groundwater and treated wastewater, which were spiked with the analytes at levels from 30 to 600 microgram/L. Recoveries of analytes were similar regardless of matrix DNT and RDX being recovered quantitatively, and TNT and HMX showing losses of about 5%. Intralaboratory precisions, based on the average of duplicate determinations, were less than 15 microgram/L, which corresponds to 9% relative standard deviation at the average concentration examined Interlaboratory precisions were at most 50% larger than in tralaboratory values. Valid statistical analysis required rejection of about 10% of the data set as outliers. The rationale for applying a variety of statistical evaluations is discussed. trataboratory values Valid statistical analysis required rejection of about 10% of the data set as outliers. The rationals for applying a variety of statistical evaluations is discussed

MP 2051

MATHEMATICAL SIMULATION OF NITRO-GEN INTERACTIONS IN SOILS.

Selim, H.M., et al. June 1983, 25(3), p.241-248, 21

Mehran, M., Tanji, K.K., Iskandar, I.K.

40-3464
SOIL CHEMISTRY, GAS INCLUSIONS, WASTE DISPOSAL, GROUND WATER, NUTRIENT CY-CLE, WATER FLOW, INTERFACES, MATHEMATICAL MODELS, CONVECTION, AGRICULTURE.

AGRICULTURE.
Four mathematical models were evaluated for their ability to describe the fate of introgen (N) in the soil environment. The first model is a general one which accounts for convective-dispersive N transport under transient water flow conditions with active N uptake by plants Model II considers N transport to be only of the convective type, whereas model III considers N uptake as a passive process In contrast, model IV considers N transport under conditions of steady water flow in the convective model (II) and the steady state model (IV) are inferior in describing N flow in the soil system as well as the convective dispersive transport mechanisms must be considered for reliable simulation of N behavior in the soil environment. N behavior in the soil environment.

MP 2052 MP 2052
MEASUREMENT OF THE RESISTANCE OF IMPERFECTLY ELASTIC ROCK TO THE PROPAGATION OF TENSILE CRACKS.
Peck, L., et al, Aug. 10, 1985, 90(B9), p.7827-7836, 35

Nolen-Hoeksema, R.C., Barton, C.C., Gordon, R.B.

40-3466 ROCKS, ROCKS, CRACK PROPAGATION, ELASTIC PROPERTIES, TENSILE PROPERTIES, FRACTURING, STRENGTH, TESTS.

TURING, STRENGTH, TESTS.

Laboratory tests confirm the accuracy of the compliance equations for wedge-loaded, linearly elastic, double cantilever beam test specimens used for the measurement of fracture energy G(I) but show that there are significant discrepancies with theory in tests on rock specimens of the same design. The dependence of the compliance on the length of the crack in the test specimen is not correctly predicted by theory for the experiments done on rock. The axial load applied to the arms of the double cantilever beam as a result of wedge loading reduces Young's modulus by as much as 44% and decreases the measured elastic anisotropy of specimens of grante. The experiments show that useful measurement of G(I) can be made on rock provided that the Young's modulus used in the determination of G(I) is measured on the same specimen under the same conditions of loading as are used in the fracture experiments

MP 2053 ON ZERO-INERTIA AND KINEMATIC WAVES. Katopodes, N.D., Nov. 1982, 108(HY11), p.1381-1387, 5 refs. Discussion by M G Ferrick, Journal of hydraulic engineering, Mar. 1984, 110(3), p.352-357, 8 refs.

Ferrick, M.G. 40-3483

RIVER FLOW, WAVE PROPAGATION, WATER WAVES, CHANNELS (WATERWAYS). MATHEMATICAL MODELS

MP 2054 PROCEEDINGS.

Symposium on Applied Glaciology, 2nd, West Lebanon, N.H., Aug 23-27, 1982, 1983, Vol 4, 314p., Refs. passim. For individual papers see 37-4071 through 37-4120.

Colbeck, S.C., ed.

37-4070

GLACIOLOGY, PERMAFROST, ICE SURVEYS, SNOW SURVEYS, AVALANCHES, SEA ICE.

MP 2055 EQUATIONS FOR DETERMINING THE GAS AND BRINE VOLUMES IN SEA-ICE SAMPLES. Cox, G.F.N., et al. 1983, 29(102), p.306-316, in English with French and German summaries. Weeks, W.F. 38-1476

SEA ICE, BRINES, GAS INCLUSIONS, ICE DEN-SITY, MATHEMATICAL MODELS

SITY, MATHEMATICAL MODELS
Equations are developed that can be used to determine
the amount of gas prevent in sea ace from measurements
of the bulk ace density, salinity, and temperature range of 2 to 30 C. Conversely these relationships can be used to give the density of sea ace as 5 afforction of its temperature and salinity, considering both
the presence of gas and of solid salits in the ice. Liquations
are also given by allow the calculation of the gas and
the solid salicity was determined (Auth)

SURFACE INTEGRAL METHOD FOR DETER-MINING ICE LOADS ON OFFSHORE STRUC-TURES FROM IN SITU MEASUREMENTS. Johnson, J.B., 1983, Vol.4, p.124-128, 23 refs.

ICE LOADS, OFFSHORE STRUCTURES, ICE SOLID INTERFACE, MATHEMATICAL MOD-ELS, SHEAR STRESS, FLOATING ICE.

MP 2057

MEASUREMENTS OF RADAR WAVE SPEEDS IN POLAR GLACIERS USING A DOWN-HOLE RADAR TARGET TECHNIQUE.

Jezek, K.C., et al, Oct. 1983, 8(2), p.199-208, 17 refs Roeloffs, E.A.

RADAR ECHOES, WAVE PROPAGATION, GLA-CIER ICE, ELECTRICAL RESISTIVITY, AN-TARCTICA—VICTORIA LAND, GREENLAND.

TARCTICA—VICTORIA LAND, GREENLAND. A new technique for measuring the speed of radar waves in polar ice sheets was developed to investigate a previously reported disagreement between the permittivities of laboratory and glacier ice. The technique involves lowering a cylindrical radar target to several carefully measured depths in a borehole and measuring the travel time of a radar wave transmitted from a surface radar unit to the target in the borehole. The experiment was performed at Dome C, East Antarctica, and Dye-3, Greenland, and useable date were collected for target depths between 200 ard 800m. After computing the range to the target along a straight ray path and after correcting the travel time for delays in in the radar receiver, the velocities determined from these experiments were found to be in good agreement with the velocities predicted by Robin's empirical formula. The apparent discrepancy between the permittivity of glacier ice, as measured using the radar wide-angle reflection method, and laboratory ice now seems to be due in large part to signal delay in the radar receiver that was ignored in earlier experiments. (Auth)

RECENT CHANGES IN THE DYNAMIC CON-DITION OF THE ROSS ICE SHELF, ANTARC-

Jezek, K C, Jan 10, 1984, 89(B1), p.409-416, 9 refs.

Jezek, K C, Jan 10, 1984, 89(B1), p.409-416, 9 refs. 38-1742
ICE SHELVES, FLOW RATE, RADAR ECHOES, ICE COVER THICKNESS, ANTARCTICA—ROSS ICE SHELF, ANTARCTICA—SIPLE COAST, ANTARCTICA—CRARY ICE RISE.

Variations in the amphitude of radar echoes from the bottom of the grid western half of the Ross Ice Shelf have been analyzed. Contrary to the results of a similar analysis performed for the grid eastern sector of the ice shelf, bands of low signal strength downstream from both Crary Ice Rise and the Siple Coast do not correlate with modern flow lines The difference in direction between the radar bands downstream of Crary Ice Rise and the present velocity vectors and the absence of of a comparable trend farther east suggest to us that the grounding line around Crary Ice Rise retreated within the last 1000 years This hypothesis is reinforced by the observation of several domes and hollows in ice thickness downstream of Crary Ice Rise which are similar to a hollow now located in the wake of the ice rise and a dome of its eastern flank. We interpret this as evidence for a rapid increase in flow around the ice rise which carried downstream for the Siple Coast suggests that there was a regional retreat of the West Antarctic grounding line (Auth.)

MODIFIED THEORY OF BOTTOM CRE-VASSES USED AS A MEANS FOR MEASURING THE BUTTRESSING EFFECT OF ICE SHELVES ON INLAND ICE SHEETS.

Jezck, K.C., Mar 10, 1984, 89(B3), p 1925-1931, 20

38-2914

ICE SHELVES, CREVASSES, FLOATING ICE, ICE MECHANICS, ANTARCTICA—ROSS ICE SHELF.

Bottom crevasses are fractures that extend upward into floating ice shelves. They form when seawater penetrates the base of the rice shelf and ruptures the rice up to the level at which englacial stresses equal the stress of the seawater. For a freely floating rice shelf, the penetrating level of closely spaced crevasses is estimated at about half the rice thickness. In for an isolated crevasse the level is about pin 4. However, an analysis of the heights and locations of bottom crevases in the Ross Ice. Shelf shows that none of the crevasses approach the predicted limits, perhaps because the existing theory does not include the back stress which is present in bounded rice shelves. By reformulating the theory to include a back stress term, back stress which is present experimentally from radar measurements of crevasse height and rice thickness. The magnitude of back stress (2 bars in the grid northwest corner of the rice shelf) suggests the ce shelf is playing an important role in buttressing the inland ice sheet. (Auth.) Bottom crevasses are fractures that extend upward into floating

WHAT BECOMES OF A WINTER SNOWFLAKE. Colbeck, S.C., Dec 1985, 38(6), p.312-215.

40-3481
SNOWFLAKES, SNOW CRYSTAL STRUCTURE,
SNOW CRYSTAL GROWTH, TEMPERATURE
GRADIENTS, TEMPERATURE EFFECTS,
VAPOR DIFFUSION.

MP 2061

SIZE AND SHAPE OF ICE FLOES IN THE BAL-TIC SEA IN SPRING.

Leppăranta, M., 1983, 19(2), p.127-136, 4 refs. 40-3462

ICE FLOES, SEA ICE DISTRIBUTION, REMOTE SENSING, ICE MELTING, AERIAL SURVEYS, SEASONAL VARIATIONS, PHOTOGRAPHY, BALTIC SEA

MP 2062

ICE PROPERTIES IN THE GREENLAND AND BARENTS SEAS DURING SUMMER.

Overgaard, S., et al, 1983, 29(101), p 142-164, With French and German summaries 34 refs. French and German summaries Wadhams, P., Leppäranta, M.

SEA ICE DISTRIBUTION, ICE COVER STRENGTH, ICE COVER THICKNESS, ICE SALINITY, ICE TEMPERATURE, ICE DENSITY, ICE COMPOSITION, ICE ELECTRICAL PROP-ERTIES, IONS,

MP 2063 GROWTH MODEL FOR BLACK ICE, SNOW ICE AND SNOW THICKNESS IN SUBARCTIC BA-SINS.

Lepparanta, M., 1983, 14(2), p.59-70, 22 refs.

ICE FORMATION, SNOW ICE, SNOW DEPTH, HEAT FLUX, SNOWFALL, SURFACE TEMPERATURE, MATHEMATICAL MODELS, SNOW DENSITY, METAMORPHISM (SNOW), ICE SHEETS.

MP 2064

BURIED SEED AND STANDING VEGETATION IN TWO ADJACENT TUNDRA HABITATS, NORTHERN ALASKA.

Roach, D.A., 1981, Vol.60, p 359-364, For M.S thesis see 37-4301. 35 refs.

TUNDRA, VEGETATION, GROWTH, SOIL WA-TER.

MP 2065

UNIFIED DEGREE-DAY METHOD FOR RIVER ICE COVER THICKNESS SIMULATION. Shen, H.T., et al, Mar. 1985, 12(1), p.54-62, 16 refs.

39-2513
ICE COVER THICKNESS, RIVER ICE, DEGREE DAYS, ICE CONDITIONS, ICE BREAKUP, MATHEMATICAL MODELS, CANADA—SAINT LAWRENCE RIVER.

MP 2066

ISOTHERMAL COMPRESSIBILITY WATER MIXED WITH NA-SATURATED MONT-MORILLONITE.

Oliphant, J.L., et al, Sep 1983, 95(1), p.45-50, 14 refs.

WATER CHEMISTRY, COMPRESSIVE PROPERTIES, CLAYS, FREEZE DRYING, THERMODY-NAMICS, MINERALS, ANALYSIS (MATH-EMATICS)

MP 2067 CLEAR IMPROVEMENT IN OBSCURATION. Palmer, R.A., Aug 1985, 77(502), p.476-477.

BI OWING SNOW, VISIBILITY, MILITARY OP-ERATION, FOG. DESIGN.

MP 2068

REPEATED LOAD TRIAXIAL TESTING OF FROZEN AND THAWED SOILS. Cole, D.M., et al., Dec. 1985, 8(4), p 166-170, 4 refs Durell, G., Chamberlain, E.J

FROZEN GROUND STRENGTH, GROUND THAWING, STRESSES, LOADS (FORCES).
THAW WEAKENING, SOIL STRENGTH.
FREEZE THAW CYCLES, STRAIN TESTS,
DEFORMATION, SOIL WATER, EQUIPMENT

This paper describes the equipment and methodology used to determine the resilient properties of granular soils that exhibit thaw-weakening behavior. Such toils suffer a significant loss in stiffness as the result of freezing and thawing and subsequently experience an increase in stiffness during a secovery phase. The recovery phase results from gradual

desaturation of the thawed soil and is characterized by an increase in the soil moisture tension level. We have developed a means to simulate this freeze-thaw-recovery process in the laboratory that calls for testing specimens several times at soil moisture tension levels corresponding to field

MP 2069

VERTICALLY STABLE BENCHMARKS: A SYN-THESIS OF EXISTING INFORMATION.

Gatto, L.W., U.S. Army Corps of Engineers Surveying Conference, Jacksonville, FL, Feb. 4-8, 1985. Pro-ceedings, 1985, p.179-188, Refs. p.183-185.

FROST ACTION, MEASURING INSTRUMENTS, PERMAFROST, BENCH MARKS, TOPOGRAPHIC SURVEYS, HYDROLOGY, STRUCTURES, DEFORMATION, DESIGN.

Techniques used for topographic, hydrographic and structural movement surveys are no more accurate than the benchmarks used as reference. In northern areas, frost action can cause substantial vertical movement of benchmarks. Bench-marks can also subside or shift in wetland and coastal areas. Vanous benchmark designs and installation procedures reduce Various benchmark designs and installation procedures reduce or eliminate movement, but information on the designs and procedures is widely scattered and not available to Corps of Engineers Districts in one report. This paper gives the preliminary results of a synthesis of existing information compiled from surveys of Crops of Engineers Districts and Divisions, U.S. and Canadian government agencies and private industry and from a literature review. A matrix for selecting benchmarks appropriate for various climate and soil conditions will be prepared from the synthesized information. This matrix and a description of the procedures required for installing various types of benchmarks will be available in September 1985.

MP 2070 COLD WEATHER O&M. Reed, S.C., et al, 1985, 2(2), p.10-15, 6 refs. Niedringhaus, L.

WASTE TREATMENT, WATER TREATMENT, COLD WEATHER OPERATION, TEMPERATURE EFFECTS, VISCOSITY, LUBRICANTS.

MP 2071 USACRREL'S SNOW, ICE, AND FROZEN GROUND RESEARCH AT THE SLEEPERS RIVER RESEARCH WATERSHED.

Pangburn, T., et al, Eastern Snow Conference, Washington, D.C., June 7-8, 1984. Proceedings, (1984), p.229-240, 25 refs.

McKim, H.L.

SNOW HYDROLOGY, ICE SURVEYS, FROZEN GROUND PHYSICS, SNOW WATER EQUIVALENT, RUNOFF FORECASTING, WATERSHEDS, MODELS, TEMPERATURE EFFECTS. SHEDS, MODELS, TEMPERATURE EFFECTS.
The Sleepers River Research Watershed in Danville, Vermont, has one of the longest historical data bases for a cold regions area NOAA/NWS have been conducting research in snow hydrology at the watershed for the past 24 years; CRREL has been involved for the past 6 years CRREL's major research involves 1) developing and testing a sensor that will measure the water equivalent of snow in near real time, and 2) modifying existing hydrologic models to accept remotely obtained data on snow, ice, and frozen ground

COMPUTATIONAL MECHANICS IN ARCTIC ENGINEERING.

Sodhi, DS, Computer Methods in Offshore Engineering Specialty Conference, Halifax, Nova Scotia, May 23, 1984. Proceedings, (1984), p.351-374, Refs.

40-3229
ICE MECHANICS, ICE SOLID INTERFACE,
OFFSHORE STRUCTURES, ENGINEERING, ICE
LOADS, IMPACT STRENGTH, COLD WEATHER CONSTRUCTION, COMPUTER APPLICATIONS, MATHEMATICAL MODELS, DRIFT,
FLOATING ICE.

A review of numerical modeling in arctic engineering is presented and emphasis is given to the work which deals with computational mechanics. For large-scale problems the dynamic model for sea ice and teeberg drift is discussed for medium-scale, roblems the bearing capacity of floating ice sheets and ice-structure interaction for bending, bucking and crushing failures of ice sheets are discussed. A brief discussion is also presented on the impact ice forces and the kinematic model for ridge formation.

TANK E/O SENSOR SYSTEM PERFORMANCE IN WINTER: AN OVERVIEW

Lacombe, J., et al, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, 1985₁, 26p., Presented at the Smoke/Obscurants Symposium, 9th, Adelphi, MD, April 23-25, 1985. 8

Redfield, R.K.

40-3530

MILITARY OPERATION, TANKS (COMBAT VEHICLES), COLD WEATHER OPERATION, METEOROLOGICAL FACTORS, LASERS, INSTRUMENTS, WINTER, VISIBILITY, OPTICAL PROPERTIES, ELECTRICAL PROPERTIES, SNOWFALL.

SNOWFALL.

This paper describes the SNOW-III-WEST experiment and a related study conducted in the Federal Republic of Germany that was designed to increase the understanding of the effects of winter weather on the performance of electro-optical sensor systems in main battle tanks SNOW-III-WEST was conducted at Camp Grayling, Michigan, during December 1984 and January 1985. Its objectives were to document the performance of the M1 tank EO sensor suite in winter and gather data from threat vehicle EO sensors and M1 tank developmental sensors for use in developing system capability comparisons. To accomplish this, an M1 tank gunners primary sight (GPS) was positioned to view and range to vehicular targets at distances out to 1600 m. The GPS contains a day sight, night sight and laser rangefinder. Other US, and threat EO systems were co-located with the GPS. Day and night sight imagery through the device optics was recorded using video equipment while simultaneous target observations by the sight operator were documented. Detailed measurements were made to characterize important target seene and environmental factors. These included Detailed measurements were made to characterize important target scene and environmental factors. These included meteorological, airborne-snow, scene illumination, and atmospheric transmission measurements, as well as inherent and apparent visible and infrared target/background signature measurements. PM Smoke's personnel response and evaluation system for target obscuration (PRESTO) was used to document the sight operator's target detection responses.

EFFECTS OF SNOW ON VEHICLE-GENERATED SEISMIC SIGNATURES.

Albert, D.G., Sensor Technology Symposium, 4th, Apr. 26-28, 1983. Report. Vol.1: Unclassified papers, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, Environmental Laboratory, July 1984, p.83-109, 9 refs. 40-3531

SNOW COVER EFFECT, MILITARY OPERA-TION, SEISMIC SURVEYS, ATTENUATION, ACOUSTICS, SEASONAL VARIATIONS, VEHI-CLES.

CLES.
Vehicle-generated seismograms recorded under summer and winter conditions at Fort Devens, Massachusetts, are analyzed and compared. The data were recorded using three-component geophones located just beneath the ground surface and microphones mounted on tripods 0.3 m tall. Winter data were recorded with a 0.7-m-thick snow cover present at the test site. The 14-track FM field tapes were digitized in the laboratory at a sampling rate of 500 Hz in preparation for filtering and spectral analysis. The filtering effect of the snow cover on the seismic data is striking. Because the acoustic-to-seismic coupled energy is attenuated by the snow, the appearance and frequency content of the recorded ground motion is changed dramatically. Automatic vehicle classification algorithms will have to account for these effects if they are to operate successfully in the presence of snow

FROZEN PRECIPITATION AND CONCUR-RENTLY OBSERVED METEOROLOGICAL CONDITIONS.

Bilello, M.A., [1985], 11p, Presented at the 42nd Meeting of the Eastern Snow Conference, Montreal, Canada, June 1985. 8 refs.

40-3532 SNOWFALL PRECIPITATION (METEOROLO-GY), METEOROLOGICAL DATA, STATISTICAL ANALYSIS, FREEZING, AIR TEMPERATURE, HUMIDITY, WIND VELOCITY, FOG, VISIBILI-TY, DIURNAL VARIATIONS.

TY, DIURNAL VARIATIONS.

This study evaluates statistical data for two or more meteorological parameters, recorded concurrently during the winter. The analysis considers only freezing forms of precipitation, placed into seven categories, and correlated with simultaneously observed atmospheric conditions, such as temperature, humidity and wind speed. Computer tabulated data from 11 years of winter weather for München/Riem, West Gernany, were obtained for the investigation. Typical results are 1) the variations in absolute humidity values that can be expected during periods of fog or ground fog at different air temperatures, 2) the likelihood that freezing rain or freezing drizzle will occur least frequently between 1200 and 1700 hours, and 3) the durinal and monthly air temperatures, relative humidity and examples of the unusual and interesting environmental knowledge that can be gained from available climatic records, similar investigations can be conducted for other sites that have long-term weather records in computer-based files.

MP 2076

EVALUATION OF SEASONAL VARIATION IN RESILIENT MODULUS OF GRANULAR SOIL AFFECTING PAVEMENT PERFORMANCE.

Johnson, T.C., (1985), c21p, Presented at the 33rd Annual Conference on Soil Mechanics and Founda-tion Engineering, St. Paul, MN, Jan. 1985. 27 refs.

40-3533
PAVEMENTS, FREEZE THAW CYCLES, FROZ-EN GROUND MECHANICS, ROAD MAINTE-NANCE, SEASONAL VARIATIONS, LOADS (FORCES), DAMAGE, FORECASTING, TESTS, MOISTURE TRANSFER, SOIL STRUCTURE

Hromadka, T.V., II, et al, Oct. 1985, 1(2), 9p., 7 refs.

Berg, R.L. 40-3585

40-3933 SOIL FREEZING, HEAT TRANSFER, FREEZE THAW CYCLFS, BOUNDARY VALUE PROB-LEMS, MATHEMATICAL MODELS, SOIL WA-TER, THERMAL REGIME, COMPUTER AP-PLICATIONS, LATENT HEAT, PHASE TRANS-FORMATIONS, ROADS.

FORMATIONS, ROADS.
The Complex Variable Boundary Elerient Method or CVBEM is used to develop a computer model (CVBFR1) for estimating the location of the freezing front in soil-water phase change problems. Because the numerical technique is a boundary integral approach, the control volume thermal regime is modeled with respect to the boundary values and, therefore, the CVBFR1 date entry requirements are significantly less than that ususally required of domain methods such as finite-differences or finite-elements. Soil-water phase change along the freezing front is modeled as a simple balance between computed heat flux and the evolution of soil-water volumetric latent heat of fusion.

MP 2078 FRAZIL ICE.

Daly, S.F., Conference on Frontiers in Hydraulic Engineering, Cambridge, MA, Aug. 9-12, 1983. Proceedings. Edited by H.T. Shen, New York, American Society of Civil Engineers, 1983, p.218-223, 8 refs 40, 3554

FRAZIL ICE, ICE CRYSTAL GROWTH, ICE STRUCTURE, RIVER ICE, NUCLEATION RATE, STREAMS, ANALYSIS (MATHEMATICS).

The study of crystal growth and its application to large scale industrial crystallization can provide many insights and quantitative approaches to the problem of frazilice continuity and heat conservation equations are presented in which the key parameters are crystal growth and nucleation rates. These parameters and frazil morphology are discovered. cussed The problems of applying these equations to natural waterbodies are discussed Further research needs are

MP 2079 UNSTEADY RIVER FLOW BENEATH AN ICE COVER

Ferrick, M G, et al, Conference on Frontiers in Hydraulic Engineering, Cambridge, MA, Aug. 9-12, 1983. Proceedings. Edited by H.T. Shen, New York, American Society of Civil Engineers, 1983, p.254-260, 9 refs Lemieux, G.E.

RIVER FLOW, ICE COVER EFFECT, RIVER ICE, ICE BREAKUP, FRAZIL ICE, FLOODING, ICE JAMS, WATER WAVES, ICE WATER INTER-

MP 2080 FIRST-GENERATION MODEL OF ICE DETERI-ORATION

ORATION.
Ashton, G.D., Conference on Frontiers in Hydraulic Engineering, Cambridge, MA. Aug. 9-12, 1983 Proceedings. Edited by H.T. Shen, New York, American Society of Civil Engineers, 1983, p 273-278, 12 refs

40-3003 ICE DETERIORATION, ICE MODELS, FLOAT-ING ICE, ICE STRUCTURE, RIVER ICE, LAKE ICE, ICE COVER STRENGTH, ICE BREAKUP, HEAT TRANSFER, DIURNAL VARIATIONS.

The phenomenon of deterioration of ice, particularly of floating ice on rivers and lakes, is commonly observed during the ice on rivers and lakes, is commonly observed during the spring period. The result of the deterioration is a porous spring period. The result of the deterioration is a porous hone-comb like structure, generally of the strength, and the greatly reduced strength contributes to the timing of nec break-up as well as significantly reducing the load-carrying capacity of the necessary. A combined radiation-conduction heat transfer analysis is presented that preducts the diurnal strength variations associated with low surface albedo and internal melting. The results are compared with field

MP 2081

MODELING OF ICE DISCHARGE IN RIVER MODELS.

Calkins, D.I. Conference on Frontiers in Hydraulic Engineering, Cambridge, MA, Aug. 9-12, 1983. Proceedings. Edited by H.T. Shen, New York, American Society of Civil Engineers, 1983, p.285-290, 7 refs.

RIVER FLOW, RIVER ICE, ICE MECHANICS, DRIFT, ICE MODELS, HEAT TRANSFER, EXPERIMENTATION, TEMPERATURE EFFECTS, HYDRAULICS, FREEZEUP.

Athermal modeling criterion for the ice discharge in refrigerated physical river models is presented along with laboratory results. Ice production was evaluated for freshwater and for 0.3% and 1% urea concentrations in water. Discharges of 0.0056 and 0.0094 cu m/s were run in the model river at air temperatures of 5, 10 and 15°C. Preliminary results show that as the concentration of urea in the water is increased, the model ice outflow increases. The measured for the present at since within a data has been exemplating. increased, the model ice outflow increases. The measured ice discharge at river outlet and the ice accumulation on the riverbed are both linearly related to the air-water temperature difference. The ice accumulation rate on the riverbed was also found to be a linear function of time. The freshwater flow had a greater bed accumulation rate than urea-doped solutions. A slight increase in model ice production was noted for the higher water flow rates. Proper scaling of the ice discharge through a model reach may require relaxing the heat transfer coefficient scaling law because sufficient ice cannot be generated in the river, and ice must be introduced at the inlet of the model. By changing the urea concentration in the water or using a separate ice production flume, a wide range of values for the input of model ice discharge can be selected. model ice discharge can be selected

MP 2082

DYNAMIC FRICTION OF BOBSLED RUN-NERS ON ICE.

Huber, N.P., et al, Le sport. Enjeu technologique. Edited by A. Midol and T. Mathia, Dec. 4, 1985, 26p., 10 refs.

Itagaki, K., Kennedy, F.E., Jr. 40-3552

40-3522
METAL ICE FRICTION, SLEDS, ICE SURFACE, ICE FRICTION, ICE DETERIORATION, DYNAMIC LOADS, MODELS, EXPERIMENTATION, STATISTICAL ANALYSIS.

The challenge we have been presented with, to perfect the runners of the U.S. Bobsled Team's sled for the 1988 Winter runners of the U.S. Bobsled Team's sled for the 1988 Winter Olympics in Calgary, requires an understanding of the experimentation performed by other researchers, the conclusions reached, and the limitations of their findings. Most of the ice friction studies to date have been made under more or less idealized conditions. Thus, in the highly dynamic situation of a bobsled or a skier sliding on a rough ice surface, a variety of unknown and disregarded factors may contribute greatly to the friction phenomena. For instance, none of the previous studies addressed the mechanical destruction of the ice surface, though earling or melting a track in the ice could account for most of the frictional energy loss. This paper describes the results of a preliminary study performed using a model sled

MP 2083

OHIO RIVER MAIN STEM STUDY: THE ROLE OF GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING IN FLOOD DAMAGE ASSESSMENTS.

Edwardo, HA, et al. International Symposium on Remote Sensing of Environment, 18th, Paris, France, Oct 1-5, 1984 Proceedings, Vol 1, [1984], p.265-281. 3 refs.

281, 3 rets.
Metry, C.J., McKim, H.L
40-3551
REMOTE SENSING, RIVER FLOW, TOPOGRAPHIC FEATLRES, FLOODS, DAMAGE,
LANDFORMS, GEOGRAPHY, CLASSIFICATIONS, MAPPING, UNITED STATES OHIO
BUYER

RIVER.

The Pittsburgh District, Corps of Engineers, has conducted feasibility analyses of various procedures for performing flood damage assessments along the main stem of the Ohio River Procedures using traditional, although highly automated, techniques and those baseo on geographic information systems have been evaluated at a test site, the City of New Martinsville, Wetze, County, West Virginia. The flood damage assessments of the test site developed from an automated, conventional structure-by structure appraisal served as the ground truth data set. truth data set

MP 2084 SPATIAL ANALYSIS IN RECREATION RE-SOURCE MANAGEMENT FOR THE BERLIN LAKE RESERVOIR PROJECT.

Edwardo, H.A., et al. 1984 SPOT Symposium. Proceedings. SPOT simulation applications handbook. American Society of Photogrammetry, 1984, p.209-

Merry, C.J., McKim, H.L.

40-3549

LANDFORMS, RESERVOIRS, REMOTE SENS-ING, TOPOGRAPHIC FEATURES, CLASSIFICA-TIONS, ENVIRONMENT SIMULATION, WATER CHEMISTRY, LAKE WATER, GEOG RAPHY.

RAPHY.

The simulated SPOT data acquired from aircraft over the study site had several radiometric characteristics which would not be encountered in the nadir-looking satellite observations. These differential scene brightness features were removed from the data. The corrected data were used in two studies to assess their information content for water quality assessment and land cover classification. Both studies indicate that the SPOT data are comparable to high altitude color-infrared aerial photography in digital form. The implication for land cover mapping is that techniques developed for LANDSAT MSS will need to be modified to allow for interactive user input and the use of textural and contextual features in automatic digital classification. The results of the water quality analysis point to the potential of the SPOT data for assessing the presence of materials in the light-interactive zone of the water column

MP 2085 WILDLIFE HABITAT MAPPING IN LAC QUI PARLE, MINNESOTA.

Merry, C.J., et al, 1984 SPOT Symposium. Proceed-ings. SPOT simulation application handbook. Ameri-

can Society of Photogrammetry, 1984, p.205-208. Green, G., Anderson, S.

VEGETATION, REMOTE SENSING, SPECTROS COPY, PHOTOINTERPRETATION, MAPPING, CLASSIFICATIONS, AGRICULTURE, UNITED

CLASSIFICATIONS, AGRICULTURE, UNITED STATES—MINNESOTA—LAC QUI PARLE.

SPOT High Resolution Visible (HRV) simulated data were obtained over Lac qui Parle, Minnesota, to determine their usefulness for mapping wildlife habitat categories associated with Corps projects. Ground truth data were available from photometrpreted wildlife habitat unit maps and the agricultural crop inventory prepared for the summer of 1983. A geometric correction could not be applied to the data set, so only the spectral reflectance quality of the data was assessed. The sample size of 512 x 512 pixels was selected for the analyses. An unsupervised classification land cover map was generated with the Earth Resources Laboratory Application Software package. The classification was successful in discriminating wheat and alfalfa and other uniformly colored areas, but pasture and corn could not be separated. Also, we were not successful in separation of grasslands and legumes. Our results indicated that the 20-m HRV data can be used to photoniterpret wildlife habitat using the false color image, but a digital classification cannot be performed. To obtain a habitat map using the HRV data would require a multitemporal analysis.

MP 2086 CRREL INVESTIGATIONS RELEVANT TO OFF-SHORE PETROLEUM PRODUCTION IN ICE-COVERED WATERS.

Tucker, W.B., International Symposium on Remote Sensing of Environment. Second Thematic Conference "Remote Sensing for Exploration Geology," Fort Worth, Texas, Dec. 6-10, 1982, Proceedings. Vol.1, (1983), p.207-215, Refs. p.213-215.

40-3547
OFFSHORE STRUCTURES, ICE LOADS, SEA ICE DISTRIBUTION, REMOTE SENSING, DRIFT, ICE CONDITIONS, ICE CRYSTAL STRUCTURE, DESIGN, ICE MECHANICS, ICE STRENGTH

The U.S. Army Cold Regions Research and Engineering The U.S. Army Cold Regions research and implemental Laboratory has studied the sea ice environment of the Beaufort Sea for many years. Offshore development is now proceeding beyond the barrier islands and many of these studies have relevance to the planned activities. Sea ice presents ing beyond the barrier islands and many of these studies have relevance to the planned activities. Sea ice presents a formidable hazard to the design and construction of production platforms and sea floor pipelines. CRREL investigations have addressed a number of the problems associated with these activities and remote sensing has played a major role in some of these studies. Specific efforts at CRREL have addressed the measurement of ice motion, the distribution and morphology of pressure ridges and whore tee pile-ups, ice conditions and thickness, the determination of ice strength, ice crystal structure, and the modeling of ice dynamics and thermodynamics.

MP 2087

ICE BANDS IN TURBULENT PIPE FLOW. Ashton, G.D., 1984, 84-WA/HT-106, 7p., 10 refs.

PIPELINE FREEZING, PIPE FLOW, ICE FOR-MATION, HEAT TRANSFER, ICE SURFACE, TURBULENT FLOW, HEAT FLUX, FLOW RATE, EXPERIMENTATION, SURFACE ROUGHNESS. Results of experiments in two pipe sizes with annular freezing are reported. A wavy ice relief generally formed. The results are compared to a correlation previously proposed by Gilpin based on a thermal enterion and to a correlation developed by Ashton based on a kinematic enterion. The results are discussed within the context of these criteria.

MP 2088 ICE ENGINEERING FACILITY.

Zabilansky, L.J., et al., [1983], 12p. + fig, Prepared for the International Institute of Ammonia Refrigeration, 5th annual meeting, Sarasota, FL, April 17-20,

Alexander, V. 40-3609

ICE SURVEYS, LABORATORIES, EQUIPMENT ICE NAVIGATION, ICE FORMATION, ICE LOADS, ICE JAMS, ENGINEERING, ICING, FLOODS, HEAT RECOVERY.

MP 2089

DATA ACQUISITION IN USACRREL'S FLUME FACILITY.

Daly, S.F., et al, Specialty Conference on Hydraulics and Hydrology in the Small Computer Age, Lake Buena Vista, FL, Aug. 12-17, 1985. Proceedings, Vol.2. Edited by W.R. Waldrop, New York, American Society of Civil Engineers, 1985, p.1053-1058, 1

Wuebben, J.L., Zabilansky, L.J. 40-3610

LABORATORIES, COMPUTER APPLICATIONS, REFRIGERATION, ICE FORMATION, HYDRAULICS, SEDIMENT TRANSPORT, FRAZIL ICE, UNSTEADY FLOW, ICE COVER EFFECT. **EQUIPMENT**

EQUIPMENT.
The refragerated flume facility at the U.S. Army Cold Regions Research and Engineering Laboratory (USACRREL), Hanover, New Hampshire, consists of a tiltable flume that is 120 ft long, 4 ft wide and 2 ft deep (366 x 1 2 x 0 61 m), two constant-speed centrifugal pumps and associared piping, flow meters, heat transfer devices, automatic valves, etc. The flume is an experimental facility used to study the formation of fratil ice, temperature effects on sediment transport, unsteady flow under an ice cover, and other subjects relevant to cold regions hydraulies. A computerized data acquisition system has been developed that is based on a Hewlett-Packard 9845B desktop computer

MP 2090 CAZENOVIA CREEK MODEL DATA ACQUISI-TION SYSTEM.

Bennett, B.M., et al, Specialty Conference on Hydraulics and Hydrology in the Small Computer Age, Lake Buena Vista, FL, Aug. 12-17, 1985. Proceedings, Vol.2. Edited by W.R. Waldrop, New York, Ameri-can Society of Civil Engineers, 1985, p.1424-1429, 4

Zabilansky, L.J. 40-3611

MODELS, ICE BREAKUP, COMPUTER AP-PLICATIONS, RIVER ICE, ICE CONTROL, ICE JAMS, TESTS, ENGINEERING, STRUCTURES, DESIGN, COUNTERMEASURES.

DESIGN, COUNTERMEASURES.
The Cazenovia Creek Model is a physical hydraulic model constructed in the 160-fix 80-fi (48.8-m x 24.4 m) refrigerated research area of the Ice Engineering Facility at the U.S. Army Cold Regions Research and Engineering Laboratory located in Hanover, New Hampshire The purpose of the model is to reproduce river ice breakup phenomena for optimizing the design of an ice control structure. The optimal design will delay or ultimately prevent the passage of ice flores, climinating downstream ice jam flooding. The performance of the ice control structure during a simulated breakup is monitored by using an interactive real-time data acquisition system. The data acquisition system is governed by a Hewlett-Packard 9485A desktop computer and enables a rapid analysis of the work because of the real-time monitoring. This paper discusses the model and its method of data collection.

MP 2091

INSTRUMENTATION FOR AN UPLIFTING ICE FORCE MODEL.

Zabilansky, L.J., Specialty Conference on Hydraulics and Hydrology in the Small Computer Age, Lake Buena Vista, FL, Aug. 12-17, 1985. Proceedings, Vol 2. Edited by W.R. Waldrop, New York, American Society of Civil Engineers, 1985, p.1430-1435, 4 refs. 40-3612

MODELS, OFFSHORE STRUCTURES, COMPUT-ER APPLICATIONS, FREEZEUP, ICE PRES-SURE, ICE LOADS, ENGINEERING, WATER LEVEL, PILE STRUCTURES.

LEVEL, PILE STRUCTURES.

Manne structures frozen into an ice cover are subjected to vertical forces as the ice sheet responds to changes in the water level. Pile-supported, light duty structures are especially unlerable to the uplifting forces, which can extract the piles from the soil, destroying the structure's integrity. To evaluate the parameters that control the magnitude of the uplifting force a laboratory model study was conducted in a refrigerated test basin.

MP 2092 REAL-TIME MEASUREMENTS OF UPLIFTING ICE FORCES

Zabilansky, L.J., 1985, Vol.31, p.253-259, 2 refs.

40-3038 ICE SOLID INTERFACE, PILE EXTRACTION, ICE LOADS, PILE LOAD TESTS, OFFSHORE STRUCTURES, DAMAGE, COUNTERMEAS-URES, COMPUTER APPLICATIONS.

MP 2093

BOUNDARY INTEGRAL EQUATION SOLU-TION OF MOVING BOUNDARY PHASE CHANGE PROBLEMS.

O'Neill, K., 1983, Vol.19, p.1825-1850, 47 refs. 40-3660

SOIL FREEZING, ANALYSIS (MATHEMATICS), BOUNDARY VALUE PROBLEMS, PHASE TRANSFORMATIONS, CONVECTION, STEFAN PROBLEM, TEMPERATURE GRADIENTS, PIPES (TUBES).

PROBLEM, TEMPERATURE GRADIENTS, PIPES (TUBES).

Boundary integral equation methods are presented for the solution of some two-dimensional phase change problems. Convection may enter through boundary conditions, but cannot be considered within phase boundaries. A general formulation based on space-time Green's functions is developed using the complete heat equation, followed by a simpler formulation using the Laplace equation. The latter is pursued and applied in detail. An elementary, noniterative system is constructed, featuring linear interpolation over elements on a polygonal boundary. Nodal values of the temperature gradient normal to a phase change boundary are produced directly in the numerical solution. The system performs well against basic analytical solutions, using these values in the interphase jump condition, with the simplest formulation of the surface normal at boundary vertices. Because the discretized surface changes automatically to fit the scale of the problem, the method appears to offer many of the advantages of moving mesh finite element methods. However, it only requires the manipulation of a surface mesh and solution for surface variables. In some applications, coarse meshes and very large time steps may be used, r-lative to those which would be required by fixed grid domain methods. Computations are also compared to original lab data, describing two-dimensional soil freezing with a time-dependent boundary condition. Agreement between simulated and measured histories is good.

MP 2094

HELICOPTER SNOW OBSCURATION SUB-TEST.

Edited by R. Jordan, p.359-376, ADB-101 241. 40-3784

MILITARY OPERATION, HELICOPTERS, NAVI-GATION, BLOWING SNOW, SNOW COVER EF-FECT, PHOTOGRAPHY, AIR CUSHION VEHI-CLES, DETECTION, COUNTERMEASURES, TESTS

Three sets of helicopter-downwash-produced snow obscuration trials were conducted (two sets on 8 December 1983, one set on 17 January 1984), for a total of 30 individual trials. Both hovering and forward flight patterns were performed. In order to obtain an adequate data base which is relevant to Army scenarios, the planned flight altitudes chosen for the text were for representative flying at low-level or NOE (nap-of-carth) missions and landing. In addition, some text flight trials were directed towards information on "masking" and "unmasking" below and above terrain features or tree tops. Thus the altitudes for the text were primarily restricted to no higher than 50 feet above the surface for forward flights, and 150 feet for hovering. Flights were made perpendicular to the main transmissometer line of sight, or in hovering, vertical take-off and landing modes. Three sets of helicopter-downwash-produced snow obscuration

SNOW-COVER CHARACTERIZATION: SAD-ARM SUPPORT.

O'Brien, H., et al, June 1984, SR 84-20, SNOW-TWO data report. Vol.2: System performance. Edited by R. Jordan, p.409-411, ADB-101 241.

40-3787

40-3/8/ SNOW OPTICS, SNOW ELECTRICAL PROPER-TIES, MILITARY OPERATION, METEOROLOG-ICAL FACTORS, SNOW COVER EFFECT, DE-TECTION, SNOW DENSITY, SNOW WATER CONTENT, GRAIN SIZE, SNOW DEPTH.

FIELD SAMPLING OF SNOW FOR CHEMICAL OBSCURANTS AT SNOW-TWO/SMOKE WEEK

Cragin, J.H., June 1984, SR 84-20, SNOW-TWO data report. Vol.2: System performance. Edited by R. Jordan, p.265-270, ADB-101 241, 3 refs. 40-3787

MILITARY OPERATION, SMOKE GENERA-TORS, SNOW COMPOSITION, SNOWFALL SNOW SURFACE, VISIBILITY, CHEMICA ANALYSIS, AIR POLLUTION, TESTS. CHEMICAL

MP 2097

TERRAIN ANALYSIS FROM SPACE SHUTTLE PHOTOGRAPHS OF TIBET.

Kreig, R.A., et al, International Conference on Cold Regions Engineering, 4th, Anchorage, Alaska, Feb. 24-26, 1986. Proceedings. Edited by W.L. Ryan, New York, American Society of Civil Engineers, 1986, p.400-409, 14 refs. Guodong, C., Brown, J.

40-2459

PERMAFROST DISTRIBUTION, ALPINE LAND-SCAPES, REMOTE SENSING, TOPOGRAPHIC FEATURES, CONTINUOUS PERMAFROST, MAPPING, SPACEBORNE PHOTOGRAPHY. AERIAL SURVEYS, TIBET.

EFFECT AND DISPOSITION OF THE IN A TER-RESTRIAL PLANT.

Palazzo, A.J., et al, Jan.-Mar. 1986, 15(1), p.49-52, 24

Leggett, D.C. 40-3708

SOIL POLLUTION, PLANT PHYSIOLOGY, VEGETATION, MILITARY FACILITIES, ROOTS, DAMAGE, WASTE DISPOSAL, WATER TREAT-

MENT. Little is known about the response of terrestrial plants to 2,4,6-timitrotoluene (TNT). To assess its effects, yellow nutsedge (Cyperus esculentus L.) was grown in hydroponicultures containing TNT concentrations of 0, 10, and 20 mg/L. The deleterious effects of TNT were rapid and occurred at solution concentrations of 5 mg/L and higher Root grown was most affected, followed by leaves and rhizomes. Root weights were reduced about 95% when grown in the presence of TNT. Plant yields were 54 to 74% lower than the control. The TNT and its metabolites, 4-amino-2,6-dimitrotoluene (4-ADNT), and 2-amino-4,6-dimitrotoluene (2-ADNT), and 2-amino-4,6-dimitrotoluene (2-ADNT), were found throughout the plants. So 4-amino-2,6-dinitrotoluene (4-ADNT), and 2-amino-4,6-dinitrotoluene (2-ADNT) were found throughout the plants. Solutions were continually monitored to ensure that no metabolites were present in solution. Since TNT was the only compound taken up, the metabolities must have formed within the plant. Levels of 4-ADNT exceeded those of 2-ADNT and TNT itself, ranging up to 2200 mg/kg in roots of plants grown in 20 mg/L of TNT. The greatest quantities of all three compounds were found in the rhizomes. Increasing solution TNT levels increased the concentrations and quantities of all three compounds in the plants.

MP 2009

METEOROLOGICAL VARIATION OF ATMO-SPHERIC OPTICAL PROPERTIES IN AN AN-TARCTIC STORM.

Egan, W.G., et al. Apr. 1, 1986, 25(7), p 1155-1165, 56

Hogan, A.W. 40-3771

REMOTE SENSING. BLOWING SNOW, ALBEDO, VISIBILITY, AEROSOLS, SOLAR RADIATION. ANTARCTICA—AMUNDSEN-SCOTT STATION

STATION Ground truth inputs obtained during an aniarcitic storm were applied to the Dave vector atmospheric model. The spectropolarimetric properties of spin-carry atmospheric radiation are quantitatively related to the number of see crystals in the optical path. At large scattering angles (smaller angles in the plane of vision), the see crystal scattering produces item polarization proportional to the concentration. However, at small scattering angles, the see crystals cause generally small polarization, permitting the generally large polarization proportions of the underlying terestinal sarface to be inferred fee crystals, by surface of their edges, scatter differently than spheres and may have scattering cross sections many orders.

of magnitude greater than an equivalent area sphere Polarization appears to be a useful adjunct in synoptic passive atmospheric remote sensing. (Auth.)

MP 2100

FINITE ELEMENT SIMULATION OF ICE CRYSTAL GROWTH IN SUBCOOLED SODI-UM-CHLORIDE SOLUTIONS.

Sullivan, J.M., Jr., et al, International Conference on Numerical Methods in Engineering: Theory and Ap-plications (NUMETA 85), Swansea, Wales, Jan. 7-11, 1985. Proceedings, Vol.1. Edited by J. Middleton and G.N. Pande, Rotterdam, A.A. Balkema, 1985, p.527-532, 12 refs.

Lynch, D.R., O'Neill, K.

40-3850

ICE CRYSTAL GROWTH, SOLUTIONS, TEM-PERATURE EFFECTS, FREEZING, DENDRITIC ICE, ANALYSIS (MATHEMATICS).

ICE, ANALYSIS (MATHEMATICS).

A finite element solution for ice-crystal growth in subcooled sodium-chloride solution is presented. The freezing process for aqueous solutions requires simultaneous solution of the heat equation in the solid and a complete transport treatment in the liquid region. The moving ice surface in the simulations is continuously tracked via deformable grids. Heat and mass are conserved exactly in the simulations. Specifying the interface temperature based on the constitutional phase diagram is inadequate due to the disparate interfacial growth kinetics for the A-axis and C-axis of the ice crystal. Herein we apply radiation type boundary conditions on the ice interface which maintain. growth kinetics for the A-axis and C-axis of the ice crystal. Herein we apply radiation type boundary conditions on the lice interface which maintain temperature close to equilibrium along a fast-growth axis, but allow subcooled conditions to prevail along a slow-growth axis. This preliminary report concentrates on problem formulation and one-dimensional verification of the method against analytic solutions. MP 2101

PERFORMANCE BASED TIRE SPECIFICA-TION SYSTEM FOR MILITARY WHEELED

Blaisdell, G.L., U.S. Army Survivable Tire Symposium, Carson City, NV, Nov. 4-8, 1925. Proceedings, 1985₁, p.277-280, 2 refs.

TIRES, MILITARY EQUIPMENT, VEHICLES, DESIGN.

DESIGN.

Most military wheeled vehicles continue to utilize the NDCC tire, despite its extremely low tread life and relatively poor performance. Current tire technology has far surpassed that available when the NDCC tire was designed, yet the Army continues, on all but its newest vehicles, to apply this tire. With such a disparity between the NDCC tire and what is commercially available, and with the potential now to design a tire for numerous specific performance areas, how does the Army determine what tire it should use for a particular vehicle. In answering this question, a working aroun was formed and a new tire specification. areas, now does the Army determine what tire it should use for a particular vehicle. In answering this question, a working group was formed, and a new tire specification was developed. This system is based not on specific design features in as much as is possible, but on entical areas of tire performance. This system takes into account the vehicle's mission profile and the necessity of certain minimum levels of performance for various conditions.

MP 2102 RADIAL TIRE DEMONSTRATION.

Liston, R.A., U.S. Army Survivable Tire Symposium, Carson City, NV, Nov. 4-7, 1985. Proceedings. (1985), p.281-285. 40-3866

TIRES, MILITARY EQUIPMENT, MILITARY TRANSPORTATION, VEHICLES.

TRANSPORTATION, VEHICLES.

A demonstration of the use of commercially available radial tires on the Atmy's 5 ton dump trock is currently in progress at Wildflecken, Germany. One construction company, Company C of the 54th Engineering Battalon, has appearablely half of its trucks equipped with radial tires and half with the standard rulitary tires. The purpose of the demonstration is to identify the improved off-road high way, and tread wear performance of the commercial radial tire compared to the bias phy, non-directional cross country tire that has been the US Army standard tire for some forty years. Some information relative to fuel wage and rolling resistance are remoded. forty years. Some information rolling resistance are provided

MP 2103 TIME-LAPSE THERMOGRAPHY: A UNIQUE LECTRONIC IMAGING APPLICATION.

Marshall, S.J., et al. International Electronic Imaging Exposition and Conference, Boston, MA, Sep. 11-13. 1984, (1984), p 84-88, 21 refs

Munis, R H 40-4226

SURFACE TEMPERATURE, INFRARED PHO-TOGRAPHY, ELECTRONIC EQUIPMENT, LAS-FRS

I new tech que has been recently introduced that comtime-layer sides techniques with those of therma, maging As a result, dynamic thermal events can be recorded in factor those motion and played back at expanded or compressed rates compatible with digital collancement and analysis techniques. raits comparince mist cipital collantement and analysis less inques. The enhancement techniques are sived is improve the capability for pattern recognition as well as for the rapid estituation of enaurisum, minimum and average soften temperatures. The equipment increasars in assemble and operate a "ypical time-sapse thermal imaging system is described along with some examples of practical and research applications. The capabilit sibilities are also discussed. The capabilities, limitations, and future pos-

MP 2104

SIMPLE MODEL OF ICE SEGREGATION USING AN ANALYTIC FUNCTION TO MODEL HEAT AND SOIL-WATER FLOW.

Hromadka, T.V., II. et al. International Offshore Mechanics and Arctic Engineering Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984. Proceedings, Vol.3. Edited by V.J. Lunardini, New York, American Society of Mechanical Engineers, 1984, p.99-104, 10 refs.

Guymon G.L.

38-2031

J8-2031 HEAVE, SOIL FREEZING, HEAT TRANSFER, MOISTURE TRANSFER, FREEZE THAW CYCLES, GROUND ICE, SOIL WATER MIGRATION, HYDRAULICS, WATER PRESSURE, MATHEMATICAL MODELS.

MP 2105

PROCEEDINGS.

International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985, New York, American Society of Mechanical Engineers, 1985, 2 vols., Refs. passim. For selected papers see 39-2382 through 39-2438.
Chung, J.S., ed, Lunardini, V.J., ed. 39-238.

39-2381

OFFSHORE STRUCTURES, OFFSHORE DRILL-ING, ICE CONDITIONS, ICE LOADS, IMPACT STRENGTH, ENGINEERING, CONSTRUCTION MATERIALS, OCEANOGRAPHY, MEETINGS.

ICE GOUGE HAZARD ANALYSIS.
Lanan, G.A., et al. Offshore Technology Conference, 18th, Houston, Texas, May 5-8, 1986. Proceedings, Vol. 4, 1986, p. 57-66, 13 refs.
Nicdoroda, A.W., Weeks, W.F.

ICE SCORING, TRENCHING, OCEAN BOTTOM.
PIPELINES, MARINE GEOLOGY.

Sea floor ice gouge depth distributions and pipeline trenching requirements are analyzed. An improved method is presented for parameterizing new ice gouge events based on a single record of existing sea floor ice gouges. Information on the gouge infilting process and the maximum observable gouge depth are used in this procedure.

MP 2107

RELIABLE, INEXPENSIVE RADIO TELEME-TRY SYSTEM FOR THE TRANSFER OF METEOROLOGICAL AND ATMOSPHERIC DATA FROM MOUNTAIN-TOP SITES.

Govoni, J.W., et al, International Workshop on Atmospheric leing of Structures, 3rd, Vancouver, B.C., May 6-8, 1986. Proceedings, Canadian Electrical Association, (1986), 6p., (4.2) 6 refs.
Rancourt, K.L., Oxton, A.

POWER LINE ICING, ICING, RADIO COM-MUNICATION, TELECOMMUNICATION, ICE ACCRETION, STRUCTURES, MOUNTAINS, METEOROLOGICAL DATA, WIND VELOCITY, WIND DIRECTION, PRECIPITATION (METEOROLOGY), COMPLTER TIONS.

A study to examine oriegraphic effects on atmospheric seing intensity is being conducted on two remote monitaritops in the noetheastern Lunted States. The study involves the collection and transmission of meteocological data, including stud speed and direction, promptation, humbers, temperature, and seing rate. Remote sites are located on Loon Mountain and Cannon Mountain, both situated in the White Mountains of New Humpshire. State-of-the-art instrumentation, consisting of hot cross wire wind sensers, humbity probes, see detectives and electronei rain gauges, is interfaced with consisted data loggers. The data are transmitted from these remote sixts by a specially designed radio triencity system, consisting of a Tocion Amateur Packet Palon Terminal Node Controller (TNC) and a Motocola radio high A study to examine oregraphic effects on atmospheric icing

CONDUCTOR TWISTING RESISTANCE EFFECTS ON ICE BUILD-UP AND ICE SHED-DING

Govoni, J.W., et al. International Workshop on Atmospheric leing of Structures, Ird, Vancouver, B.C., May 6-8, 1986. Proceedings, Canadian Electrical Association, 1986; Sp. - figs. 15-8; 5-refs. Ackley, S.F.

40. 1981

POWER LINE ICING, ICE REMOVAL, ICE BREAKING, WIND VELOCITY, EXPERIMEN **TATION**

In water of mount diameter taken a got ber with Afferent INDING CONSIDER OF THESE ma. rigidite mere tested under otherwise similar environmental ic no conditions at the summit of Mt. Washington. It was found that the more rotationally rigid (stiffer) wire affected both the mode of ice buildup and showed some capability of deicing itself in moderate wind conditions. The lesser ice buildup on the stiffer wire is apparently related to the suppression of dynamic twisting oscillations in the wire, oscillations which were apparent in the softer wire. The softer wire showed heavier ice buildup with the wire at the center of a cylindrical accretion. The stiff wire showed less ice buildup on the windward side with the development of an elliptical accretion due to semi-static rotation of the wire. Deicing of the stiffer wire apparently took place by breaking of the ice after it slowly rotated into the wind by several possible mechanisms. The increased drag on the ice as it moved into the wind creates a bending moment which apparently exceeded the failure stress of the ice near where it was attached to the wire. The ice fails and drops off the wire and the cycle then repeats itself.

MP 2109

COMMUNICATION TOWER ICING IN THE NEW ENGLAND REGION.

MEM ENGLAND REGION.

Mulherin, N., et al, Internationa Workshop on Atmospheric Icing of Structures, 3rd, Vancouver, B.C., May 6-8, 1986. Proceedings, Canadian Electrical Association, [1986], 7p., (6.9). 15 refs.

Ackley, S.F.

40-3991

ICING, TOWERS, HOARFROST, TRANSMISSION LINES, PRECIPITATION (METEOROLOGY), DAMAGE, COST ANALYSIS.

GY), DAMAGE, COST ANALYSIS.
Rime icing and freezing precipitation are of concern to the radio and television broadcasting industry. This paper discusses the results of a study seeking to document the severity and extent of transmitter tower icing and related problems in the northes*ern United States. Information was obtained via mail questionnaire and telephone interviews with eighty-five station owners and engineers concerning 118 different stations. Results show that television and FM broadcasters are seriou by impacted, yet AM operators are, in general, only slightly affected by expected New England icing levels. Combined annual costs for icing protection and leing related repairs averaged \$121, \$402, and \$3066 for AM, FM, and TV stations, respectively. None of the AM stations polled employ any icing protection measures, whereas all the TV stations do.

MP 2110 STRUCTURE OF ICE IN THE CENTRAL PART OF THE ROSS ICE SHELF, ANTARCTICA. Zotikov, I.A., et al. 1985, No.54, p.39-44, 8 refs, In

Russian with English summary.

Gow, A.J., Jacobs, S.S. 40-3903

ICE SHELVES, ICE COMPOSITION ICE CORES, ICE CRYSTALS, IMPURITIES, CLIMATIC CHANGES.

Studies of ice of obtained from a 416 m deep borehole in the Ross Lo. helf in the vicinity of the 1-9 station, revealed changes in ice crystal structure, inclusions and dimensions with depth. This variation is explained by climetic sions with depth.

MF 2111
TOXIC ORGANICS REMOVAL KINETICS IN
OVERLAND FLOW LAND TREATMENT.
Jenkins, T.F., et al, 1985, 19(6), p.707-718, 32 rcfs.
Loggett, D.C., Parker, L.V., Oliphant, J.L.

40-3900

WASTE TREATMENT, WATER TREATMENT, WATER POLLUTION, LAND RECLAMATION, VIGETATION, EXPERIMENTATION, MOD-

The efficiency in removing 13 trace organics from wastewater was studied on an outdoor, prototype overland flow land treatment system. M. re than 94% of each substance was removed at an application wite e^+C is cm/h (0.12 ou m/n/m of width). The $\frac{\pi}{2}$ removals declined as application rates were increased. Removal from solution was described by first-order kinetics. A model based on the two-film theory was developed using three properties of each substance (the Henry's cons'ant, the octanol-water partition coefficient. In the modelular weight) and two system parameters (average water depth and residence time). The dependence of the moval process on temperature was consistent with the known dependence of Henry's constant and diffusivity in temperature. The model was tested on a second overland flow system. The efficiency in removing 12 trace organics from wastewater flow system

MP 2112

WASTEWATER TREATMENT AND REUSE PROCESS FOR COLD REGIONS.

Bouzoun, J.R., Cold Regions Environmental Engineering Conference, Fairbanks, AK, May 18-23, 1983. Edited by T. Tilsworth and D.W. Smith, [1983], r 47-557, 11 refs.

40-3993 WASTE TREATMENT, WATER TREATMENT, SLUDGES, LAND RECLAMATION, DESIGN. MP 2113

REVEGETATION ALONG PIPELINE RIGHTS-OF-WAY IN ALASKA.

OF-WAY IN ALASKA.

Johnson, L., International Symposium on Environmental Concerns in Rights-of-Way Management, 3rd, San Diego, CA, Feb. 15-18, 1982. Proceedings, State College, Mississippi State University, 1984, p.254-264, 40-3994

REVEGETATION, VEGETATION, PIPELINES, INTRODUCED PLANTS, GRASSES, UNITED STATES—ALASKA.

STATES—ALASKA.

The Trans-Alaska Pipeline System for transporting crude oil from Prudhoe Bay to Valdez has recently been completed. The Alaskan Natural Gas Transportation System for transporting gas from Prudhoe Bay to the "Lower 48" is underconstruction. The rights-of xay of both these major pipelines traverse the arctic and subarctic climatic zones, where severe environmental conditions require specialized measures for revegetating disturbed terrain. On the oil wipeline right-of-way an argressive grass seeding and fertilizing program was used for revegetation, while on the natural gas pipeline natural renvasion will be encouraged. These different approaches reflect different management goals and changing technologies as revegetation research progresses in the far north. This paper presents some of the implications of these methods for long-term restoration of disturbed terrestrial areas.

MP 2114

COMBINED ICING AND WIND LOADS ON A SIMULATED POWER LINE TEST SPAN.

Govoni, J.W., et al, June 1987, No.3439, International Workshop 1011, Atmospheric leing of Structures, 2nd, Trondheim, Norway, June 19-21, 1984. Proceedings. Edited by M. Ervik, p.173-182, Includes discussion. 3 refs.

Ackley, S.F.
40.3995

POWER LINE ICING, ICE LOADS, ICE ACCRETION, WIND PRESSURE, UNFROZEN WATER CONTENT, SUPERCOOLED CLOUDS, WIND VELOCITY, TESTS.

VELOCITY, TESTS.

During the winter of 1982-83 measurements of combined teing and wind loading, along with in-cloud liquid water content and droplet size, were obtained on a simulated power line test span at the 2000-meter summit of Mt. Washington, New Hampshire. Icing loads were measured using a triaxial load cell which resolves three perpendicular force components of the wire tension. Wind speeds were obtained from a vaned pitot-static tube located near one end of the test wire. Wind and gravity loading of the test span was obtained for winds up to 80 m/s. The in-line loading, a combination of wind and gravity loads, rang 1 up to 2300 N for ice accretions of up to 19 cm in liameter. Some indications were found that rougher rime ice accretions had higher drag than glaze accretions. had higher drag than glaze accretions

MP 2115

MEASURED AND EXPECTED R-VALUES OF 19 BUILDING ENVELOPES. Flanders, S.N., 1985, 91(2B), p.49-57, 3 refs.

BUILDINGS, THERMAL INSULATION, HEAT TRANSFER, WALLS, HEAT FLUX, MANUALS, ROOFS, COLD WEATHER CONSTRUCTION

ROOPS, COLD WEATHER CONSTRUCTION
This paper compares in situ measurements of R-values R(e) with R-values obtained from handbook calculations for 19
Army buildings in Colorado, Washington, and Alaska The R-values were measured with heat flux and t..nperature sensors, with data severaged and recorded for several days The handbook calculations rely on borings in the construction, depth probes, boroscope inspection, and as-built drawings. A subjective measure of certainty about the construction reflects the quality of this information. Examination of selected soudy cases indicated that convection is a frequent heat transfer mechanism in fibrous insulation, in both walls and attics. Thermal bridges were also evident from the measurements. Air leakage and moisture were not significant causes of (delia)R. Measurements of R-values were found to be in good agreement with handbook values, where knowledge of the construction is good and where convection and Lermal bridges are not major effects.

HYDROLOGIC ASPECTS OF ICE JAMS.

Caikins, D.J., Symposium. Cold Regions Hydrology, Fairbanks, Alaska, 1986j. Proceedings. Edited by D.L. Kane, Bethesda, MD, American Water Resources Association, 1986, p.603-609, 14 refs.

40-4097
ICE JAMS, HYDROLOGY, RIVER ICE, SNOW-MELT, THERMAL ANALYSIS, RIVER FLOW.
The hydrologic aspects of ice jams have received very little attention. This paper examines hydrologic information that is more tailed an analyzing ice jam flooding problems, such as flow measurements under the ice cover and winter stage rating curves, frequency analysis of winter flow records, watershed cooling and natural river thermal regimes, ice discharge and snowmelt runoff prediction. The significance of each of these areas is addressed and suggested research opportunities are examined. Dr. ing the last 30 years, the major emphasis has been placed on understanding the

hydraulics and mechanics of ice jams and determining their "flood" levels. However, a parameter that should be known with reasonable accuracy is the flow discharge at the ice iam location.

MP 2117

40.4196

REMOTE SENSING OF THE ARCTIC SEAS. Weeks, W.F., et al, 1986, 29(1), p. 9-64, 7 refs. Carsey, F.D.

40-4196
SEA ICE DISTRIBUTION, ICE CONDITIONS,
REMOTE SENSING, MICROWAVES, ICE MECHANICS, ICE COVER THICKNESS, RADIATION BALANCE, AIR TEMPERATURE, ARCTIC OCEAN.

MP 2118

ORIENTATION TEXTURES IN ICE SHEETS OF

QUIETLY FROZEN LAKES. Gow, A.J., Feb.-Mar. 1986, 74(2), p.247-258, 19 refs.

ICE CRYSTAL STRUCTURE, LAKE ICE.

MP 2119

ARCTIC ICE AND DRILLING STRUCTURES. Sodhi, D.S., Apr. 1985, 107(4), p.63-69.

OFFSHORE STRUCTURES, DRILLING, ICE LOADS.

MP 2120 LAWRENCE RIVER FREEZE-UP FORE-CAST.

Foltyn, E.P., et al, July 1986, 112(4), p.467-481, 16

...n, H.T. 40-4246

40-4246
ICEBOUND RIVERS, ICE FORECASTING,
RIVER ICE, FRECZEUŁ, ICE FORMATION,
LONG RANGE FORECASTING, ANALYSIS
(MATHEMATICS), AIR TEMPERATURE,
WATER TEMPERATURE, SAINT LAWRENCE

RIVER.

In this study a method for making long-range forecasts of freeze-up dates in rivers is developed. The method requires the initial water temperature at an upstream station, the long-range air temperature forecast, the predicted mean flow velocity in the river reach, and water temperature response parameters. The water temperature response parameters can be either estimated from the surface heat exchange coefficient and the average flow depth or determined empirically from recorded air and water temperature data. The method is applied to the St. Lawrence River between Kingston, Ontario, and Massena, New York, and is shown to be capable of forecasting the freeze-up data

MP 2121

VARIATION OF ICE STRENGTH WITHIN AND BETWEEN MULTIYEAR PRESSURE RIDGES IN THE BEAUFORT SEA.

Weeks, W.F., June 1985, 107(2), p.167-172, 6 refs. For another source see 38-2036 (MP 1680).

ICE STRENGTH, PRESSURE RIDGES, CO PRESSIVE PROPERTIES, POROSITY, TESTS.

PRESSIVE PROPERTIES, POROSITY, TESTS.

A recent series of tests on the uniaxual compressive strength of ice samples taken from multiyear pressure ridges allows the testing of several hypotheses concerning the variation in strength, within and between ridges. The data set consists of 218 strength tests performed at two temperatures (5 and -20 C) and two strain rates (001 and 00005/s). There was no significant difference between the strength of the ice from the ridge sails and the ice from the ridge keels when tested under identical conditions. As the total porority of the ice from the sails is higher by 40 percent than the ice from the keels, the lack of a significant difference is believed to result from the large variations in the structure of the ice which occur randomly throughout the cores. A three-level analysis of variance model was used to study the variations in strength between 10 different ridges, between cores located side by side in a given ridge, and between samples from the zame core. In all cases the main factor contributing to the observed variance was the difference within cores. This is not surprising considering the rather extreme local var ability in the structure of ice in such ridges. There was no reason at the 5 percent level of significance to doubt the hypothesis that the different cores at the same site and and the different ridges have equal strength means.

MP 2122

DETERIORATION OF FLOATING ICE COV-FRS.

Ashton, G.D., June 1985, 107(2), p.177-182, 18 refs For another source see 38-2020 (MP 1676). 39-3286

ICE DETERIORATION, FLOATING ICE, ICE COVER STRENGTH, ICE MELTING, HEAT TRANSFER, SOLAR RADIATION, ALBEDO, THERMAL REGIME, POROSITY.

The deterioration of feeting recovers is analyzed to determine under what conduct as the ice cover loses strength due to internal melting. The analysis considers the interaction between sensible reat transfer and long wave radiation loss.

at the surface, the surface albedo, the short wave radiation penetration and absorption and the unsteady heat conduction within the ice. The thermal analysis then leads to a determination of the porosity of the ice that allows strength analysis to be made using beam-type analyses. The results provide criteria to determine when and how rapidly the ice cover loses strength and under what conditions it will regain the original strength associated with an ice cover of full integrity.

MP 2123

LABORATORY STUDY OF FLOW IN AN ICE-COVERED SAND BED CHANNEL.
Wuebben, J.L., IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol.1, (1986), p.3-14, 11 refs.
40-4529

CHANNELS (WATERWAYS), ICE COVER EF-FECT, WATER FLOW, BOTTOM TOPOGRA-PHY, SANDS, FLOW RATE, BOTTOM ICE, SEDI-TRANSPORT, TESTS, ANALYSIS (MATHEMATICS).

(MATHEMATICS).

The objective of this study was to examine the effects of adding an ice cover to flow in a movable bed channel A senes of five tests at four water discharges were conducted in a 36-million recruculating flume facility that is 12 m wide and 0.6 m deep.

After uniform, equilibrium conditions were established for a flow of water with a free surface, essentially identical runs were repeated with the addition of smooth and rough ice covers.

All tests were run at room temperature, approximately 19 C, with simulated ice covers.

The sediment was a uniform, 0.45-mim-diameter quartz sand and bed forms were in the ripple and dune regimes

The major variables examined in this paper include ded form beight, wavelength, Manning's roughness and sedibed form height, wavelength, Manning's roughness and sediment discharge.

MP 2124 COMPARISON OF TWO CONSTITUTIVE THEORIES FOR COMPRESSIVE DEFORMATION OF COLUMNAR SEA ICE.

Brown, R.L., et al, IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Pr (1986), p.241-252, 11 refs Richter-Menge, J.A., Cox, G.F.N. Proceedings,

ICE DEFORMATION, COMPRESSIVE PROPER-TIES, ICE CRYSTAL STRUCTURE, SEA ICE, VIS-COELASTIC MATERIALS, MODELS, STRESS STRAIN DIAGRAMS, ANALYSIS (MATHEMAT-

Two constitutive formulations are used to represent the con-Two constitutive formulations are used to represent the constitutive behavior of columnar sea ice under variable path compressive loadings. The first is a single integral representation which has been successfully used to model viscoelastic materials. This representation is a convenient form for describing nonlinear rate dependent properties and is mathematically more tractable than multiple integral representations or nonlinear differential relations. The second constitutive or nonlinear differential relations in the second constitutive formulation is an elastic-viscoplastic relation which defines the instantaneous strain rate in terms of several microdynamical variables (compressive mobile dislocation density, tensile mobile dislocation density, and specific microcrack surface area).

MP 2125

FRACTURE TOUGHNESS OF MODEL ICE.

Dempsey, J. A., et al, IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol 1, 1986, p 365-376, 28 refs.
Bentley, D.L., Sodhi, D.S.
40-458

ICE CRACKS, FRACTURING, ICE STRENGTH, TENSILE PROPERTIES, COMPRESSIVE PROPERTIES, STRESSES, STRAINS

A wedge-loaded TDCB (tapered double-cantilever-beam) test specimen was used to measure the fracture toughness of model ice. Crack path stability under tensile cracking conditions was ensured by way of the crack-parallel compressive stress provided by the displacement controlled wedge loading. The TDCB specimen size and ice thickness were loading The TDCB specimen size and ice thickness were such that plane strain fracture toughness values were obtained The influence of crack tip acuity and loading rate were

LABORATORY AND FIELD STUDIES OF ICE FRICTION COEFFICIENT.

Tatinclaux, J.C., et al, IAHR Symposium on Icc, 8th, Iowa City, Aug. 18-22, 1986. (1986), p.389-400, 5 refs. Forland, K.A., Murdey, D. Proceedings, Vol 1.

40-4560 40-4560 ICE FNICTION, ICE CRYSTAL STRUCTURE, SURFACE ROUGHNESS, STEEL STRUCTURES, SHEAR STRENGTH, TESTS, AIR TEMPERATURE, PLATES, LABORATORY TECHNIQUES.

Results of laboratory and field tests on the dynamic friction factor between ice (freshwater, urea-doped, and granular or columnar sea ice) and bare or inerta-coated steel plates of various noughness averages are presented. Laboratory tasts were made at three air temperatures. T = -15.

9, and -2 C, with eithir the ice sample towed over the test plate or a plate sample towed over the ice sheet. All field tests were made at T = -2 C to 0 C. The maximum

test velocity was 30 cm/s, and the normal pressure was of the order of 10 kPa. From the test results it is concluded that viscous shear in the meltwater layer between ice and test plate may dominate when the test plate is very smooth, as proposed by Oksanen in his analytical model, but when the material roughness increases, mechanical shear of the ice crystals dominates

FRAZIL ICE MEASUREMENTS IN CRREL'S FLUME FACILITY.

FLUME FACILITY.
Daly, S.F., et al, IAHR Symposium on Ice, 8th, Iowa
China Anna 18-22 1386. Proceedings, Vol.1, City, Aug. 18-22, 1986. [1986], p.427-438, 9 refs Colbeck, S.C. Proceedings,

40-4563

FRAZIL ICE. PARTICLE SIZE DISTRIBUTION. ICE GROWTH, ICE CRYSTAL NUCLEI, ICE ME-CHANICS.

In a series of recent experiments the dynamic size distribution In a series of recent experiments the dynamic size distribution and concentration of fizzal ties crystals were measured in the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) refrigerated flume facility. These data were found using a crystal imaging system developed at CRREL. The imaging system consists of a circular fiber-optic strobe light, a microscope, and either a high resolution television camera and monitor or a 35 mm camera. The system can observe crystal sizes ranging from 30 micrometers to several millimeters. This system was attached to a movable carriage mounted on the flume. A series of experiments were performed. In each experiment, the size distribution carriage mounted on the flume. A series of experiments were performed. In each experiment, the size distribution of the frazil crystals was measured as it developed along the length of the flume. The slope of the flume and the bottom roughness of the flume were varied to provide a range of hydraulic conditions. Supercooling levels of 0.01 C to 0.04 C were achieved in the flume and held constant for several hours

PRELIMINARY STUDY OF A STRUCTURE TO FORM AN ICE COVER ON RIVER RAPIDS DURING WINTER.

Perham, R.E., IAHR Symposium on Ice, 8th, Iowa City, Aug 18-22, 1986. Proceedings, Vol.1, (1986), p.439-450, 9 refs.

ICE GROWTH, ICE COVER, FRAZIL ICE, HY-DRAULIC STRUCTURES, ICE DAMS, RIVER ICE, COUNTERMEASURES, FLOODING, TESTS. ICE BOOMS.

TESTS, ICE BOOMS.

The concept of using a trash-rack-like fence across a river to form an overflow weir by accumulating frazil ice was studied. The main purpose of the structure is to create an upstream pool on which a smooth ice cover can form Laboratory tests in a refrigerated flume provided structural stability guidance and some frazil accumulation experience, with the latter being somewhat inconclusive. Field tests were conducted using a 19-m-long by 1 22-m-high fence boom across two approximately 17-m-wide rivers, one in New Hampshire and one in Vermont.

SUB-ICE CHANNELS AND LONGITUDINAL FRAZIL BARS, ICE-COVERED TANANA RIV-ER, ALASKA.

Lawson, D.E., et al, IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol 1, 1986, p.465-474, 6 refs. Chacho, E.F., Brockett, B.E.

40-4566

40-3500 RIVER FLOW, SUBGLACIAL DRAINAGE, CHANNELS (WATERWAYS), FRAZIL ICE, RIVER ICE, ICEBOUND RIVERS, ICE BOTTOM SURFACE, SEDIMENT TRANSPORT, VELOCI-TY, UNITED STATES—ALASKA—TANANA RIVER.

RIVER.

Repetitive surveys and measurements from 1983 through 1986 of the ice-covered Tanana River near Fairbanks, Alaska, have shown that flow occurs in sub-ice channels that are separated by longitudinal bars composed of stratified, partly consolidated frail ice of varying type and distribution in contrast to hanging dams, these frazil bars extend up- and downstream parallel to flow as well as from the base of the ice cover to the bed, and act as lateral walls for the sub-ice channels. Individual sub-ice channels may branch sub-ice channels Individual sub-ice channels may branch and reunitt, thus forming a braided pattern beneath the ice cover Longitudinal frazil bars apparently develop at locations characterized by lower velocities, such as where currents are discreted by irregularities in the bed or in the base of the ice cover.

MP 2130 FRAZIL ICE PEBBLES: FRAZIL ICE AGGRE-GATES IN THE TANANA RIVER NEAR FAIR-

BANKS, ALASKA.
Chacho, EF, et al, IAHR Symposium on Ice, 8th, Iowa City, Aug 18-22, 1986. Proceedings, Vol 1, 1986, P475-483, 4 refs.
Lawson, D.E., Brockett, B.E.

FRAZIL ICE, ICE MECHANICS, ICE GROWTH, AGGREGATES. GRAIN SIZE, ABRASION. UNITED STATES—ALASKA—TANANA RIVER.

A unique form of frazil ice aggregate, the frazil ice pebble, occurs in large quantities in the Tanana River near Fairbanks, Alaska. Frazil pebbles consist of a mixture of individual Alaska. Frazil pebbles consist of a mixture of individual particles, including other aggregates, which are bound together to form a consolidated, compact mass that is similar in appearance to water-worn stream pebbles. Frazil pebbles have been found incorporated into the ice cover, in transport beneath the ice cover and in frazil deposits. They range in length from less than 5 mm to greater than 150 mm. Internally, grains composing the frazil pebbles do not posses a preferred C-axis orientation, but appear to show an alignment related to grain size and shape.

MP 2131 POTENTIAL SOLUTION TO ICE JAM FLOOD.

ING: SALMON RIVER, IDAHO.
Earickson, J., et al, IAHR Symposium on Ice, 8th, Iowa City, Aug 18-22, 1986 Proceedings, Vol 2, Iowa City, Aug 18-22, 1986 1986₃, p 15-25, 10 refs Zufelt, J.E.

40-4581

ICE JAMS, FLOODING, WATER LEVEL, FLOOD CONTROL, FREEZEUP, RIVER ICE, ICE CON-TROL, DESIGN, ICE BOOMS, UNITED STATES
—IDAHO—SALMON RIVER

—IDAHO—SALMON RIVEN
The uppermost 140 miles of the Salmon River generates great quantities of frazil ice throughout Idaho's cold winters. A freeze-up ice jam forms at a slackwater region 27 miles downstream of the city of Salmon, Idaho every winter, and often progresses upstream to the city. As the ice jam often progresses upstream to the rity As the ice jam moves through Salmon, the river level can rise 6 to 8 feet and cause extensive flooding Flooding has occurred at least 32 times since 1900, and the 1982 flood caused at least 32 times since \$1,000,000 in damages

DESIGN AND MODEL TESTING OF A RIVER

Tatinclaux, J C., IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986 Proceedings, Vol.2, 1986, p.137-150, 16 refs.

ICE NAVIGATION, RIVER ICE, ICE CONDI-

ICE NAVIGATION, RIVER ICE, ICE CONDITIONS, ICE BREAKING, DESIGN, DAMS, LOCKS (WATERWAYS), MODELS, TESTS One of the tasks in the Corps of Engineers River Ice Management (RIM) program is to develop an ice prow capable of creating nearly ice-free channels in the vicinity of locks and dams on the librious and Ohio Rivers. Based on a literature survey the selected concept was that of a barge type attachment to be mounted ahead of a towboat. The prow is equipped with deflector vanes. The paper presents the results of model resistance tests which served to select he vane configuration and number of ice knives. A prototype of the prow is under final design for construction, field testing and demonstration are scheduled for winter 1986-87.

BUBBLERS AND PUMPS FOR MELTING ICE. Ashton, G.D., IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986 Proceedings, Vol 2, City, Aug. 18-22, 19 (1986), p 223-234, 8 refs 40-4597

ICE MELTING, BUBBLING, WATER FEMPERATURE, PUMPS, WATER FLOW, HYDRAULIC JETS, ANALYSIS (MATHEMATICS).

JEIO, ANALIJOS (MATHEMATICS).

Air bubbing systems and submerged pumps have both been used to induce a jet-like flow of warm water against the underside of i.e. sheets resulting in i.e. melting. The mechanics of air bubbing systems for this purpose has been analyzed previously and analytical methods are available to evaluate their effectiveness. A similar analysis of the melting caused previously and analytical methods are available to evaluate their effectiveness. A similar analysis of the melting caused by pump systems is presented. A comparison of the effectiveness of bubblers and pumps is made in terms of power. Finally the advantages and disadvantages of the two kinds of systems are contrasted.

FLEXURAL AND BUCKLING FAILURE OF FLOATING ICE SHEETS AGAINST STRUC-

Sodhi, D.S., IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986 Proceedings, Vol. 2, [1986], p.339-359, Refs. p.355-359

40-4604 FLOATING ICE, ICE STRENGTH, OFFSHORE STRUCTURES, FLEXURAL STRENGTH, ICE PRESSURE, ICE SOLID INTERFACE, ICE DEFORMATION, ICL SHLLTS, STRESSES, ICE COVER THICKNESS, ICE ADHESION

This is a review of work on bending and buckling failure of floating ice sheets along with the forces generated during ice structure interaction. The focus is on the work published after 1980. Estimation of ice forces as a result of bending and buckling failure of an ice sheet can be made with a fair degree of confidence when the ice structure interaction of multimodal failure of floating ice sheets needs further thirds.

COLD CLIMATE UTILITIES MANUAL.

Smith, D.W., ed, Montreal, Canadian Society of Civil Engineering, 1986, var.p., Refs. passim.

40-4533
COLD WEATHER CONSTRUCTION, COLD WEATHER OPERATION, ENGINEERING, UTILITIES, WATER TREATMENT, WASTE DISPOSAL, PIPELINES, HEAT LOSS, MANUALS, ENVIRONMENTAL PROTECTION.

MP 2136

SEA ICE PROPERTIES.

Tucker, W.B., et al, Oct. 1984, SR 84-29, MIZEX: a program for mesoscale air-ice-ocean interaction experiments in Arctic marginal ice zones. 5: MIZEX 84 summer experiment PI preliminary reports. Edited by O.M. Johannessen and D.A. Horn, p.82-83, ADA-148 986.

Gow, A.J., Weeks, W.F. 40-4700

ICE PHYSICS, SEA ICE, ICE CORES, ICE FLOES, ICE STRUCTURE, ICE SAMPLING, ABLATION, SNOW COVER EFFECT.

MP 2137

IN-SITU THERMOCONDUCTIVITY MEAS-UREMENTS.

Faucher, M., 1986, SR 86-01, Technology transfer opportunities for the construction engineering community: materials and diagnostics, p.13-14, ADA-166 360.

THERMAL CONDUCTIVITY, THERMISTORS, SOIL PHYSICS, CONSTRUCTION MATERIALS, MEASURING INSTRUMENTS.

MP 2138

MP 2138
ROOF BLISTER VALVE.
Korhonen, C., 1986, SR 86-01, Technology transfer opportunities for the construction engineering community: materials and diagnostics, p.29-31, ADA-166 360. 40-4706

ROOFS, LEAKAGE, DAMAGE, COUNTER-MEASURES, WEATHERING.

MP 2139

AIRBORNE ROOF MOISTURE SURVEYS.

Tobiasson, W., 1986, SR 86-01, Technology transfer opportunities for the construction engineering community. materials and diagnostics, p.45-47, ADA-166 360.

ROOFS, MOISTURE DETECTION, AIRBORNE EQUIPMENT, MAINTENANCE.

MP 2140 PROTECTED MEMBRANE ROOFING SYS-

Tobiasson, W, 1986, SR 86-01, Technology transfer opportunities for the construction engineering community: materials and diagnostics, p.49-50, ADA-166

360. 40-4708

ROOFS, INSULATION, PROTECTION, SOLAR RADIATION, DRAINAGE, DAMAGE

MP 2141

SCATTERING AT MM WAVELENGTHS FROM IN SITU SNOW.

Walsh, J., et al, Open Symposium on Wave Propaga-tion: Remote Sensing and Communications, Durham, NH, July 28-Aug 1, 1986. [Proceedings]. Pre-print volume. International Union of Radio Science, (1986), p.1.6.1-1.6.2. Cook, R., Layman, R., Berger, R.H.

SNOW OPTICS, BACKSCATTERING, INFRA-RED RADIATION, WAVE PROPAGATION.

MP 2142

LARGE-SCALE ICE-OCEAN MODELING.
Hibler, W.D., III, June 1986, No.73, Canadian East
Coast Workshop on Sea Ice, Bedfo. 1, Quebec, Jan 79, 1986. Proceedings Compiled by G Symonds
and I.K. Peterson, p.165-184, 11 refs.

TICE WATER INTERFACE, SEA ICE DISTRIBUTION, DRIFT, ICE EDGE, OCEAN CURRENTS, ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).
Utilizing results from diagnostic ice-ocean models of the Arctic, Greenland and Norwegian Seas, physical characteristics and problems related to large-scale ice-ocean modeling are examined. In these models a 14-level baroclinic ocean model has been coupled to a two-thickness level dynamic-thermodynamic sea ice model utilizing a nonlinear plastic ice interaction. Simulations of the ocean (for the Arctic Basin only) without the ice cover, and of the ice without the ocean model, are also done to examine certain physical problems.

MP 2143 COUPLED ICE-MIXED LAYER MODEL FOR THE GREENLAND SEA.

Houssais, M.N., June 1986, No.73, Canadian East Coast Workshop on Sea Lee, Bedford, Quebec, Jan. 7-9, 1986. Proceedings. Compiled by G. Symonds and I.K. Peterson, p.225-260, 29 refs. 41-150

ICE MODELS, ICE WATER INTERFACE, SEA ICE, THERMODYNAMICS, SEASONAL VARIATIONS, HEAT FLUX, CONVECTION, ICE MELT-ING, FREEZING, ANALYSIS (MATHEMATICS), GREENLAND SEA.

GREENLAND SEA.

A thermodynamic coupled ice-mixed layer model, designed to study the seasonal cycle of the ice-ocean interactions in the Greenland Sea is presented. The sea-ice model assumes a constant ice thickness and considers only the variations of ice compactness under the effect of the atmospheric and oceanic heat fluxes. The mixed-layer model predicts the rate of penetrative convection within the water column as a result of both the surface buoyancy flux and the mechanical energy input. The mixed layer is embedded in a three-dimensional primitive equations model which calculates the ocean velocity field and its contribution to the time evolution of the temperature-salinity distribution, and also, following Adamec et al. (1981), helps in describing the pycnocline characteristics at the mixed layer base. The model has been tested without advection of horizontal diffusion through a five-years simulation. The annual entrainment-retreat cycle of the mixed layer is well reproduced together with the advance-decay cycle of the ice cover. The horizontal distribution of the mixed layer depth is in agreement with our knowledge of the effect of an ice cover upon a mainly buoyancy driven oceanic convection.

RIVER AND LAKE ICE ENGINEERING.

Ashton, G.D., ed, Littleton, CO, Water Resources Publications, 1986, 485p, Refs. passim.

RIVER ICE, LAKE ICE, ENGINEERING, ICE PHYSICS, ICE MECHANICS, ICE MODELS, ICE CONTROL, ICEBREAKERS, REMOTE SENSING, THERMAL REGIME, HYDRAULICS, ICE NUCLEI.

MP 2145

SEA ICE AND THE FAIRWAY ROCK ICEFOOT. Kovacs, A, et al, Fall 1985, 17(3), p.25-32, 18 refs. Sodhi, D.S., Cox, G.F.N.

41-33/ ICE LOADS, OFFSHORE STRUCTURES, DRIFT, OFFSHORE LANDFORMS, ICE PRESSURE, ICE MECHANICS, SEA ICE, ICE COVER THICK-NESS, PRESSURE RIDGES, BERING STRAIT.

NESS, PRESSURE RIDGES, BERING STRAIT. The information obtained in this study revealed that a massive icefoot appears to form around Fairway Rock each winter. This receoot is the result of ice impinging against the island, failing, and subsequently piling up, forming indges up to 15 m high. The icefoot varies from less than 10 m to over 100 m wide. The slope of the inner ridges averages 33 degrees while the slope of the outer face of the icefoot can exceed 70 degrees. This is apparently the result of nongrounded ice rubble having slumped or been cleaved off. The instructive findings are, as anticipated, that ice rubble formation around a large structure placed in "deep" water will not extend appreciably beyond the width of the structure, and therefore will not add significantly to its effective diameter. In order for this to be so, the submarine slope needs to be relatively steep. At Fairway Rock, it is reasonable to assume that the shallowest submarine slope was at or near the angle of repose of the rock talus.

MP 2146

THEORY OF MICROFRACTURE HEALING IN

Colbeck, S.C., Jan. 1986, 34(1), p.89-95, 12 refs., With French and German summaries. 41-261

ICE CRACKS, REGELATION.

ICE CRACKS, REGELATION.
The thermodynamics of air- and vapor-filled microfractures in ice is described. Simple models of healing are constructed assuming the cracks are aspheroidal. The healing of air-filled cracks is rate limited by vapor diffusion through the learn while the healing of vapor-filled cracks is rate limited by heat flow through the ice. Therefore vapor-filled cracks of less than 5 mm radius and an initial aspect ratio of 1000 can heal to a 1/e decay diurnally. Larger cracks weaken the most, heal more slowly, and are effective longer. A temperature gradient imposed on the ice should accelerate healing, especially in a vapor-filled crack that is oriented perpendicular to the temperature gradient.

MP 2147
MONITORING SEASONAL CHANGES IN SEA-FLOOR TEMPERATURE AND SALINITY.

Sellmann, P.V., et al, Gas Hydrates, Arctic/Offshore Research, and Deep Source Gas Contractors Review Meeting, Morgantown, WV, Mar. 25-26, 1986. Pro-ceedings. Edited by C.A. Komar. Morgantown, WV, U.S. Dept of Energy, Morgantown Energy Technology Center, July 1986, p.110-114.
Reimnitz, E.

41-309 SUBSEA PERMAFROST, PERMAFROST THER-MAL PROPERTIES, SEA WATER, WATER TEM-PERATURE, WATER CHEMISTRY, SALINITY, SEASONAL VARIATIONS, MEASURING IN-STRUMENTS, BEAUFORT SEA.

MP 2148 PROPOSED CODE PROVISIONS FOR DRIFT-ED SNOW LOADS.

O'Rourke, M., et al, Sep 1986, 112(9), p.2080-2092,

Tobiasson, W., Wood, E.

41-405 SNOW LOADS, ROOFS, SNOWDRIFTS, SNOW ACCUMULATION, STATISTICAL ANALYSIS, FORECASTING.

Current code provisions for drift snow loads on multilevel roofs are examined in light of recent research results from a statistical study of approximately 350 drift load case histories. astantacia study of approximately 350 offit load case instones. New provisions are proposed in which the design drift load is a function of the length of the upper-level roof and the 50-yr mean recurrence interval ground snow load. It is felt that these new proposed provisions result in a design drift load with a mean recurrence interval of about 50 yrs.

MP 2149

CORPS OF ENGINEERS LAND TREATMENT RESEARCH AND DEVELOPMENT PROGRAM. Iskandar, I.K., Technology Transfer Opportunities for Iskandar, I.K., Technology Transfer Opportunities for the Construction Engineering Community (Confer-ence₂. Environment Session, Denver, CO, Feb. 25-27, 1986. Proceedings [1986], p.17-18. 41-:06 W ATER TREATMENT, LAND RECLAMATION, SOIL FREEZING, MUNICIPAL ENGINEERING.

HEAT DISTRIBUTION RESEARCH.

Phetteplace, G., Technology Transfer Opportunities for the Construction Engineering Community (Conference₁ Energy Session, Denver, CO, Feb. 25-27, 1986. Proceedings, [1986], p.2-3, 1 ref.

HEAT TRANSFER, FROZEN GROUND THER-MODYNAMICS, WATER PIPES, HEAT LOSS, HEATING, SOIL TEMPERATURE, DISTRIBU-TION, DESIGN.

WATER-SOURCE HEAT PUMPS.

Phetteplace, G., Technology Transfer Opportunities for the Construction Engineering Community (Conference). Energy Session, Denver, Co, Feb. 25-27, 1986 Proceedings, (1986), p 14-15, 6 refs.

WATER PIPES, PUMPS, HEATING, HEAT TRANSFER, WATER TEMPERATURE, FREEZ-ING POINTS

MP 2152 EFFECT OF COLD WEATHER ON PRODUC-

Abele, G., Technology Transfer Opportunities for the Construction Engineering Community (Conference). Construction seminar, Denver, CO., Feb. 25-27, 1986 Proceedings, [1986], p.61-66, 15 refs.

COLD WEATHER CONSTRUCTION, COLD WEATHER PERFORMANCE, COLD STRESS, COLD WEATHER TESTS, EQUIPMENT, SNOW-FALL, WIND FACTORS, TEMPERATURE EFFECTS.

MEGASTRUCTURES FOR MOBILIZATION.

Flanders, S N, Technology Transfer Opportunities for the Construction Engineering Community [Conferencej Mobilization Readiness and Logistics Session, Denver, CO, Feb 25-27, 1986. Proceedings. (1986), p.10-11 41-410

MILITARY FACILITIES, BUILDINGS, LOGISTICS, STRUCTURES, TIME FACTOR

GLACIERS AND SEDIMENT.

Bezinge, A., et al, June 1986, UAG-R (306), p.53-69,

Refs. p.64-67. Chacho, E.F., Lawson, D.E.

GLACIAL DEPOSITS, SEDIMENT TRANSPORT, GLACIAL HYDROLOGY, GLACIER SURGES, GLACIER OSCILLATION, UNITED STATES— ALASKA.

MP 2155

ICE PROBLEMS ASSOCIATED WITH RIVERS AND RESERVOIRS

Benson, C., et al, June 1986, UAG-R (306), p.70-98. Refs. p.95-98.

Calkins, D.J., Chacho, E.F., Lawson, D.E.

ICE CONDITIONS, RIVER ICE, RESERVOIRS, LAKE ICE, ICE CONTROL, PONDS, WATER RE-SERVES, ICE FORECASTING, UNITED STATES ALASKA.

MP 2156

PERMAFROST.

Benson, C., et al, June 1986, UAG-R (306), p.99-106, 19 refs

Chacho, E.F., Kane, D.

PERMAFROST HYDROLOGY, RUNOFF, ENGI-NEERING, GLACIAL RIVERS, FROZEN GROUND, MOUNTAINS, UNITED STATES— ALASKA.

MP 2157

MP 2157
MICROSTRUCTURE AND THE RESISTANCE
OF ROCK TO TENSILE FRACTURE.
Peck, L., et al, Nov. 1985, 90(B13), p.11,533-11,546,
Refs. p.11,545-11,546.

Barton, C.C., Gordon, R.B.

41-496

MICROSTRUCTURE, ROCKS, TENSILE PROP-ERTIES, FRACTURING, GRAIN SIZE, MINERALOGY, SCANNING ELECTRON MI-CROSCOPY, TESTS, CRACKING (FRACTUR-

ING).

The resistance of rock to tensile fracture may be measured by its fracture energy G(I), which is found to range from 40 to 200 J/sq m in tests on nine types of sedimentary and crystalline rock. Differences in microstructure among the rocks tested are the principal cause of differences in the steady state tested or the principal cause of differences in the steady state value of G(I), in the distance that a crack must advance before steady state fracturing is attained, and in the amplitude of the fluctuation of G(I) that accompanies crack advance. When nearly continuous surfaces of weakness are present, as in the Salem limestone, G(I) is long attained state of the fluctuation of G(I) that accompanies crack advance. When a precisiting, interconnected network of microcracks is exploited by the fracture process, G(I) is large, and steady state is attained only after extended crack propagation. The sensitivity of G(I) to crack speed and the presence of water is low under the test conditions used in all the rocks examined. However, the magnitude of G(I) measured in a given type of rock depends on the configuration of the test specimen and on components of stress near the crack tip that do not influence crack growth in linearly elastic materials. The conditions under which G(I) can be considered a material property are therefore restricted. restricted

MP 2158

NATURAL CONVECTION IN SLOPING POR-OUS LAYERS.

Powers, D.J. et al, International Conference on Finite Elements in Water resources, 6th, Lisboa, Portugal, June 1986. Proceedings. Edited by A. Sá da Costa, et al, Berlin, Computational Mechanics Publication, 1986, p.697-710, 11 refs.

O'Neill, K. 41-608

POROUS MATERIALS, HEAT TRANSFER, CON-VECTION, FLUID FLOW, HEATING, SLOPE ORIENTATION, ANALYSIS (MATHEMATICS), SATURATION.

2-D finite difference simulations of natural convection in a laterally confined, saturated porous medium show distinctive cell patterns and heat transfer characteristics when the medium cell patterns and heat transfer characteristics when the medium is inclined relative to the horizontal. A perfectly horizontal layer heated from below exhibits the classical Benard type convection cells, while a vertical medium heated on one side forms a single Rayleigh cell Progressing from the horizontal to the vertical one sees an evolution of cell forms, each typically featuring a pattern of cell types which alternate longitudinally along the slope Benard cells rotating in harmony with the Rayleigh forces grow, eventually consuming their weakened counter-rotating neighbors. The latter gradually dimitiash to the status of transition cells between the dominant types which flank them. Identifiable transitions in flow configuration and cell morphology, asuse dramatic changes in the efficiency of transverse heat transfer through the layer. These changes have previously been interpreted only as scatter in experimental data.

MP 2159

MOVING BOUNDARY—MOVING MESH ANALYSIS OF PHASE CHANGE USING FI-NITE ELEMENTS WITH TRANSFINITE MAP-PINGS.

Albert, M.R., et al, Apr. 1986, 23(4), p.591-607, 27 refs.

O'Neill, K. 41-607

BOUNDARY LAYER, PHASE TRANSFORMATIONS, FREEZING, ANALYSIS (MATHEMATICS), TEMPERATURE EFFECTS, LATENT ICS), TEMPERA HEAT, MODELS.

Two-dimensional heat conduction phase change problems I wo-dimensional heat conduction phase change problems are solved using a moving boundary-moving mesh approach. A transfinite mapping technique successfully controls interior mesh motion, and numerical results compare well with analytical solutions. Calculations also agree well with two-dimensional laboratory data for cases featuring time-dependent boundary conditions.

ICE FORCES ON BRIDGE PIERS.

Haynes, F.D., Research on transportation facilities in cold regions Edited by O.B. Andersland and F.H. Sayles, New York, American Society of Civil Engineers, 1986, p 83-101, Refs. p.99-101.

ICE LOADS, PIERS, BRIDGES, ICE PHYSICS, ICE STRENGTH, ICE DEFORMATION, ICE CRACKS, DESIGN, IMPACT STRENGTH, MOD-

ELS.

The force that river ice exerts on bridge piers has been studied in the field and with models in the laboratory lee forces are a function of the strength, thickness, failure mode and velocity of the ice, the ice-structure interaction and the geometry of the structure. Results of field measurements on the Yukon and Ottauquechee Rivers are discussed. Results of laboratory tests on vertical structures and sloping structures are presented lee failure in crushing, bending (both up and down) and splitting has been observed in the laboratory and the ice forces associated with each mode are presented. A discussion of the measured ice forces with regard to the existing design codes is given

MP 2161

USE OF TRANSFINITE MAPPINGS WITH FI-NITE ELEMENTS ON A MOVING MESH FOR TWO-DIMENSIONAL PHASE CHANGE.

Albert, M.R, et al, Adaptive computational methods for partial differential equations. Edited by I Babuska, Philadelphia, Society for Industrial and Applied Mathematics, 1983, p.85-110, 15 refs. O'Neill, K.

41-659

PHASE TRANSFORMATIO'S, FREEZING, HEAT TRANSFER, STEFAN PROBLEM, BOUNDARY LAYER, COMPUTER APPLICA-TIONS, TEMPERATURE EFF (MATHEMATICS), MODELS. TEMPERATURE EFFECTS, ANALYSIS

The transfinite mapping technique of automatic mesh generation is used with finite elements to solve for two-dimensional heat conduction phase change on a moving mesh. The governing equation is transformed to account for mesh motion, so that coefficients remain attached to moving nodes. The energy conserving attachment of mesh boundaries to phase boundaries avoids approximation across surfaces of discontinuity, and facilitates application of a physical jump condition there. That condition drives boundary motion, while evolution of the interior mesh is determined from boundar, node motion via tite transfirmite mappings. Analytical and computed solutions compare well for the problem of freezing in a corner. Some limitations of both the mapping scheme and this moving finite element system are identified. In conjunction with the latter, a Von Neumann type analysis of the governing equation is outlined, and approximate relations are developed between Stefan number and a numerical Peciet number based on mesh velocity. The transfinite mapping technique of automatic mesh genera-

MP 2162

TRANSIENT TWO-DIMENSIONAL PHASE CHANGE WITH CONVECTION, USING DEFORMING FINITE ELEMENTS.

Albert, MR, et al, Computational techniques in heat transfer Edited by RW Lewis, et al, Swansea, England, Pineridge Press, Ltd., 1985, p.229-243, 15 refs.

41-657 HEAT TRANSFER, PHASE TRANSFORMATIONS, FREEZEUP, PIPES (TUBES), BOUNDARY LAYER, CONVECTION, FLOW RATE, ANALYSIS (MATHEMATICS). MP 2163

SEA SPRAY ICING: A REVIEW OF CURRENT MODELS.

Ackley, S.F., U.S. Navy Symposium on Arctic/Cold Weather Operations of Surface Ships, Dec. 3-4, 1985. Proceedings, Washington, D.C., Dept. of the Navy, (1986), p.239-262, ADA-168 714, 11 refs.

SHIP ICING, SEA SPRAY, HEAT FLUX, ICE ACCRETION, FORECASTING, MATHEMATICAL MODELS, VELOCITY, BRINES, FOG, ICE COVER THICKNESS.

CLASSIFICATION OF SEASONAL SNOW COVER CRYSTALS.

Colbeck, S.C., Aug. 1986, 22(9), p.59S-70S, 34 refs. 41-1028

SNOW CRYSTAL STRUCTURE, METAMOR-PHISM (SNOW), SNOW WATER CONTENT, FREEZE THAW CYCLES, CLASSIFICATIONS, SEASONAL VARIATIONS.

SEASONAL VARIATIONS.

Snow cover crystals must be classified in a physically meaningful way Previous classification systems are not sufficiently detailed or not based on sufficient knowledge of the physical processes. A new system is proposed based on our current knowledge of the physical processes of metamorphism. As more information about snow metamorphism is developed, the labels attached to snow grains should evolve too. Two levels of classification are proposed here. For practical purposes only a few terms like rounded and faceted are necessary, but for a more complete description a more detailed system is also given. The most basic description given it, the table could be useful to many practitioners, while the more complete description given in the appendix will be necessary for many purposes

MP 2165

41.1183

MP 2105
RESPONSE OF PERMAFROST TERRAIN TO DISTURBANCE: A SYNTHESIS OF OBSERVATIONS FROM NORTHERN ALASKA, U.S.A.
Lawson, D.E., Feb. 1986, 18(1), p.1-7, 12 refs.

PERMATROST PRESERVATION, DRILLING, ENVIRONMENTAL IMPACT, VEGETATION, GROUND ICE, THERMAL REGIME, GROUND THAWING, PERMAFROST THERMAL PROPERTIES, REVEGETATION, THAW DEPTH.

ERTIES, REVEGETATION, THAW DEPTH. Former exploratory dniling sites in the National Petitoleum Reserve—Alaska, are examples of the long-term physical modifications resulting from disturbance of perennially frozen terrain. Camp construction and drilling activities in the late 1940s/early 1950s resulted in disturbances which can be grouped by their first modification to the site and its thermal regime trampling of vegetation, killing the vegetative cover, removal of the vegetation and soil. Removal of the vegetation led to the most extensive modifications at all sites, but the subsequent response to disturbance between sites varied with primarily the most extensive modifications at all sites, but the subsequent response to disturbance between sites varied with primarily four factors (1) ground ice volume, (2) distribution and size of massive ground ice. (3) material properties during thaw, and (4) relief, including progressive changes during thaw, subsidence. Variations in response time resulted from the influence of these factors on the type and activity of degradational processes that ensued. Physical stability is required for growth of vegetation and thermal equilibration, and has taken over 30 yr to attain in ice-rich, thaw-unstable areas. Ice-poor, thaw-stable materials in undrained or low relief areas required an estimated 5 to 10 yr for stability; thaw depth measurements suggest that certain of these areas have also equilibrated thermally

NEW METHOD OF MEASURING THE SNOW-SURFACE TEMPERATURE.

Andreas, E.L., Apr 1986, 12(2), p.139-156, 23 refs

SNOW TEMPERATURE, SURFACE TEMPERATURE, SNOW COVER, METEOROLOGICAL FACTORS, HYGROMETERS, DEW POINT, WATER VAPOR, SATURATION, VAPOR TRANSFER, LATENT HEAT, MEASURING IN-STRUMENTS.

STRUMENTS.

Because a snow cover is so tenuous, measuring its surface temperature is not eas. The surface is ill-defined and easily disturbed; in assive transducers commonly used for other surfaces are, thus, generally inappropriate for snow. We therefore describe a hygometric method of measuring the snow-surface temperature. The advantages are that the method is non-invasive, that its accuracy depends only weakly on the surface structure, and that it is reliable even in bright sunlight. The key assumption is that the air at a snow surface is in saturation with the snow, the dewpoint temperature of air right at the snow surface is thus the surface temperature. Consequently, under a fairly wide range of conditions we can, in effect, measure the surface temperature by measuring the dew-point temperature 10 cm above the surface. We develop a theoretical justification for the hygometric measurement, discuss the meteorological parameters that affect the accuracy of the method, and compare hygometric data with more traditional measurements.

ARCTIC THERMAL DESIGN.

Lunardini, V.J., May 1985, 107(5), p.70-75.

PERMAFROST THERMAL PROPERTIES, ICE ACCRETION, THERMAL REGIME, POLAR RE-GIONS, FREEZE THAW CYCLES, ENGINEER-ING, ICING, PERMAFROST PRESERVATION, HOT OIL LINES.

MP 2168 ARMY RESEARCH COULD REDUCE DANGERS POSED BY SEA ICE.

Tucker, W.B., Mar. 1984, 25(3), p 20-24 41-1329

ICE STRENGTH, ICE PHYSICS, ICE CORES, SEA ICE, REMOTE SENSING, ICE CONDITIONS, ENGINEERING, OFFSHORE STRUCTURES, OFFSHORE DRILLING, PRESSURE RIDGES, ICE PILEUP, ICE OVERRIDE.

MP 2169 EFFECTS OF COLD ENVIRONMENT ON RAPID RUNWAY REPAIRS.

Abele, G., Army Science Conterence, June 17-19, 1986. Proceedings, Vol.1, U.S. Department of Defense, 1986, p.1-9, 15 refs 41-1355

RUNWAYS, COLD WEATHER CONSTRUCTION, ROAD MAINTENANCE, MILITARY ENGINEERING, WIND FACTORS, TEMPERATURE EFFECTS, SNOWFALL.

REMOVAL OF TRACE-LEVEL ORGANICS BY SLOW-RATE LAND TREATMENT.

Parker, L.V, et al, Nov. 1986, 20(11), p.1417-1426, 36 refs.

Jenkins, T.F.

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, SOIL POLLUTION, COUNTERMEASURES DEGRADATION, CHEMICAL ANALYSIS

CHEMICAL ANALYSIS.

A 2 yr study was performed on an outdoor, prototype, slow-rate system to determine the removal efficiency for 16 organic substances in wastewater. The 16 organic were chloroform, benzene, toluene, chlorobenzene, bromoform, m-dichlorobenzene, dibromochloromethane, penthane, hexane, nitrobenzene, m-introtoluene, diethylphthalate, PCB 1242, napthalene, phenanthrene and pentachlorophenoi. The initial concentration of each of these substances in the wastewater was approx 50 microgram/l. Initial removal was via volatilization during spray application. The final concentration of substances after spraying correlated well with their calculated liquid-phase transfer coefficients and the substances initial concentration losses were up to 70% for the most volatile components.

SUITABILITY OF POLYVINYL CHLORIDE WELL CASINGS FOR MONITORING MUNI-TIONS IN GROUND WATER.

Parker, L V, et al, Summer 1986, 6(3), p 92-98, 27

Jenkins, T.F.

WELL CASINGS, GROUND WATER, SOLU-TIONS, MONITORS, MATERIALS, DEGRADA-TION, SOIL MICROBIOLOGY

TION, SOIL MICROBIOLOGY

A number of samples of polyvinyl chloride (PVC) well casings used for ground water monitoring that varied in schedule, diamete, or manufacturer were placed in contact with low concentrations of aqueous solutions of TNT, RDX, HMX and 2,4-DNT for 80 days. Analysis indicated that there was more loss of TNT and HMX with the PVC casing than with the glass controls, but that the amount lost was, for the most part, equivalent among different types. A second experiment was performed to determine if these losses were due to sorption or if biodegradation was involved. Several different ground water conditions were simulated by varying salinity, initial pH and dissolved oxygen content. The only case where there was an increased loss of any substance due to the presence of PVC casing was with the TNT solution under nonsterile conditions. The extent of loss was small, however, considering the length of the equilibration period. This increased loss is thought to be associated with increased microbial degradation rather than sorption. than sorption

MP 2172 IN-SITU ASSESSMENT OF TWO RETROFIT INSULATIONS.

Flanders, S.N., ASHRAE/DOE/BTECC Conference (on) Thermal Performance of the Exterior Envelopes of Buildings, 3rd, Clearwater Beach, FL, Dec. 2-5, 1985. Proceedings, Atlanta, GA, American Society of Heating, Refingerating and Air-Conditioning Engineers, 1986, p.32-44, 6 refs.

THERMAL INSULATION, WALLS, HEAT FLUX, HOUSES, MOISTURE METERS, CELLULAR MATERIALS, MEASURING INSTRUMENTS,

RESINS.

Two retrofit wall insulations were the subject of in-situ R-value measurement and economic assessment of their success for energy conservation. Ft Lewis, Washington, installed cellulose fiber insulation in the walls of more than 1000 housing units where moisture potentially presented a problem Ft Monmouth, New Jersey, added an exterior expanded polystyrene foam insulation system to its many concrete masonry buildings. These represent retrofit insulation methods that have yet to be applied to thousands of military frame and masonry buildings. The R-value measurement included the use of thermography, heat flux transducers, thermocouples and data acquisition equipment. Holes bored in walls gave independent confirmation of guomposition of the construction layers. Boroscope inspection of wall interiors and moisture meter readings of framing sought evidence of moisture and confirmation of voids in cellulose insulation Measurements of the same or similar buildings occurred approximately a year apart. The economic assessment employed Department of Army life-cycle cost criteria

ANALYSIS OF SELECTED ICE ACCRETION MEASUREMENTS ON A WIRE AT MT. WASH-

McComber, P., et al, Eastern Snow Conference, 42nd, 1985, [1985], p.34-43, 12 refs. Govori, J.W.

41-1482

POWER LINE ICING, ICE ACCRETION, ICE LOADS, TRANSMISSION LINES, WIND VELOCITY, MATHEMATICAL MODELS.

VELOCITY, MATHEMATICAL MODELS.

Although numerical models have been developed to predict the increase in load on transmission lines due to atmospheric icing, there are very few data available with which to verify them experimentally. The accretion of ice on a writer is a complex three-dimensional phenomenon involving torsion of the write under the accretion weight, vibration, and breaking of some of the ice. In particular, the Mt. Washington test site used for our experiments experiences strong winds that cause high loads, vibrations, and breaking of ice chunks Load measurements for a few wire-icing events are analyzed to determine the functional relationship between iring load and time, and how this compares with the predictions of some available numerical models. Results indicate that loads for steady icing conditions tend to increase exponentially with time. with time

HUDSON RIVER ICE MANAGEMENT.

Ferrick, M G, et al, Eastern Snow Conference, 42nd, 1985, 1985, p 96-110, 7 refs Lemieux, G E, Gatto, L.W, Mulherin, N

ICE JAMS, ICE BREAKUP, RIVER ICE, ICE CON-DITIONS, ICE DAMS, ICE COVER EFFECT, RIVER FLOW, ICE COVER THICKNESS, FLOODING. COUNTERMEASURES. WAVES

An ice management strategy is being developed for a reach of the Hudson River that experienced ice jam flooding during the 1983-84 winter — Preliminary field studies have focused on developing a technique to induce the breakup of an on developing a technique to induce the breakup of an ice cover or ice jam by releasing water from an upstream dam. During these studies, a series of abrupt releases generated long-period river waves of different magnitudes, durations and spacings that caused changes in river level, durations and spacings that caused changes in river level, dividently, and integrity of the rice cover. By monotoring the river e'evalion and ice cover at several locations, we have found that each of these wave parameters affected the response of the ice cover. The steepness of the wave front depends upon the initial river stage and the amplitude of the release, and is an important parameter affecting the stability of the ice cover. The sequence of events leading to breakup of the relatively thin ice cover on the Hudon was identical to that reported for other rivers having different physical characteristics and much thicker ice. These studies have revealed that pulsed releases of a practical magnitude were effective in removing the ice cover from the reach and provided basic data for analysis of river ice cover breakup

MP 2175 COMPUTER INTERFACING OF METEORO-LOGICAL SENSORS IN A SEVERE WEATHER AND HIGH RFI ENVIRONMENT.

Rancourt, K, et al, Eastern Snow Conference, 42nd, 1985, t1985, p 205-211, 7 refs Govoni, J.W., Oxton, A.

41-1446
METEOROLOGICAL INSTRUMENTS, COMPUTER APPLICATIONS, ICE DETECTION, ICE
LOADS, POWER LINE ICING, PROTECTION,
THERMISTORS, RADIO COMMUNICATION,
TRANSMISSION LINES, WIND FACTORS.

TRANSMISSION LINES, WIND FACTORS.

Methods are delineated whereby the outputs of ten different sensors used in a study of wind and ice loading on a cable are protected from Radio Frequency Interference (RFI) and severe weather, and processed for logging on a computer. Twelve separate signals from two types of ice detector, two types of cable load cell (including one tri-alial load cell), a pitot-static anemometer, a wind vane and a thermistor are introduced into a Digital Equipment Corporation MINC-11-23 computer. Four of these signals, which would otherwise be incompatible, are conditioned for acceptance by the computer. The signals represent high-speed, consecutive samplings of rapidly changing parameters at a sampling frequency controlled by an operator. Sampled data are logged on a printout and are transferred to magnetic tape for offisite analyses. These methods operate successfully on the summit of Mount Washington, a location known for its harsh weather, in an environment with poor electrical ground and relatively high radio and television frequency interference.

METEOROLOGICAL AND SNOW COVER MEASUREMENTS AT GRAYLING, MICHIGAN. Bates, R.E., et al, Eastern Snow Conference, 42nd, 1985, (1985), p.212-229, 5 refs. O'Brien, H W

ELECTRONIC EQUIPMENT, SNOW COVER EF-FECT, SNOWFALL, SNOW PHYSICS, SNOW

DEPTH.

U.S. Army Cold Regions Research and Engineering Laboratory is currently conducting research programs directed toward determining potential effects of airborne snow, snow cover and various meteorological parameters on electromagnetic systems. These programs required extensive-meteorological and snow cover characterization during the winter of 1982-83 and 1983-84 at Camp Grayling, Michigan, which are summarized in this report. The paper also gives a description and discusses the cold weather accuracy and reliability of the automatic recording systems and sensors employed at the snow experiments. Descriptions are given of snow cover measurement techniques, sensors utilized and their accuracy for providing the physical properties of snow cover backgrounds.

EVALUATION OF THE RHEOLOGICAL PROP-ERTIES OF COLUMNAR RIDGE SEA ICE.

Brown, R L, et al, International Conference on Ice Technology, 1st, Cambridge, MA, June 1986. P ceedings, Berlin, Springer, 1986, p.55-66, 14 refs. Richter-Menge, J A., Cox, G F N. 41-1582

41-182
ICE CREEP, RHEOLOGY, SEA ICE, MICROSTRUCTURE, ICE STRENGTH, STRESS STRAIN
DIAGRAMS, COMPRESSIVE PROPERTIES,
POROSITY, GRAIN SIZE, PRESSURE RIDGES, ICE CRYSTAL STRUCTURE

The rheological properties of columnar multi-year ridge ice tested under uniaxial compression at -5C and -20C are analyzed in terms of the material microstructure. Microstructural parameters considered included porosity and grain size. Strain rates were varied from 1 100,000-sec to 1/100 sec. A single integral representation was used to model the uniaxial A single integral representation was used to model the uniaxial material constitutive equation. Results show a definite effect of porosity and strain rate on the mechanical behavior. However, grain size was not found to significantly affect properties, probably because the grain sizes tested for columnar sea, ice were all quite large (d=10 to 40 mm). The theological properties also showd some nonlinearities which have not been observed in nonstaline ice. I mally, a viscoplastic representation is recommended as a formulation which might be better suited for characterizing the properties of sea, see.

FIELD INVESTIGATION OF ST. LAWRENCE RIVER HANGING ICE DAMS, WINTER OF

Shen, H.T, et al, Aug 1984, DTSL55-84-C-C0085A,

85p. 20 refs. Ruggles, R.W., Batson, G.B.

ICE DAMS. RIVER ICF, FRAZIL ICE, ICE COVER THICKNESS, RIVER FLOW, ICE JAMS, ICE FLOES, WATER TEMPERATURE

FRICTION OF SOLIDS ON ICE.

Huber, N.P., et al, (1986), No IRL 85/86-012, 4p., Abstract and illus.

Itagaki, K., Kennedy, F.E., Jr.

ICE FRICTION, ICE SOLID INTERFACE, LUBRICANTS, LIQUID PHASES, ICE MELTING, PRESSURE, THEORIES.

AEROSOL EXCHANGE IN THE REMOTE TRO-POSPHERE.

Hogan, A.W., July-Sep. 1986, 38B(3-4), p.197-213, 35

41-1751

ATMOSPHERIC CIRCULATION, ATMOSPHERIC COMPOSITION, AEROSOLS.

Parameters observed and reported here are primarily ozone mixing ratios, maximum and minimum ozone amounts noted near the ITCZ; antarctic aerosol concentrations and transport. near the ITCZ: antarctic aerosol concentrations and transport. Uniform aerosol concentrations were observed in the Antarctic troposphere, except in the vicinity of cirrus layers aloft, and in moist or cloudy layers near the surface corone mixing ratios occurred in troughs about the periphery of Antarctica, and in slightly turbulent layers near mountains Ozone and aerosol concentrations observed over a wide geographic area of Antarctica were stratified into two altitude classes, and the results mapped Ozone concentrations in the mid troposphere (550 to 400 mb levels) were small and nearly invariant over the interior of Antarctica Ozone concentrations in the upper tropospheric (400-300 mb) layers varied greatly, and became quite large over troughs and about the periphery of Antarctica, and in the vicinity of high mountains Ozone exchange appears quite vigorous in the upper troposphere and frequent aerosol exchange occurs in the lower troposphere inhibits mixing among these levels Vertical profiles of aerosol concentration indicate an aerosol decrease of 25 particles/cu cm / Km in clear air over Antarctica. Moist of 25 particles/cu cm/Km in clear air over Antarctica Mosst and/or cloudy air over and near the Ross and Weddell Seas is enhanced with aerosols relative to this dry profile. Moist layers over the interior of Antarctica are also enhanced in acrosol concentration in comparison with dry antarctic air (Auth. mod)

MP 2181

REGIONAL AND SEASONAL DISTRIBUTIONS OF LOW PRESSURE WEATHER SYSTEMS IN AND AROUND NORWEGIAN WATERS.

Bilello, M.A., International Conference on Polar Lows, Oslo, Norway, May 20-23, 1986. Proceedings. Edited by M. Lystad and O.G. Houmb, [1986], p.53-66, 5 refs. 41-1799

ATMOSPHERIC CIRCULATION, ATMOSPHERIC PRESSURE, SURFACE TEMPERATURE, WEATHER OBSERVATIONS, WIND (METEOROLOGY), OCEANS, METEOROLOGICAL CHARTS, SEASONAL VARIATIONS, NORWAY.

A North Polar region consisting of most of the Scandinavian countries and the major water bodies surrounding these nations was included in a study on the regional and seasonal distributions of low pressure surface weather systems. The region was divided into six zones approximately similar in area, and surface weather maps for three random years were obtained for detailed analysis of daily occurrences of surface lows that passed through these zones. The survey included the lowest isobaric pressure that identified the low, the intensity of the pressure gradient, the zone (or zones) in which the low and its direction of movement. The results of this comprehensive data set were then summarized and seasonal and regional variations of these lows and their characteristics were obtained. A North Polar region consisting of most of the Scandinavian

MP 2182 STRUCTURE AND DIELECTRIC PROPERTIES AT 4.8 AND 9.5 GHZ OF SALINE ICE

Arcone, S.A., et al, Dec. 15, 1986, 91(C12), p.14,281-14,303, 35 refs.

Gow, A.J., McGrew, S.G. 41-1857

LT ICE, SEA ICE, SIMULATION, ICE STRUC-TURE, DIELECTRIC PROPERTIES

TURE, DIELECTRIC PROPERTIES
Saline ice sle's removed from ice sheets grown in an outdoor pool have been studied and related to the complex relative dielectric permittivity. The valine ice closely simulated Arctic sea ice in its structural and salinity characteristies which were regularly monitored in a number of ice sheets grown during the winters of 1983-1984 and 1984-1985. Insitu transmission measurements at similar frequencies were also made on the ice sheet itself using antennas located above and beneath the ice. The slab measurements were made during warming from -28 C to -2 C on slabs grown during the winter of 1983-1984 (4.75 GHz) and during a warming and cooling cycle over a slightly larger temperature range on slabs grown during the winter, 1984-1985 (4.80 and 9.50 GHz). Results from the two winters are compared and the differences analyzed. The in-situ measurements showed extremely high attenuation for the young (<12 cm) brine-trich ice. Good agreement was found between data for the more desalinated samples and theoretical values predictions.

ed by a previously proposed dielectric mixing model that was modified to account for the brine pocket geometry observed in thin sections, and also by including a bulk conductivity term to account for the observed loss (Auth.

MP 2183

OVERLAND FLOW WASTEWATER TREAT-

WASTEWATER TREAT-MENT AT EASLEY, S.C.
Abernathy, A.R., et al, Apr. 1985, 57(4), p.291-299, 12
refs. Discussion by C.J. Martel and T.F. Jenkins,
Ibid., Nov. 1986, 85(11), p.1078-1079, 5 refs.

41-1899

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, CHEMICAL ANALYSIS, DESIGN.

MP 2184 EVALUATION OF SPOT HRV SIMULATION DATA FOR CORPS OF ENGINEERS APPLICA-TIONS.

McKim, H.L., et al, 1985, 5(5), p.61-71, 8 refs. Merry, C.J.

41-1917

REMOTE SENSING, SPECTROSCOPY, PHO-TOINTERPRETATION, DATA PROCESSING, DREDGING, WAFER RESERVES, ECOLOGY, BRIGHTNESS.

BRIGHTNESS.

During the summer of 1983 three Corps of Engineers project sites were overflown as part of the SPOT (Système Probatoire d'Observation de la Terre) High Resolution Visible (HRV) simulation campaign. The three sites were Chesapeake Bay, Maryland, Berlin Lake, Ohio, and Lac qui Parle, Minesota. Multispectral imagery data at a 20-m resolution for three spectral bands (0 50-0.39 micron, 0 61-0 68 micron, 0 79-0.89 micron) were obtained for each of the sites. The data were analyzed for use in dredging, recreation resource management, water quality, and wildlife habitat applications.

MP 2188.

MP 2185

FOLDING IN THE GREENLAND ICE SHEET. Whillans, I M., et al, Jan. 10, 1987, 92(B1), p.485-493, 20 refs.

Jezek, K.C.

41-1976

ICE SHEETS, ICE DEFORMATION, ICE STRUCTURE, RADIO ECHO SOUNDINGS, GREEN-LAND-DYE 3.

The deformation of layering into folds is modeled for a linear viscous medium moving over a décollement. Folds are generated by flow variations caused by relief on the décolleare generated by flow variations caused by relief on the décollement, variations in friction, or both. The model is applied to folds forming now in the Greenland ice sheet near Dye 3, for which more complete data are available than for analogous solid earth situations and for which the décollement is at or near the bed. The folds (wavelength 4-8 km) are detected by radio reflection sounding. Measured surface deformation and deformation rate are used with the radar results to test the theory Calculated fold amplitude is only 20% less than that measured, which indicates that the theory is substantially correct. Inversion of the data to calculate basal drag and velocity variations is not helpful for near Dye 3 because many different basal boundary conditions can lead to the observed deformations. MP 2186.

MP 2186 RETENTION AND RELEASE OF METALS BY SOILS—EVALUATION OF SEVERAL MODELS. Amacher, M.C., et al, Sep. 1986, 38(1-4), p.131-154,

Kotuby-Amacher, J., Selim, H.M., Iskandar, I.K. 41-2138

SOIL COMPOSITION, SOIL CHEMISTRY, MET-ALS, SOLUTIONS, MODELS

ALS, SOLUTIONS, MODELS
Several kinetic models, including irreversible and reversible 1st, 2nd, and nth order models, and several equilibrium models, including the linear, Langmuir, two-surface Langmuir, and Freundlich models, were evaluated for their ability to desembe the retention/release of Cr. Cd, and Hg by various soils. The retention/release data were obtained using a batch eaction method In general, no single-reaction kinetic model fit the data over the entire time and concentration ranges studied for any of the metals or soils. The relationship between the amount of metal retained by the soil and the concentration of metal in solution was described by either the two-surface Langmuir or Freundlich models. A significant fraction of the metals retained by the soil was not released to solution and was not exchangeable, indicating that some irreversible retention of the metals occurred. The results suggest that a multi-reaction model consisting of irrev results suggest that a multi-reaction model consisting of irre-ersible and reversible kinetic models is needed to fit all

MP 2187

BULK TRANSFER COEFFICIENTS FOR HEAT AND MOMENTUM OVER LEADS AND POLY-NYAS.

Andreas, E L., et al, Nov 1986, 16(11), p 1875-1883. 42 refs

Murphy, B. 41-2220

POLYNYAS, SEA ICE, HEAT TRANSFER, TURBULENT BOUNDARY LAYER, MATHEMATI-CAL MODELS

To develop a unified method for parameterizing the turbulent transfer from open water surrounded by pack ice, a reanalysis

has been made of data reported in the literature on momentum and heat transfer over Arctic leads and polynyas. The neutral stability value of the 10-m drag coefficient, 1 49 X .001, is independent of wind speed and open-water fetch for winds from 1 to 10 m/s and fetches from 7 to 500 m. The neutral stability value of the 10-m transfer coefficient for sensible heat, CHN10, is parameterized with the nondimensional fetch. No compelling reason was found to believe that the bulk transfer coefficient for latent heat is different from CHN10 which implies that horizontal homogeneity may not be a severe constraint for evaluating scalar transfer coefficients. The bulk transfer coefficients actually used in modeling turbulent transfer over leads and polynyas are derivable if the atmospheric stability is known. Lastly, a simple formula is developed for estimating one of the fetch factors from an easily obtainable bulk Richardson number (Auth mod.) (Auth mod.)

MP 2188

MICROWAVE DIELECTRIC, STRUCTURAL, AND SALINITY PROPERTIES OF SIMULATED SEA ICE.

Arcone, S.A., et al, Nov 1986, GE-24(6) (Special issue), International Geoscience and Remote Sensing Symposium (IGARSS '85), Amherst, MA, Oct. 7-9, 1985. [Preceedings], p 832-839, 15 refs. Gow, A.J., McGrew, S.G.

ICE CRYSTAL STRUCTURE, ICE ELECTRICAL PROPERTIES, MICROWAVES, SEA ICE, ICE SALINITY, DIELECTRIC PROPERTIES, ICE PHYSICS.

The crystalline structure, salimity characteristics, and microwave dielectric properties of artificially grown saline ice are presented. The ice was grown in an outdoor pool containing salt water of 23-25 per mill salimity. The structure and salimity profiles of this ice sheet closely simulated those found in arctic first-year sea ice. The complex relative dielectric permitivity of slabs removed from the ice sheet was measured at 4.75 GHz as a function of temperature. The slabs were placed between open-end waveguide radiators, and dielectric properties were calculated from the forward scattering coefficient. The results show both the real and imaginary parts to vary almost in direct proportion to the brine volume with values for imaginary showing more variation, and are compared with the previous work of others on actual sea ice samples The crystalline structure, salinity characteristics, and miactual sea ice samples

MP 2189 PROCEEDINGS.

International Offshore Mechanics and Arctic Engineering Symposium, 6th, Houston, Texas, Mar. 1-6, 1987, New York, American Society of Mechanical Engineers, 1987, 4 vols., Refs. passim. For selected papers see 41-2395 .hrough 41-2449.
Lunardini, V.J., ed, Sinha, N.K., ed, Wang, Y.S., ed, Goff R.D. ed.

Goff, R.D., ed.

41-2394
OFFSHORE STRUCTURES, OFFSHORE DRILLING, ICE LOADS, ICE NAVIGATION, PFRMAFROST PHYSICS, ICE CONDITIONS, ICE PHYSICS, ENGINEERING, MEETINGS, ICE SOLID INTERFACE.

MP 2190

HEAT TRANSFER CHARACTERISTICS OF A COMMERCIAL THERMOSYPHON WITH AN INCLINED EVAPORATOR SECTION.

Zarling, J.P., et al, International Offshore Mechanics and Arctic Engineering Symposium, 6th, Houston, Texas, Mar. 1-6, 1987. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1987, p.79-84, 11 refs Haynes, F.D. 41-2405

HEAT TRANSFER, PIPES (TUBES), SUB-GRADES, AIR FLOW, EVAPORATION, WIND VELOCITY, WIND TUNNELS, TESTS HEAT

VELOCITY, WIND TUNNELS, TESTS

Laboratory tests have been conducted on a full-size commercial thermosyphon in an atmospheric wind tunnel located at the U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire. The test variables were evaporator angle, wind speed and heat transfer rate. The effects on thermosyphon performance of nearby walls oriented parallel, at 45 degrees and at right angles to the air flow direction were also studied. Air speed was varied between 00 and 6 meters per second in ten increments. Evaporator angles were varied from 0 to 6 degrees in 3-deg increments theat transfer rates were varied between 600 and 1500 watts in two increments. The air temperature for all tests was about -17 degrees Celsius. Test results are presented showing thermal conductance of the thermosyphon as a function of wind speed, evaporator inclination angle and heat transfer rate. Heat transfer conductances were determined to increase with increasing wind speed, increase with increasing heat transfer rate. transfer rate

EXACT SOLUTION FOR MELTING OF FROZ-EN SOIL WITH THAW CONSOLIDATION.

Lunardini, V.J., International Offshore Mechanics and Arctic Engineering Symposium, 6th, Houston, Texas, Mar. 1-6, 1987. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1987, p.97-102, 9 refs. 41-2408

THAW CONSOLIDATION, GROUND THAWING, THAWING RATE, STRAINS, STEFAN PROBLEM, ANALYSIS (MATHEMATICS).

PROBLEM, ANALYSIS (MATHEMATICS).

The Neumann solution is applicable to the thawing of a soil for which the thaw strain is zero and the density ratio of the frozen and thawed media is one is well known that the thaw strain for many soils is nonzero. An exact solution of the problem is presented for the case of non-zero thaw strain and variable density ratio. The thaw strain can have a significant effect upon the rate of thaw when compared to the Neumann solution. In some cases the Neumann solution can overpredict the thaw depth by more than 50%

MP 2192

CONTRIBUTION OF SNOW TO ICE BRIDGES. Coutermarsh, B.A., et al, International Offshore Mechanics and Arctic Engineering Symposium, 6th, Houston, Texas, Mar. 1-6, 1987. Proceedings, Vol 4, New York, American Society of Mechanical Engineers, 1987, p.133-137, 6 refs.
Phetteplace, G.

41-2414

41-2414
ICE CROSSINGS, ICE COVER STRENGTH,
SNOW (CONSTRUCTION MATERIAL), FREEZING, HEAT TRANSFER, BEARING STRENGTH,
WATER, ICE COVER THICKNESS, SNOW DEPTH.

The role of snow in the construction of ice bridges is discussed It is shown that it has limited value as a structural reinforcement and then only by adding water and freezing the resulting slurry Equations are presented detailing the energy transier during freezing of a water layer vs a water-snow slurry and the times involved with each Natural ice thickening is inhibited by the insulating property of the snow, but snow can be used effectively as either a leveling or wearing surface. The snow should be of uniform depth and not mounded or windrowed to "void deflecting the ice away from the water surface. Insi would substantially weaken the carrying capacity of the ice bridge The role of snow in the construction of ice bridges is discussed from the water surface. This would sulthe carrying capacity of the ice bridge

CONFINED COMPRESSIVE STRENGTH OF HORIZONTAL FIRST-YEAR SEA ICE SAM-

Richter-Menge, J.A., International Offshore Mechanics and Arctic Engineering Symposium, 6th, Houston, Texas, Mar. 1-6, 1987. Proceedings, Vol 4, New York, American Society of Mechanical Engineers, p.197-207, 30 refs. 41-2422

ICE STRENGTH, COMPRESSIVE PROPERTIES, SEA ICE, ICE CRYSTAL STRUCTURE, STRAINS, TESTS, TEMPERATURE EFFECTS.

A total of 110 first-year sea ice samples from Prudhoe Bay, Alaska, were tested in unconfined and confined constant Bay, Alaska, were tested in unconfined and confined constant strain rate compression. All of the tests were performed in the laboratory on a clossed-loop electrohydraulic testing machine at -10. The confined tests were performed in a conventional triaxial cell that maintained a constant ratio between the radial and axial stress to simulate true loading conditions. Three strain rates (1/100, 1/1000, and 1/100,000/s) and three ratios between radial and axial stress (0.25, 0.50, and 0.75) were investigated. This paper summarizes the field sampling and testing techniques and presents data on the effect of confinement on the compressive strength, initial targent modulus, and failure strain of the ice.

DYNAMIC ANALYSIS OF FAILURE MODES ON ICE SHEETS ENCOUNTERING SLOPING STRUCTURES.

Sodhi, D.S., International Offshore Mechanics and Arctic Engineering Symposium, 6th. Houston, Texas. Mar. 1-6, 1987. Proceedings, Vol.4, New York, American Society of Mechanical Engineers, 1987. p.281-284, 6 refs

41-2433 ICE LOADS, DYNAMIC LOADS, OFFSHORE STRUCTURES, ICF SOLID INTERFACE, FLOATING ICE, ANALYSIS (MATHEMATICS), ICE COVER THICKNESS, VELOCITY, ICE SHEETS. SURFACE PROPERTIES, ICE DEFORMATION The interaction of a sloping structure with a slowly moving ice sheet usually results in bending failure of the ice. The resulting ice blocks are large in area in comparison to their thickness. However, when the velocity of the moving ice increases, the failure mode changes from bending to shear or crushing, resulting in very small pieces. This phenomenon has been observed both in the laboratory and in the field. As yet, no theoretical treatment has been

presented to explain this transition. In this paper, a theoretical formulation of the problem is presented in which the ice sheet is treated as an ice beam moving against a sloping structure. The resulting differential equation was solved by the finite element method, and the solution is presented in non-dimensional form.

THEORY FOR THE SCALAR ROUGHNESS AND THE SCALAR TRANSFER COEFFICIENTS OVER SNOW AND SEA ICE.

Andreas, E L., Jan. 1987, 38(1-2), p.159-184, Refs. p.182-184.

SNOW SURFACE, ICE SURFACE, ROUGHNESS COEFFICIENT, WIND VELOCITY, SNOW AIR INTERFACE, ICE AIR INTERFACE

Although the bulk aerodynamic transfer coefficients for sensi-ble (CH) and latent (CE) heat over snow and sea ice surfaces ble (CH) and lat.nt (CE) heat over snow and sea ice surfaces are necessary for accurately modeling the surface energy budget, they have been measured rarely. This paper, therefore, presents a theoretical model that predicts neutral-stability values of CH and CE as functions of the wind speed and a surface roughness parameter. The crux of the model is establishing the interfacial sublayer profiles of the scalars, temperature and water vapor, over aerodynamically smooth and rough surfaces on the basis of a surface-renewal model in which turbulent eddies continually scour the surface, transferring scalar contaminants across the interface by molecular diffusion. Matching these interfacial sublayer profiles with the semi-logarithmic inertial sublayer profiles yields the roughess lengths for temperature and water vapor. When coupled the semi-logarithmic inertial sublayer profiles yields the rough-ness lengths for temperature and water vapor. When coupled with a model for the drag coefficient over snow and sea ice based on actual measurements, these roughness lengths lead to the transfer coefficients. CE is always a few percent larger than CH Both decrease monotonically with increasing wind speeds as the surface gets rougher both increase at all wind speeds as the surface gets rougher Both, nevertheless, are almost always between 001 and 0015.

MP 2196 BANK CONDITIONS AND EROSION ALONG SELECTED RESERVOIRS.

Gatto, L.W., et al, 1987, 9(3), p.143-154, 36 refs. Doe, W.W., III. 41-2495

SHORE EROSION, BANKS (WATERWAYS), FROST HEAVE, FROST WEATHERING, ICE SCORING, ICE RAFTING, ICE PUSH

MP 2197

MODELING THE ELECTROMAGNETIC PROP-ERTY TRENDS IN SEA ICE AND EXAMPLE IM-PULSE RADAR AND FREQUENCY-DOMAIN ELECTROMAGNETIC ICE THICKNESS SOUNDING RESULTS

Kovacs, A., et al, Oct. 1986, SR 86-30, Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986. Proceedings, p 57-133. ADB-108 529, Refs. p.131-133

Morey, R.M., Cox, G.F.N., Valleau, N.C

ICE COVER THICKNESS, ELECTROMAGNETIC PROPERTIES, REMOTE SENSING, SEA ICE, ICE MODELS, DIELECTRIC PROPERTIES, ELECTRICAL RESISTIVITY, BRINES, ICE PHYSICS, ANALYSIS (MATHEMATICS).

Two-phase dielectric mixing model results are presented showing the electromagnetic properties of sea ice versus depth. The modeled data are compared with field measurements and show comparable results. It is also shown how the model data can be used in support of impulse radar and airborne electromagnetic remote sensing of sea ice.

MP 2198

VARIABILITY OF ARCTIC SEA ICE DRAFTS.

Tucker, W.B., et al, Oct 1986, SR 86-30, Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986. Proceedings, p 237-256, ADB-108 529, Hibler, W.D. III.

41-2662

ICE COVER STRENGTH, PENETRATION, ICE COVER THICKNESS, ECHO SOUNDING, SEA ICE DISTRIBUTION, ICE CONDITIONS, CLI-MATIC FACTORS, AIRBORNE EQUIPMENT, SEASONAL VARIATIONS

ON THE PROFILE PROPERTIES OF UNDEFORMED FIRST-YEAR SEA ICE.

Cox, G F N, et al, Oct. 1986, SR 86-30, Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986. Proceedings, p 257-330, ADB-108 529, Refs. p.325-330.

Weeks, W.F. 41-2663

ICE MECHANICS, ICE STRUCTURE, ICE COVER STPENGTH, ICE COMPOSITION, ICE DEFORMATION, ICE COVER THICKNESS, ICE TEMPERATURE, ICE SALINITY, ICE SHEETS. SEA ICE, DRIFT

MP 2200

COMPARISON OF THE COMPRESSIVE BEHAVIOR OF NATURALLY AND LABORATO-RY-GROWN SALINE ICE.

Richter-Menge, J.A., Oct. 1986, SR 86-30, Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986. Proceedings, p.331-350, ADB-108 529, 23 refs.

ICE SALINITY, COMPRESSIVE PROPERTIES, ICE STRENGTH, STRESSES, STRAINS, TEMPERATURE EFFECTS, TESTS, ICE CRYSTAL STRUCTURE, ICE MECHANICS, SEA ICE.

STRUCTURE, ICE MECHANICS, SEA ICE.

A series of unconfined and confined constant strain rate compression tests were performed on columnar, saline ice samples grown in the laboratory at three temperatures (-3, -5 and -10 C) and two strain rates (2 1/50 and 1/1000 per s). The confined compression rests were conducted in a conventional trainal cell designed to ramp the confining pressure in constant proportion to the axial stress being applied to the cylindrical sample. The ratio of the confining pressure to the axial stress in our tests was 0.25, 0.50 or 0.75. This paper summarizes the results of these tests and compares them to previously obtained first-year sea ice test data. We also compare the crystal structure of the saline ice grown in the laboratory and naturally occurring first-year sea ice. In general, the structural composition and mechanical behavior of the two ice types are similar, indicating that the results obtained from types are similar, indicating that the results obtained from tests on columnar saline ice grown in the laboratory reflect the behavior of first-year sea ice.

SMALL-SCALE PROJECTILE PENETRATION IN SALINE ICE.

Cole, D M., et al, Oct. 1986, SR 86-30, Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986 Proceedings, p.415-438, ADB-108 529, I ref.

Steves, H.K.

41-2668

PROJECTILE PENETRATION, ICE SALINITY, ICE DEFORMATION, ICE CRACKS, IMPACT STRENGTH, TESTS, FRACTURING, MILITARY OPERATION, MODELS.

OPERATION, MODELS.

This paper summarizes the results of a testing program to examine the deformation and fracture associated with projectile penetration in saline ice Projectiles 25.4 mm in diameter were fired into a naturally-grown saline ice sheet in a test pool at USA CRREL The tests employed three nose shapes full cone, truncated cone and full flat The impact velocities produced behavior ranging from slight penetration to perforation of the 210-280 mm thick ice sheet

MP 2202

PORTABLE HOT WATER ICE DRILL.

Tucker, W.B., et al, Oct. 1986, SR 86-30, Workshop on Ice Penetration Technology, 2nd, Monterey, CA, June 16-19, 1986 Proceedings, p.549-564, ADB-108 529,

Govoni, J W., Gartield, D.E., Farr, R.W. 41-2676

ICE DRILLS, THERMAL DRILLS, PENETRA-TION TESTS, ICE COVER THICKNESS, OFF-SHORE DRILLING, WATER TEMPERATURE, OFFSHORE STRUCTURES, EQUIPMENT.

PHYSICAL PROPERTIES OF SEA ICE DIS-CHARGED FROM FRAM STRAIT.

Gow, A J, et al, Apr. 24, 1987, 236(4800), p.436-439, 11 refs.

Tucker, W.B.

41-2806

SEA ICE, ICE PHYSICS, ICE STRUCTURE, FRAM STRAIT.

STRAIT.

It is estimated that 84 percent of the ice exiting the Arctic Basin through Fram Strait during June and July 1984 was multiyear ice and that a large percentage of this ice is ridged or otherwise deformed. While freeboard and thickness data, together with salinity measurements on cores, usually sufficed to distinguish between first and multiyear floes, preliminstry identification could usually be made on the basis of snow cover measurements with snow cover being much thicker on multiyear ice. Cores from the top half meter of multiyear floes were generally very much harder and more transparent than cores from first-year floes Age estimates of multiyear floes, based on petrographic and salinity characteristics of cores, did not exceed 4 to 5 years for any of the floes that were observed exiting Fram Strait

MP 2205 PROBLEMS AND OPPORTUNITIES WITH WINTER WASTEWATER TREATMENT

Reed, S.C., Spring 1986, 18(1), p 16-20, 4 refs. 41-2965

WATER TREATMENT, WASTE TREATMENT, SLUDGES, FREEZING.

MP 2206 ICING AND WIND LOADING ON A SIMULATED POWER LINE.

Govoni, J.W., et al, Spring 1986, 18(1), p.23-27, 10

Ackley, S.F. 41-2967

POWER LINE ICING, ICE LOADS, WIND FAC-TORS, ICE ACCRETION, POWER LINE SUP-PORTS.

MP 2207 ADVANCES IN ICE MECHANICS—1987. ADVANCES IN 10E MECHANICA - 201.
International Symposium and Exhibit on Offshore Mechanics and Arctic Engineering, 6th, Houston, TX, Mar. 1-6, 1987, New York, American Society of Mechanical Engineers, 1987, 49p., Refs. passim dividual papers see 41-2930 through 41-2933 Chung, J.S., ed, Sodhi, D.S., ed.

41-229
ICE MECHANICS, ICE LOADS, OFFSHORE STRUCTURES, ICE STRENGTH, MEETINGS, ICE PHYSICS, RHEOLOGY, ICE SOI ID INTERFACE, DRIFT, SEA ICE.

MP 2208 ADVANCES IN SEA ICE MECHANICS IN THE

Sodhi, D.S., et al, International Symposium and Exhibit on Offshore Mechanics and Arctic Engineering, 6th, Houston, TX, Mar. 1-6, 1987 (Proceedings.) Advances in ice mechanics—1987. Edited by J.S. Chung, D.S. Sodhi, New York, American Society of Mechanical Engineers. 1987, p.37-49, 105 refs. Cox. G.F.N.

41-2933
ICE MECHANICS, ICE STRENGTH, SEA ICE, ICE LOADS, OFFSHORE STRUCTURES, ICE PHYSICS, ICE SOLID INTERFACE, DRIFT, COMPRESSIVE PROPERTIES, MODELS, PE-TROLEUM INDUSTRY.

A brief review of significant advances in the field of sea ice mechanics in the United States is presented in this paper. Emphasis is on ice forces on structures, as the subject relates to development of oil and gas resources in the southern Beaufort Sea. The main topics discussed here are mechanical properties, ice-structure interaction, modeling of sea ice drift, and oil industry research activities Significant advances in the determination of ice properties are the development of testing necedures to obtain consistent. are the development of testing procedures to obtain consistent results. Using stiff testing procedures to obtain consistent results. Using stiff testing machines, researchers have been able to identify the ting near of tensile and compressive strengths on different parents, e.g., strain rate, temperature, grain size, c-axis openation, porosity, and state of stress (uniaxual or multiaxial). Now reliable data exist on the tensile and compressive strengths of first-year and multivear sea, ice.

GROWTH, STRUCTURE, AND PROPERTIES OF SEA ICE.

OF SEA ICE.

Weeks, W.F., et al, NATO Advanced Study Institute on Air-Sea Interaction, Acquafredda di Maratea, Italy, Sep. 28-Oct. 10, 1981 Proceedings Geophysics of sea ice. Edited by N. Unterstemer. NATO ASI series, Series P. Physics, Vol.146, New York, Plenum Press, 1986, 1, 164, Refs. p.152-164. For another source see 37-2407.

Ackley, S.F. 41-2987

ICE CRYSTAL GROWTH, ICE CRYSTAL STRUC-TURE, SEA ICE, ICE ELECTRICAL PROPERTIES, ICE MECHANICS, ICE THERMAL PROPERTIES, ICE PHYSICS, GRAIN SIZE, GAS INCLUSIONS, TEMPERATURE EFFECTS

MECHANICAL BEHAVIOR OF SEA ICE.

Mellor, M., NATO Advanced Study Institute on Air-Sea Interaction, Acquafredda di Maratea, Italy, Sep 28-Oct. 10, 1981. Proceedings. Geophysics of sea ice. Edited by N. Untersteiner NATO ASI series, Series B. Physics, Vol. 146, New York, Plenum Press, 1986, p.165-281, Refs. p.275-281. For another source see 38-469.

41-2988
ICE MECHANICS, SEA ICE, ICE STRENGTH, ICE ELASTICITY, FLEXURAL STRENGTH, FRACTURING, RHEOLOGY, MECHANICAL PROPERTIES, STRESSES, STRAINS, ANALYSIS

MP 2211
ICE DYNAMICS.
Hibler, W.D., III, NATO Advanced Study Institute on Air-Sea Interaction, Acquaftedda di Maratea, Italy, Sep. 28-Oct. 10, 1981. Proceedings. Geophysics of sea ice. Edited by N. Untersteiner. NATO ASI series, Series B: Physics, Vol.146, New York, Plenum Press, 1986, p.577-640, Refs. p.637-640. For another source see 39-896 or 14F-30815. 41-2995

41-2995
ICE MECHANICS, RHEOLOGY, DRIFT, ICE AIR
INTERFACE, THERMODYNAMICS, OCEANOGRAPHY, SEA ICE, ICE FORMATION, ICE
AIR INTERFACE, ICE STRENGTH, ICE COVER
THICKNESS, ICE MODELS, SEA WATER, ANTARCTICA—WEDDELL SEA.

TARCTICA—WEDDELL SEA.
Essential sspects of sea are dynamics of the Arctic and Antarctic on the geophysical scale were reviewed and the role of arc dynamics in air-sea-ice interaction was discussed. The review is divided into the following components as a discussion of the momentum balance describing ice drift, b) an examination of the nature of sea ice theology on the geophysical scale, c) an analysis of the relationship between ice strength and ice thickness characteristics, and d) a discussion of the role of ice dynamics in the atmosphere-coccan system Because of the unique, highly nonlinear nature of sea-ice interaction, special attention is given to the ramifications of ice interaction on sea ice motion and deformation These ramifications are illustrated both by analytic solution and by numerical model results. In addition, the role of ice dynamics in the atmosphere-ice-occan system is siscussed in light of numerical modeling experiments, including a fully coupled ice-occan model of the Arctic-Greenland-Norwegian seas

MP 2212 MEASUREMENTS OF REFRACTIVE INDEX SPECTRA OVER SNOW. Andreas, E.L., Apr. 1986, Vol.642, p.248-260, 33 refs.

REFRACTION, OPTICAL PHENOMENA, TURBULENCE, SNOW OPTICS, SNOW AIR INTER-FACE.

MP 2213 TRANSPORT OF WATER IN FROZEN SOIL 6.

EFFECTS OF TEMPERATURE. Nakano, Y., et al, Mar. 1987, 10(1), p.44-50, 9 refs. 41-3019

SOIL WATER MIGRATION, DIFFUSION, VAPOR DIFFUSION, UNFROZEN WATER CON-TENT, FROZEN GROUND TEMPERATURE.

IN-SITU THERMAL CONDUCTIVITY MEAS-UREMENTS.

Atkins, R.T., June 1983, FHWA-AK-RD-84-06, 38p., 41-4070

CONSTRUCTION MATERIALS, THERMAL CONDUCTIVITY, SOIL PHYSICS, THERMAL INSULATION, THERMISTORS.

SULATION, THERMISTORS.
This report describes a method for using commercially available thermistors to make *m-situ* thermal conductivity *measurements* with commonly available electronic equipment. The emphasis is on use of a single thermistor to measure threnal conductivities of soils and building insulations. Calibration techniques are explained and examples provided. Limitations on this technique are discussed, including material grain size, amount of material needed for a valid measurement, and temperature stability necessary. Specific examples of the use of this technique are provided for both soil measurements and building material measurements. Data analysis is discussed, including a statistical approach to finding the thermal conductivity in large volumes of material

INTERACTION OF GRAVEL FILLS, SURFACE DRAINAGE, AND CULVERTS WITH PERMA-FROST TERRAIN.

Brown, J., et al, Jan. 1984, AK-RD-84-11, 35p. 24

Brockett, B.E., Howe, K.E. 41-4072

PERMAFROST BENEATH ROADS, CULVERTS, EMBANKMENTS, DRAINAGE, GRAVEL, THERMAL INSULATION, THAW DEPTH, GROUND THAWING, PERMAFROST THER-MAL PROPERTIES.

MAL PROPERTIES.

During the summers of 1981 and 1982, the thaw regime of gravel roads and the performance of culverts were obs.rved in the Prudhoe Bay and Kuparuk River oilfields nathern Alaska. This relatively flat to gently rolling coastal plain is concred by shallow lakes, drained lake basins and interconnecting ice-wedge polygons. Depth of seasonal thaw of the predominantly fine-grained soils is less than 50 cm. The permafrost temperature is about -10 C. A combination of visual frost tube readings and temperature measurements were obtained in the tradbed, in an area immediately adjacent to an insulated culvert, and in areas undisturbed by construction. Gravel roads up to 2 m thick thaw completely

and thaw penetrates into the consolidated active layer. Where cepth of thaw exceeds the thickness of the active layer, ice-rich permafrost begins to thaw. Adjacent to the roads, newly formed surface troughs indicate melting of the underlying ice wedges

Shallow impoundments form on the upslope sides of roads where culverts have not been adequately sited or installed. More standardized practices for culvert placement, installation, and maintenance are desirable to minimize disruption of natural drainage.

MP 2216 EFFECT OF OSCILLATORY LOADS ON THE BEARING CAPACITY OF FLOATING ICE COV-

Kerr, A.D., et al, Apr. 1987, 13(3), p.219-224, 9 refs. Haynes, F.D. 41-3032

ICING, VEHICLES, STATIC LOADS, ICE LOADS, ICE COVER STRENGTH, BEARING STRENGTH, OSCILLATIONS, TESTS.

STRENGTH, OSCILLATIONS, TESTS.

Parked vehicles with running engines, or motor driven machinery, subject an ice cover to a static load and to a relatively small oscillatory force, that is caused by the moving parts. Since for the driving frequencies in question the dominant feature is fatigue of the 1/2 cover, while it is undergoing non-elastic time-dependent deflections, an experimental program was initiated to study this phenomenon by running a series of tests in one of the cold rooms at CRREL. An electronically driven shaker placed on the ice cover was used to simulate the dynamic case. A loading device of the same weight and base shape was used as a static control in the tests. Each test consisted of placing these two objects on an ice cover and recording how their vertical siplacements vary with time, for a fixed driving frequency of the shaker. A comparison of these two curves established the effect of the oscillating force component. Eight tests were conducted. It was found that for urea ice covers and driving frequencies of 1, 10 and 30 Hz (60, 600, and 1800 rpm) the vibrating shaker increased the vertical downward displacements and substantially decreased the time to breakdisplacements and substantially decreased the time to break-through.

MP 2217
ICE NUCLEATION ACTIVITY OF ANTARCTIC MARINE MICROORGANISMS.
Parker, L.V., et al, 1985, 20(5), p.126-128, 12 refs. Sullivan, C.W., Forest, T.W., Ackley, S.F.

SEA ICE, ALGAE, NUCLEATING AGENTS.

A brief review of recent research leads to the conclusion that scavenging is the mechanism by which microorganisms are incorporated in sea ice. Initial studies are presented of the relative ability of melted sea ice and pure cultures of ice algae and ice bacteria to nucleate water droplets Details of this process are expounded.

MP 2218 PRELIMINARY SIMULATION OF THE FOR-MATION AND INFILLING OF SEA ICE GOUGES.

Weeks, W.F., et al, Dec. 1986, No.49, Workshop on Ice Scour Research, Calgary, Alta., 'eb. 5-6, 1985. Proceedings. Ice scour and seabed engineering. Edited by C.F.M. Lewis, et al, p.259-268, 6 refs. Tucker, W.B., Niedoroda, A. 41-3118
SEA ICE ICE SCORING MARINE DEPOSITS.

SEA ICE, ICE SCORING, MARINE DEPOSITS, OCEAN BOTTOM, SEDIMENT TRANSPORT, DISTRIBUTION, MODELS, COMPUTER APPLICATIONS, STATISTICAL ANALYSIS, BEAU-FORT SEA.

MP 2219 CORPS OF ENGINEERS JEEK ICE SOLU-TIONS.

Frankenstein, G.E., Apr 1987, 28(3), p 5-7, 5 refs. 41-3140

LABORATORIES, ICE MECHANICS, MODELS, ICE PRESSURE, RIVER ICE, HYDRAULIC STRUCTURES, ICE JAMS, U.S. ARMY CRREL. MP 2220

ON ESTIMATING ICE STRESS FROM MIZEX 83 ICE DEFORMATION AND CURRENT MEAS-UREMENTS.

Leppäranta, M., et al, Mar. 1986, SR 86-03, p.17-19, ADA-172 265, 4 refs.

ADA-172 265, 4 rets. Hibler, W.D. III, Johannessen, O. 41-3055 ICE DEFORMATION, ICE EDGE, ICE ME-CHANICS, OCEAN CI/RRENTS, OCEAN WAVES, WIND FACTORS, STRESSES, DRIFT.

MP 2221 CRYSTAL STRUCTURE OF FRAM STRAIT SEA

Gow. A.J., et al, Mar. 1986, SR 86-03, p 20-29, ADA-172 265, 8 refs. Tucker, W.P., Weeks, W.F. 41-3056

ICE CRYSTAL STRUCTURE, SEA ICE, ICE COM-POSITION, FRAZIL ICE, ICE MELTING, SNOW ICE, FRAM STRAIT.

ACOUSTICAL REFLECTION AND SCATTER-ING FROM THE UNDERSIDE OF LABORATO-RY GROWN SEA ICE: MEASUREMENTS AND PREDICTIONS.

Stanton, T.K., et al, Nov. 1986, 80(5), p.1486-1494, 30 refs.

Jezek, K.C., Gow, A J

41-3068

ICE ACOUSTICS, SEA ICE, ICE BOTTOM SUR-FACE, ACOUSTIC MEASUREMENT, SOUND TRANSMISSION, SCATTERING.

TRANSMISSION, SCATTERING.

Acoustical reflection and scattering properties of the underside of undeformed sea ice which was grown in an outdoor pond were studied. Echo amplitude fluctuations of normal incidence sonar pings (100-800 kHz) were measured as the sonars moved horizontally under the ice and accumulated into echo amplitude histograms. The Rice probability density function (PDF) was fit to the data and the resultant statistical parameter was combined with the Eckart acoustical scattering theory to estimate an rm roughness of the water/ice interface to be 0.3 mm. Because the rice thin sections showed the ice to be porous and permeable at the interface with dendrites 0.5 mm thick, it appeared that the dendrites controlled the scattering was of the order 0.05. The low reflection coefficient The low reflection coefficient The low reflection coefficient The low reflection predicted from was of the order 005

(low compared to the 035 value which is predicted from the bulk properties of sea ice) was attributed to the dendritie structure which was porous and permeable at the water/ice interface. From the data and modeling done, scattering, and, hence, echo fluctuations, for normal incidence sonars of various frequencies and beamwidths were also predicted

VERIFICATION TESTS FOR A STIFF INCLU-SION STRESS SENSOR.

Cox, G.F.N., et al, Feb 1987, 24(1), p 81-88, 14 refs. Johnson, J.B.

41-3301

ROCK MECHANICS, STRAIN MEASURING IN-STRUMENTS, STRESSES, ICE MECHANICS, IM-PURITIES.

CHEMICAL SOLUTIONS TO THE CHEMICAL PROBLEM.

Minsk, L.D., Canadian Building Congress, 4th, Oct. 6-8, 1985. Proceedings I earning from experience/avoiding failures, Ottawa, Ont., National Research Council, Canada, 1985, p 238-244, 9 refs., French summary.

41-3194

PAVEMENTS, CORROSION, CONCRETE STRENGTH, ICE MELTING, SALTING, BRIDGES, ICE CONTROL, ROAD ICING, CHEMICAL ICE PREVENTION, ANTIFREEZES, SNOW REMOVAL, DAMAGE, ICE REMOVAL, TEMPERATURE EFFECTS.

TEMPERATURE EFFECTS.

The cheapest descing chemical to procure—salt—is one of the most effective freezing point depressants, but it can also be one of the most costly where material degradation results from electiolytic corroson. Damage to pavements, primarily bridge decks and elevated highways, and the high cost of repair or rehabilitation, has spurred the search for effective but non-detrimental descing chemicals. The most promising material is calcium magnesium acetate (CMA) which tests made to date have shown to exhibit little or no corrosion potential, under generally-occurring conditions, and to have an acceptable melting action. The nature of salt action on concrete and characteristics for a chemical to serve as an effective descing agent are reviewed. Also, candidate chemicals other than CMA are discussed. Reserved to improve chemical control of snow and ice, both underway and proposed, is reviewed, and the outlook for reduced damage to structures is assessed.

MP 2225 SPACEBORNE SAR AND SEA ICE: A STATUS

Weeks, W.F., July 1, 1983, No 83-11, NASA-CR-173 186, Spaceborne Imaging Radar Symposium, Pasadena, CA, Jan. 17-20, 1983. Proceedings, p.113-115, N84-16412 41-3347

SEA ICE DISTRIBUTION, REMOTE SENSING, ICE CONDITIONS, ICE MECHANICS, ICE SURFACE, ICE COVER THICKNESS, SNOW TEMPERATURE, WIND DIRECTION.

REFERENCE GUIDE FOR BUILDING DIAG-NOSTICS EQUIPMENT AND TECHNIQUES. McKenna, C, et al, July 1986, DEB-TR-86-06, 148p, ADA-179 142, Refs. p.142-148

Munis, R H. 41-3359

BUILDINGS INDOOR CHIMATES, MANUALS, HEATING AIR LEAKAGE, VENTILATION, MEASURING INSTRUMENTS, ENGINEERING.

MP 2227 CLASSIFICATION AND LABORATORY TEST-ING OF ARTIFICIALLY FROZEN GROUND. Sayles, F H., et al, Mar. 1987, 1(1), p 22-48, Refs. p 45-48. 41-2766

STRAIN TESTS, FROZEN GROUND STRENGTH, SOIL FREEZING, ARTIFICIAL FREEZING, SALINITY.

FREEZING, SALINITY.

The proposed gudelines for classifying artificially frozen ground are based on the Unified Soil Classification System, with the addition of salinity evaluation

For testing frozen soils in the laboratory, it is recommended that axial loading strain rates be 0.1 and 1%/min, constant stress loadings for creep testing be 70, 50, 30, and 10% of the strength values obtained from the constant strain rate test performed at 1%/min, temperatures of the tests be -2, -5, and -10 C, the test specimen shape and size be a right circular cylinder with height-to-diameter ratio of 2 or more and a diameter be at least 10 times that of the largest soil particle size, specimen end caps be lubricated where possible, and the test loading system have a stiffness at least five times that of the test specimen

SCIENTIFIC CHALLENGES AT THE POLES. Welch, J.P., et al, May 1987, 28(5), p.23-26, 11 refs Eppler, D.T., Lohanick, A.

ARCTIC LANDSCAPES, RESEARCH PROJECTS, REMOTE SENSING, ICE SURFACE, SNOW SUR-FACE, MICROWAVES.

EFFECT OF SNOW ON VEHICLE-GENERATED SEISMIC SIGNATURES.

Albert, D.G., Apr. 1987, 81(4), p.881-887, 14 refs. For previous versions see 40-3531, 40-3544. 41-3887

SNOW COVER EFFECT, MILITARY OPERATION, SEISMOLOGY, ACOUSTICS, ATTENUATION, VEHICLES.

MP 2230

RECRYSTALLIZATION LABORATORY AND NATURALLY DEFORMED ICE.

Gow, A.J., et al, Mar. 1987, 48(3) Supplement, p.(C1)271-(C1)276, With French summary. 9 refs. Sheehy, W. 41-3957

RECRYSTALLIZATION, ICE CRYSTAL STRUCTURE. ICE DEFORMATION, ICE STRENGTH, ICE CRYSTAL NUCLEI, ICE MELTING, PRES-SURE.

Results are presented of annealing recrystallization in both naturally and laboratory deformed ice. Thin section techniques were used to follow the progress of recrystallization which, in the case of highly compressed ice pellets annealed at -3 C, showed that as soon as any new crystal was nucleated in the deformed ice matrix it retained its lattice orientation over the duration of the recrystallization. Laboratory annealing at ambient pressures of highly deformed, strongly oriented crystal ice from cores deep in the Antarctic. Ice Sheet resulted in growth of very large crystals exhibiting casis orientations very much degraded with respect to the original ice. Textures and fabrics of the same ice annealed at 200 bars confining pressure closely resembled those observed in ice undergoing dynamic (annealing) recrystallization at 190-200 bars overburden pressure near the base of the ice sheet, which at this location in Antarctica was at pressure sheet, which at this location in Antarctica was at pressure

MP 2231

RESTRAINTS ON THIN SECTION ANALYSIS OF GRAIN GROWTH IN UNSTRAINED POLY-CRYSTALLINE ICE.
Gow, A J, Mar 1987, 48(3) Supplement, p (C1)277-

(C1)281, With French summary.

41-3958 ICE CRYSTAL GROWTH, ICE CRYSTAL STRUC-URE, GRAIN SIZE, AIR ENTRAINMENT, BUB-BLES, TESTS

BLES. TESTS

Tests were performed at -1 C evaluate the effects of a free surface and the thickness dimensions of timi sections on the growth of grains in fine-grained, pore-rich, strain free polycrystalline ice of grains in fine-grained, pore-rich, strain for grains occurs when the mean size of grains is more than 15 to 2 times the section thickness. Grain growth in thicker sections was significant for the fact that grain boundary migration, leading to 3-4 fold increases in average grain size, was situally unaffected by the presence of large numbers of bubbles in the ice. Not was there any evidence to indicate any concentrating of bubbles along migrating boundaries. Grain boundary groosing was a characteristic feature of most sections undergoing grain growth. This implies actual migration of grooves during grain growth the fact that the total length of grooves decreased with increasing grain size also implies some process of groove consumption during grain growth. Three dimensional grain growth measurements in bulk samples compared favorably with those obtained from sections two to three times thicker than the mean grain diameter. (Auth.)

MP 2232 CHEMICAL PROPERTIES OF SNOW IN THE NORTHEASTERN UNITED STATES.
Kumai, M., Mar. 1987, 48(3) Supplement, p.(C1)625-

(C1)630, With French summary. 7 refs.

SNOW COMPOSITION, CHEMICAL PROPERTIES, AERCSOLS, AIR POLLUTION, SCANNING ELECTRON MICROSCOPY, SNOWFALL, WIND DIRECTION, X RAY ANALYSIS, IONS, UNITED STATES—NEW HAMPSHIRE—HANO-

VER.

Samples of fresh snow from Hanover, N.H., were found to be slightly acidic, with pH ranging from 3.56 to 5.63, and had electrolytic conductivities in the range 2.52 to 80.0 microS/cm. Snowfalls accompanied by southerly winds from densely populated areas averaged about 3 times higher in hydrogen ion concentration and electrolytic conductivity than snowfalls accompanied by northerly winds from less populated areas. Particles found in fresh snow examined with a scanning electron microscope and an energy dispersive X-ray analyzer were most frequently soil micrals, with some fly ash particles, and occasionally diatoms and pollen. Sulfur-rich black particles were presumed to be from local oil-fired heating and electric power plants, while suicon-rich fired heating and electric power plants, while sincon-rich fly ash particles were assumed to have originated at distant coal-fired electric power plants.

MP 2233

LABORATORY INVESTIGATIONS OF LOW TEMPERATURE CRACKING SUSCEPTIBILITY OF ASPHALT CONCRETE.

Janoo, V.C., et al, Paving in Cold Areas Mini Workshop, 3rd, Ottawa, Ontario, July 20-22, 1987. Proceedings, Vol.1, Ottawa, Ministry of Transportation and Communications, July 1987, p 397-415, 8 refs., With Japanese summary.

Chamberlain, E.J.

Chambertain, e.f. 41-4030
BITUMINOUS CONCRETES, LOW TEMPERA-TURE TESTS, CONCRETE STRENGTH, THER-MAL STRESSES, CRACKING (FRACTURING), CEMENT ADMIXTURES, STRAINS, TEMPERA-TURE EFFECTS, RHEOLOGY, TESTS, TENSILE PROPERTIES.

PROPERTIES.

A laboratory test program to study the behavior of asphalt concrete at low temperatures is underway at USA CRREL. The effects on strength and thermal stresses and strains, of temperature, temperature cycling, tensile creep, types of asphalt cement and later the influence of additives are included in this investigation. The results from these tests will be used to evaluate, validate and modify two existing thermal cracking models. After verification in the laboratory, the models will be tested in the field. If either model is successful, it is expected that one will be incorporated in the overall Corps of Engineers design procedures for asphalt concrete payement. concrete pavements

STATEMENT OF RESEARCH NEEDS TO AD-DRESS AIRPORT PAVEMENT DISTRESS.

Vinson, T.S., et al. Paving in Cold Areas Mini Workshop, 3rd, Ottawa, Ontario, July 20-22, 1987 Proceedings, Vol 2, Ottawa, Ministry of Transportation and Communications, July 1987, p 981-1012, 11 refs., With Japanese summary Berg, R L., Tomita, H.

41.3050

AIRPORTS, COLD WEATHER PERFORMANCE. PAVFMENTS, COLD WEATHER PERFORMANCE, PAVFMENTS, CRACKING (FRACTURING), FROST HEAVE, ICE COVER EFFECT, SNOW COVER EFFECT, THERMAL STRESSES, BEARING STRENGTH, FREEZE THAW CYCLES, DAMAGE, DRAINAGE.

ING STRENGTH, FREEZE THAW CYCLES, DAMAGE, DRAINAGE.

In early fall 1983 the Federal Aviation Administration (FAA), tunded the U.S. Army Cold Regions Research and Engineering Laboratory (U.S.CAREL) to conduct a study of airport pasements in cold regions of the United States. A U.S.A.C. REIL's request, the American Association of Airport Executives (AAAE) sent a questionnaire to over 325 general aviation arroots in cold regions. The results from over 200 responses were compiled and evaluated and over 20 airport managers were contacted for additional details. Site visitations were made to 36 airports to obtain additional information. The most common pavement problems identified in the study were associated with non-traffic-related phenomena and included (1) pre-existing cracks reflecting through asphalt concrete overlays (2) thermal cracking and (3) longitudinal cracking Most of the airports experienced (1) water pumping up through cracks, and joints in the pavements during spring thaw, or (2) additional roughness due to differential frost heave in the winter, or both problems. Many airport managers reported that debris was generated at cracks during the winter and spring. Pavement problems can often be traced to the evolutionary history of general aviation airports and the lack of consideration for site drainage. Based on the recognition of these problems, several future research programs are identified.

SUMMARY OF PROPER COLD WEATHER PAVEMENT REPAIR METHODS.

Eaton, R.A., Paving in Cold Areas Mini Workshop, 3rd, Ottawa, Ontano, July 20-22, 1987. Proceedings, Vol.2, Ottawa, Ministry of Transportation and Communications, July 1987, p.1013-1027, 5 refs, With Japanese summary.

41-4031
PAVEMENTS, COLD WEATHER CONSTRUCTION, BITUMINOUS CONCRETES, DAMAGE, ROAD MAINTENANCE, FREEZE THAW CYCLES, DRAINAGE CONSTRUCTION MATERIALS, COMPACTION, EQUIPMENT, SEALING.

ALS, COMPACTION, EQUIPMENT, SEALING. Currently available portable construction equipment can provide hot asphalt concrete on a year-round basis in cold regions. This permits rapid and permanent repairs to pavements if potholes occur or utility cuts are made when the local hot asphalt concrete plants are closed for the winter

MP 2236

PORTABLE HOT-WATER ICE DRILL.

Tucker, W.B., et al, June 1987, 14(1), p.57-64, 5 refs. For another version see 41-2676.

Govoni, J.W.

41-4216
ICE DRILLS, THERMAL DRILLS, PENETRATION TESTS, ICE COVER THICKNESS, OFFSHORE DRILLING, WATER TEMPERATURE,
OFFSHORE STRUCTURES, EQUIPMENT.

A portable hot-water drilling system has been developed for conducting detailed thickness surveys of multi-year sea ice. Primary components of the system are a propaneired water heater and a twin-piston pump which is driven by a small gasoline engine. When assembled, the system fired water heater and a twin-piston pump which is driven by a small gasoline engine. When assembled, the system is mounted on a sled which can be moved across relatively smooth ice surfaces by two persons. The system components easily fit inside a BEII 205 or 212 helicopter for movement to other locations. A field program in April and May 1986 proved the viability of the system for rapidly penetrating multi-year sea ice in relatively cold amhient temperatures. The prototype drill penetrated ice at a tes of 3 m/min A 43-cm-diameter ring can be quickly substituted for the normal drilling probe. This ring is useful for making larger holes through the ice for the release or recovery of instruments. Overall performance of the drilling system was highly satisfactory during the field investigations. Future systems, however, will incorporate fuel oil burners and higher-pressure pumps to achieve higher penetration rates as well as to take advantage of more readily available fuel sources. sources

RIVER WAVE RESPONSE TO THE FRICTION-INERTIA BALANCE.

Ferrick, M.G., et al. National Conference on Hydrau-lic Engineering, Williamsburg, VA, Aug. 3-7, 1987. Proceedings, New York, American Society of Civil Engineers, 1987, p.764-769, 2 refs.

41-4222

RIVER FLOW, WATER WAVES, WAVE PROPAGATION, FRICTION, UNSTEADY FLOW, ICE JAMS, ICE BREAKUP, FLOODS, ANALYSIS (MATHEMATICS).

The changing character of the solution of the Saint-Venant equations for river flow problems with the dimensionless parameter F(I) reflects a changing balance between friction and inertia. I linearize and place these equatiors in nondimensional form, and obtain solutions or consider the structure of the solution in different ranges of F(I). The volutions for inertia-dominated flow and for friction-dominated flow nor increased minimum and for increased minimum and for multi-option and for increasing the transition between these extremes I identify and obtain expressions for the frictional attenuation of disturbances transmitted by dynamic waves

MP 2238

DIAGNOSTIC ICE-OCEAN MODEL.

Hibler, W.D., III. et al. July 1987, 17(7), p 987-1015. 36 refs.

Bryan, K

OCEAN CURRENTS, SEA ICE, ICE WATER INTERFACE, MATHEMATICAL MODELS

TERFACE, MATHEMATICAL MODELS
A coupled tee-occan model sutable for simulating tee-occan circulation over a seasonal cycle is developed by coupling a dynamic thermodynamic sea see model with a multilevel baroclinic ocean model. This model is used to investigate the effect of ocean circulation on seasonal sea ice simulations by carrying out a simulation of the Arctic, Greenland and Norwegian seas. The ocean model contains a linear term that damps the ocean temperature and salimity towards climatology. The damping term was chosen to have a three-year relaxation time, equivalent to the adjustment time of the pack ice. No damping, however, was applied to the uppermost layer of the ocean model, which is in direct contact with the mo-ing pack ice. This damping procedure allows seasonal and shorter time-scale variability to be simulated in the ocean, but does not allow the model to drift away from ocean climatology on longer time scales. For the standard experiment, an initial integration of five years was performed at one-day time steps and a 145 deg by

1 45 deg resolution in order to obtain a cycle equilibrium. For comparison, a five-year simulation with an ice-only model, and shorter one-year sensitivity simulations without surface salt fluxes and without ocean currents, were also carried out. Input fields consisted of climatological surface air temperatures and mixing ratios, together with daily geostrophic winds from 1979 Operational features of the model are winds from 1979 Operational features of the model are described and an analysis is given in terms of the advance and retreat of the ice edge, ice melt fluxes, heat transport and atmospheric heat balance. (Auth mod)

CHEMICAL FRACTIONATION OF BRINE IN THE MCMURDO ICE SHELF, ANTARCTICA. Cragin, J.H., et al, 1986, 32(112), p 307-313, With

French and German summaries, 21 r ferent source see 38-688 or 13F-28806 21 refs For dif-

Gow, A.J. Kovacs. A.

ICE CORES, ICE SALINITY, ICE COMPOSITION, ICE SHELVES, ICE PHYSICS, ANTARCTICA— MCMURDO SOUND.

During the austral summers of 1976-77 and 1978-79, several ice cores were taken from the McMurdo Ice Shelf brine zone to investigate its thermal, physical, and chemical properzone to investigate its thermal, physical, and chemical properties. Chemical analyses of brine samples from the youngest (uppermost) brine wave show that, except for the advancing front, it contains sea salts in normal sea-water proportions. Further inland, deeper and older brine layers, though highly saline (\$>200 per mill), are severely depleted in (\$O4)2-Na+ ratio being an order of magnitude less than that of normal sea-water. Consideration of the solubility of alternative salts, together with analyses of Na+, K+, Ca2+, Mg2+, (\$O4)2-, and C1- concentrations, shows that the sulfate depletion is probably due to selective precipitation of mirabilite, Na2SO4 10H2O. The location of the inland boundary of brine penetration is closely related to the depth at which the brine encounters the firm/ice transition. However, a small but measurable migration of brine is still occurring in otherwise impermeable ice, this is attributed to eutectic in otherwise impermeable ice, this is attributed to eutectic dissolution of the ice by concentrated brine as it moves into deeper and warmer parts of the McMurdo ice Shelf (Auth)

MP 2240 PHYSICAL PROPERTIES OF SUMMER SES

ICE IN THE FRAM STRAIT. Tucker, W.B., et al, June 30, 1987, 92(C7), p 6787-6803, 37 refs

Gow, A.J., Weeks, W.F. 41-4238

41-428 ICE PHYSICS, SEA ICE, ICE EDGE, SNOW COVER EFFECT, ICE COVER THICKNESS, ICE SALINITY, ICE CRYSTAL STRUCTURE, SEA-SONAL VARIATIONS, FRAM STRAIT.

SALINITY, ICE CRYSTAL STRUCTURE, SEA-SONAL VARIATIONS, FRAM STRAIT.

The physical properties of sea ice in the Fram Strait region of the Greenland Sea were examined during June and July 1988 in conjunction with the Marginal Ice Zone Experiment field program Most of the ice sampled within Fram Strait during this period was multiyear. Thicknesses and other properties indicated that none of the multiyear ice was older than 4 to 5 years. Snow cover on the multiyear ice was older than 4 to 5 years. Snow cover on the multiyear ice averaged 29 cm, while that on first-year ice averaged couly 8 cm deep. This difference may be related to enhanced sublimation of the snow on the thinner first-year ice. The salinity profiles of first-year ice clearly show the effects of ongoing brine drainage in that profiles from cores drilled later in the experiment are substantially less saline than earlier cores. This section examinations of crystal structure indicate that about 75% of the ice consisted of congelation ice with typically columnar type crystal structure. The remaining 25% consisted of granular ice with only a few occurrences of snow ice. The granular ice with only a few occurrences of snow ice. The granular ice with only a few occurrences of snow ice. The granular ice consisted primarily of frazil, found in small amounts at the top of flocs but mainly observed in multiyear ridges. The horizontally oriented crystal cases showed various degrees of alignment ranging from no alignment to strong alignments in which the alignment direction changed with depth, implying a change in floe orientation with respect to the ocean current at the ice-water interface during ice growth. Evidence of crystal retexturing was observed in the upper meter of nearly every multiyear core. This retexturing, consisting of grain boundary smoothing and nearly complete obliteration of the ice platelet-brine layer substructure, is attributed to summer warming.

MESOSCALE SEA ICE DEFORMATION IN THE EAST GREENLAND MARGINAL ICE

Leppăranta, M., et al. June 30, 1987, 92(C7), p 7060-

7070, 23 refs. Hibler, W.D., III

41-4261

ICE MECHANICS, DRIFT, ICE FLOES, ICE CON-DITIONS, MICROWAVES, OCEAN CURRENTS, ICE EDGE, ANALYSIS (MATHEMATICS)

ICE EDGE, ANALYSIS (MATHEMATICS)
In this paper, mesoscale (10 km) are kinematics data obtailed during the drift phase of the 1983 Marginal ke. Zone Experiment are analyzed. The measurements were made with a microwave transponder system accurate to better than 1 m. From the point of view of granular media theory, the nee pack was close to ideal. Over the scale of the array the pack was quite regular, with flores of relatively uniform size closely packed together. The main external

driving force for the ice was the ocean current. Simultaneous current measurements were made at three of the strain array sites. The ice behaved in a relatively rigid manner, with more shear than dilatation occurring. Least squares fits of the strain rate tensor showed the deformation field to be quite homogeneous. Superimposed on the rigid motion were smaller fluctuations with a spectrum falling off proportional to frequency to the power of -3/2 to -2. Close examination of individual strain lines showed rather discontinuous distance changes more representative of plastic slip rather than floe bumping. Although a substantial signal at the inertial period was present in the absolute drift, no clear peaks at this period occurred in the spectra of the strain rate tensor invariants. Analysis of the spatial variation of the underlying ocean currents revealed quite a different picture from that of the ice kinematics. In particular, the current from that of the ice kinematics. In particular, the current form that of the ice kinematics. Overall, the rigid interactive character of the compact ice cover prevented most of the differential ocean currents from being transferred to the differential ocean currents from being transferred to the differential ice inotion. differential ice motion

ROLE OF FLOE COLLISIONS IN SEA ICE RHEOLOGY. Shen, H.H., et al, June 30, 1987, 92(C7), p.7085-7096,

21 refs. Hibler, W.D., III, Lepparanta, M.

ICE MECHANICS, ICE FLOES, ICE EDGE, ICE DEFORMATION, STRESSES, RHEOLOGY, MATHEMATICAL MODELS, PACK ICE

MATHEMATICAL MODELS, PACK ICE.

A collisional rheology for an idealized two-dimensional flow of a fragmented ice field is derived. This fragmented ice field is modeled as an assembly of identical smooth disks. Collisions between neighboring disks are caused by the mean deformation field. These collisions transfer momentum which produces the internal stresses in the deformational energy, a relationship between the stress and strain rate is quantified. To demonstrate the essential idea, an analytical derivation is first given under quite restricted assumptions. A Monte Carlo simulation is then developed to provide a more general approach for the analysis. It is found that the collisional stresses are proportional to the square of disk diameter and the square of the deformation rate. The magnitude of stresses is also found to increase rapidly as the collisional restitution of disks increases. The collisional rheology yields zero tensile strength. The associated normal flow rule commonly used in the plastic. collisional rheology yields zero tensile strength, sociated normal flow rule commonly used in the plastic rheology is not valid in the collisional rheology. It is found that the collisional stresses are very small conse-

iound that the collisional sitesses are very small Consequently, the resulting stress divergence is estimated to be much lower than the air stress typically encountered in the marginal ice zone become singular as the maximum compactness is reached, indicating that a different mechanism may exist in that

MP 2243

COLD REGIONS ROOF DESIGN.

Tobiasson, W., Aug 1987, No.516, p.457-458. 41-4277

ROOFS, WATERPROOFING, ICING, SNOW SLIDES, DESIGN, MOISTURE, COLD WEATHER CONSTRUCTION, WATERSHEDS, CON-STRUCTION MATERIALS, DRAINAGE, POLAR REGIONS.

MP 2244

CHANGES IN THE SALINITY AND POROSITY OF SEA-ICE SAMPLES DURING SHIPPING AND STORAGE.

Cox, G.F.N., et al, 1986, 32('12), > 371-375, 7 refs., With French and German summaries

Weeks, W.F 41-4291

ICE SALINITY, POROSITY, SEA ICE, TRANS-PORTATION, STORAGE
A theoretical examination of salimity and porosity changes

introduced in sea-ice samples by brine expulsion and gas entrapment caused by thermal cycling during shipping and storage shows that in extreme cases such effects can be significant, resulting in 15% reductions in porouty (n). More representative scenarios give porosity changes of less than 2% which, assuming that ice-property variations scale with n(1,2), result in property variations of less than 1%

MP 2245

METHOD OF MEASURING LIQUID WATER MASS FRACTION OF SNOW BY ALCOHOL SO-LUTION.

Fish, D.J., 1986, 32(112), p.538-541, 3 refs. With French and German summaries 41-4311

WATER CONTENT. **SNOW** SNOW WATER CONTENT, UNFROZEN WATER CONTENT, TEMPERATURE MEASURING INSTRUMENTS, THEORIES, HI VI TRANSFER
A method of makes, "I'd measurements of the liquid water fraction of snow has been developed in which a snow sample in distolled in methanol to produce a temperature depression. The depression is linearly related to the liquid water content

A single operator can perform four of the snow sample. to five measurements per hour with a maximum absolute error of 1.0%.

MP 2246

VENTS AND VAPOR RETARDERS FOR ROOFS. Tobiasson, W., U.S. Army Cold Regions Research and Engineering Laboratory, 1986, 11p., Paper pre-sented at the Symposium on Air Infiltration, Ventila-tion and Moisture Transfer, Ft. Worth, TX, Dec. 1986. 41-4575

ROOFS, AIR LEAKAGE, MOISTURE, VENTILA-TION, INDOOR CLIMATES, HUMIDITY, WATER VAPOR, AIR TEMPERATURE, CON-DENSATION, COUNTERMEASURES.

MP 2247

DEVIATION OF GUIDELINES FOR BLASTING FLOATING ICE.

Mellor, M., Feb. 1987, 13(2), p.193-206, 12 refs.

ICE BLASTING, PROJECTILE PENETRATION, FLOATING ICE.

MP 2248

TRAILING-TIRE MOTION RESISTANCE IN SHALLOW SNOW.

Blaisdell, G.L., International Conference of ISTVS, 9th, Barcelona, Spain, Aug. 31-Sep. 4, 1987. Proceedings, Vol.1, Hanover, NH, International Society for Terrain Vehicle Systems (ISTVS), [1987], p.296-304, 6 refs.

SNOW STRENGTH, TRAFFICABILITY, VEHI-CLES, SNOW COVER, GROUND THAWING, TIRES, SNOW COMPACTION, VELOCITY, TIRES, TESTS.

Considerable attention has been given to the subject of motion resistance of tires traveling in virgin snow. Trailing tires (those that follow in the rut of a preceding wheel) are generally assumed to provide negligible motion resistance. Levels of resistance for trailing tires were measured with the CRREL Instrumented Vehicle operating in two snow conditions. Using this vehicle, two methods of measuring trailing tire resistance have been explored. Good agreement was found between the methods. A very different balance of leading-tire to trailing-tire resistance was also found for two snows. For both snows, it is seen that it is not appropriate to assume that trailing-tire resistance is negligible. e attention has been given to the subject of motion f tires traveling in virgin snow. Trailing tires

MP 2249 PNEUMATICALLY DE-ICED ICE DETECTOR— FINAL REPORT, PHASE 2, PART 1.

Franklin, C.H., et al, Ann Arbor, MI, Franklin Engineering Company, May 1986, 9p. + appends. Rogie, C.O., Vinton, C.S.

ICE DETECTION, ICE REMOVAL, EQUIP-MENT, ICE FORMATION, MEASURING IN-STRUMENTS, WIND FACTORS, ICE ACCRE-TION, LOADS (FORCES).

MP 2250 THEORY OF PARTICLE COARSENING WITH A LOG-NORMAL DISTRIBUTION.

Colbeck, S.C., July 1987, 35(7), p.1583-1588, With French and German summaries. 22 refs. 42-69

METALS, LOW TEMPERATURE TESTS.

MP 2251

CHEMICAL, PHYSICAL AND STRUCTURAL PROPERTIES OF ESTUARINE ICE IN GREAT BAY, NEW HAMPSHIRE.

Meese, D.A., et al, June 1987, 24(6), p.833-840, 5 refs. Gow, A.J., Mayewski, P.A., Ficklin, W., Loder, T.C. 42-66

ICE PHYSICS, ICE COMPOSITION, ICE STRUCTURE, SEA ICE, ESTUARIES.

MP 2252 FLOATING DEBRIS CONTROL; A LITTLAA-

TURE REVIEW. Perham, R.E., June 1987, REMR-HY-2, 22p. + 41p. of append, 18 refs.

TROL, WATER POLLUTION, DAMAGE, MAINTENANCE, EQUIPMENT, TESTS.

Plosting debris can have an extremely harmful effect on certain hydraulic structures such as flood control works and navigation facilities and is consequently an important concern in maintenance and repair activities

This report assembles navigation facilities and is consequently an important concern in maintenance and repair activities. This report assembles information found in published sources about equipment and methods used to control floating debris. Also included is an appendix on booms, their functions in the water transportation of pulpwood, and results of laboratory tests of various boom designs which was previously published by the Pulpand Puper Research Institute of Canada and which contains much uneful information applicable to booms for control of floating debris.

MP 2253 VIBRATION VIBRATION ANALYSIS OF THE YAMA-CHICHE LIGHTPIER.

Haynes, F.D., Apr. 1986, 1(2), p. 9-18, For another version see 40-1881. 14 refs. 42-100

IERS, VIBRATION, ICE LOADS, SHEAR TRENGTH, MATHEMATICAL MODELS, COM-PIERS. PUTER APPLICATIONS.

SPECTRAL MEASUREMENTS IN A DIS-TURBED BOUNDARY LAYER OVER SNOW Andreas, E.L., Aug. 1, 1987, 44(15), p.1912-1939, 96 refs 42-95

TURBULENT BOUNDARY LAYER, SNOW SUR-FACE, SNOW AIR INTERFACE, WIND VELOCI-TY, AIR TEMPERATURE, HUMIDITY.

TY, AIR TEMPERATURE, HUMIDITY.

Time series were measured of the turbulent fluctuations in longitudinal (u) and vertical (w) velocity and in temperature (t) and humidity (a) with fast-responding sensors in the near-neutrally stable surface layer over a snow-covered field. These series yielded individual spectra, u-w, w-t, w-q, and ey cospectra, and phase and coherence spectra for nondimensional frequences (Iz/U) from roughly 0.001 to 10. This, thus, one of the most extensive spectral sets ever collected over a snow-covered surface. With the exception of the u-w cospectra, all of the spectra and cospectra displayed the expected dependence on frequency in an inertial or inertial-convective subrange. At this complex site, turbulence alone determines the spectra and cospectra at high frequency, while at low frequency, the spectra and cospectra reflect a combination of topographically generated turbulence and, probably, internal waves. From the measured temperature and humidity spectra and the t-q cospectra, refractive index spectra for light of 0.55 micron and millimeter wavelengths were computed, the first such spectra obtained over snow. From the u, t and q spectra, the surface sensible (Hs) and latent (Hl) heat fluxes were estimated using the inertial-dissipation technique. Aspects of these computed and estimated values are discussed. (Auth, mod.)

OPTICAL PROPERTIES OF ICE AND SNOW IN

THE POLAR OCEANS. 1. OBSERVATIONS. Perovich, D.K., et al, 1986, Vol.637, Ocean optics 8. Edited by M A. Blizard, p.232-241, 38 refs. Maykut, G.A., Grentell, T.C.

ICE OPTICS, SNOW OPTICS, SEA ICE, BRINES, ALBEDO, SCATTERING, ICE SPECTROSCOPY, ICE COVER EFFECT, TEMPERATURE EF-FECTS.

FECTS. Optically sea ice is a complex material with an intricate and highly variable structure which includes brine pockets, air bubbles, brine channels and internal platelet boundaries Large variations in the optical properties of the surface layer can occur on horizontal scales of only a few meters, complicating efforts to quantify larger scale interactions between shortwave radiation and the ice-occan system. Radiative transfer in sea ice is dominated at visible wavelengths by scattering rather than absorption. Because scattering in the ice is essentially independent of wavelength, spectral variations in the optical properties are primarily the result of differences in absorption. Observations show that albedos are particularly sensitive to the presence of liquid water in the surface layers, the effect being most pronounced at wavelengths above 600 nm. Albedos and extinction coefficients in the ice vary inversely with brine volume, and wavelengins above oou nm. Albedos and estinction coefficients in the ice vary inversely with brine volume, and thus temperature. Below the eutectic point, precipitation of solid salts causes a sharp increase in scattering and corresponding increases in albedo and absorption. Biological sponding increases in albedo and absorption biological activity in natural sea ice often affects light transmission and absorption, particularly in coastal regions and in the southern ocean Phase function measurements indicate that the seattering distribution in sea ice is only weakly dependent on wavelength and brine volume

OPTICAL PROPERTIES OF ICE AND SNOW IN THE POLAR OCEANS. 2. THEORETICAL CAL-CULATIONS.

Grenfell, T.C., et al. 1986, Vol.637, Ocean optics 8. Edited by M.A. Blizard, p.242-251, 25 refs. Perovich, D.K.

ICE OPTICS, SNOW OPTICS, SEA ICE, ANAL-YSIS (MATHEMATICS). ALBEDO, SOLAR RADIATION, ICE MICROSTRUCTURE, BRINES, TEMPERATURE EFFECTS, GRAIN SIZE.

TEMPERATURE EFFECTS, GRAIN SIZE.
Radiative transfer models of sea i.e applied to date range from a simple Bouquere-Lambert representation for net downwelling irradiance through 16 stream models which takes into account detailed variations in ice microstructure. Both sea ice and snow are strongly multiple scattering media with single scattering albedos well above 0.9 through the visible and into the near infrared. Parameter studies indicate that the optical properties of sea ice are controlled by the density of brine and vapor inclusions which in general undergo substantial seasonal changes. Melting and brine draining are the principal causes of these variations. For ice below 5.0, temperature effects are relatively weak unless the

T(ice) drops below the eutectic point of snow depend primarily on grain size, the bulk density, and the presence of impurities such as carbon soot. The theoretical models appear to be able to reproduce observations quite well and have revealed that soot or dust contamination of snow appears to be prevalent even in the Arctic snow appears to be prevalent even in the Arctic.

OPTICAL CHARACTERIZATION OF SEA ICE STRUCTURE USING POLARIZED LIGHT TECHNIQUES.

Gow, A.J., 1986, Vol 637, Ocean optics 8. Edited by M.A. Blizard, p.264-271, 11 refs.

42-196 42-196
ICE OPTICS, RECRYSTALLIZATION, ICE
STRUCTURE, SEA ICE, POLARIZATION
(WAVES), ICE CRYSTAL STRUCTURE, BRINES,
ICE CRYSTAL SIZE, LIGHT TRANSMISSION,
REFLECTION, ICE SALINITY, ICE TEMPERA-TURE.

DRE.

Optical properties of sea ice depend to a greater or lesser extent on its crystalline properties and on the size, shape, and distribution of brine inclusions systematically trapped in the ice crystals. The use of polarized light techniques was demonstrated to examine the internal structure of sea ice. Using both naturally occurring and laboratory simulated sea ice we show how the crystalline and salinity components originate including discussion of the mechanisms by which first-year ice desalinates and recrystallizes into multi-year ice exhibiting optical properties significantly different from those of first-year ice.

MP 2258 PARAMETERS AFFECTING THE KINETIC FRICTION OF ICE.

Akkok, M., et al, July 1987, 109(3), p.552-561, Includes discussion by K. Itagaki and authors' closure. 19 refs.

Ettles, C.M.M., Calabrese, S.J., Itagaki, K.

42-202 ICE FRICTION, ICE SOLID INTERFACE, TEM-PERATURE EFFECTS.

OPTICAL SNOW PRECIPITATION GAUGE Koh, G., et al, Eastern Snow Conference, 43rd, 1986, 1987, p.26-31, 8 refs Lacombe, J.

SNOWFALL, PRECIPITATION GAGES, SNOW OPTICS, MEASURING INSTRUMENTS, DISTRI-

BUTION.

The most common quantitative measurement of falling snow is the precipitation rate. The time resolution of conventional mechanical snow gauges is poor, and their accuracy in measuring light snowfall is severely limited. An optical device designed to give an accurate instantaneous measurement of rain rate has been modified to operate in falling snow. Snow rates are inferred from statistical averages of intensity fluctuations caused by snow particles as they fall through a beam of light. Test results snow that the optical device is catternely sensitive to light snowfall and may be a significant improvement over mechanical techniques to measure snow precentiation rates. precipitation rates

MP 2260 ANALYSIS OF 112 YEARS OF ICE CONDI-TIONS OBSERVED ON THE OHIO RIVER AT CINCINNATI.

Daly, S.F., et al, Eastern Snow Conference, 43rd, 1986, 1987, p.70-79, 10 refs. Bilello, M.A.

42-218
RIVER ICE, ICE CONDITIONS, HYDROLOGY,
WATERSHEDS, STATISTICAL ANALYSIS, DEGREE DAYS, FREEZING, DAMS, LOCKS (WATERWAYS), UNITED STATES—OHIO RIVER.

TERWAYS), UNITED STATES—OHIO RIVER.

Daily tee conditions observed on the Ohio River at Cincinnation the winters of 1874-75 through 1985-86 were analyzed. The amount of tee on the river, except during particularly cold winters, has decreased since 1900. The decline has been especially significant starting around 1930. Investigation of the secenty of seea winter, using the number of freezing degree-days as an index, revealed no systematic temperature trends over the 112 years of recont. Associations between number of days with river tee and concurrent accumulated freezing degree-days over ,0- or 11-winter increments were investigated. The results showed that between the winters of 1934-35 and 1963-64 considerably more freezing degree-days were required to produce tee, but the trend has reversed slightly since then. This decreasing trend in observed tee has occurred during a period of basin development, as indicated by a sample population, the construction of large locks and dams, and an increase in nasigation tonnage on the trier. The increase in heated discharge into the river corresponding with baun development and the construction of large locks and dams have probably had the most significant impacts.

ALCOHOL CALORIMETRY FOR MEASURING THE LIQUID WATER FRACTION OF SNOW.

Fisk, D.J., Eastern Snow Conference, 43rd, 1986, 1987, p.163-166, 2 refs. 42-227

SNOW WATER CONTENT, TEMPERATURE MEASUREMENT, SNOW ICE INTERFACE, UNFROZEN WATER CONTENT, CALORIMETERS, LATENT HEAT, ICE VOLUME, SPECIFIC HEAT, MEASURING INSTRUMENTS.

MEASURING INSTRUMENTS.
Equipment and procedure have been devised for measuring the liquid water/ice ratio of snow. The measurement is based on the temperature depression observed on dissolving a 25 g snow sample at 0 C in 80 g methanol at 0 C. The masses of the sample and alcohol are held constant, and the heat of solution of 25 water in 80 g methanol at zero deg is constant, so the or / variable is the water/ice ratio in the sample. The solution process occurs quickly enough that it is essentially adiabatic. The latent heat ratio in the sample. The solution process occurs quickly enough that it is essentially adiabatic. The latent heat of fusion of up to 8.3 g ice is supplied by the heat of solution of the water in the alcohol. The heat of fusion of any sce above 8.3 g is supplied by a decrease in the solution temperature. Since the total latent heat of fusion varies linearly with ice content, and the solution specific heat is virtually constant, the final solution temperature also varies linearly with sample ice content.

MP 2262

INTERCOMPARISON OF SNOW COVER LIQ-UID WATER MEASUREMENT TECHNIQUES. Boyne, H.S., et al, Eastern Snow Conference, 43rd, 1986, 1987, p.167-172, 8 refs.

Fisk, D.J. 42-228

SNOW WATER CONTENT, SNOW COVER, UN-FROZEN WATER CONTENT, TEMPERATURE MEASUREMENT, MELTWATER, TESTS.

remote sensing * stems operating the microwave and millime-ter wave region of the electromagnetic spectrum. Recently, an alcohol calorimeter method of measuring liquid water has been reported which is simpler than the freezing calorimeter. It is of interest to intercompare the two methods to show equivalence and to assess the errors of each. The intercomparison was made in a laboratory cold room with homogeneous anow having a mass liquid water content from 0% to 15%. The intercomparison shows that the two methods are equivalent and that the experimental errors associated with the measurements are consistent with what is expected from an error analysis of each method.

MP 2263 PAVEMENT ICING DETECTOR—FINAL RE-PORT.

Goldstein, N., et al, Contract No.DACA33-86-G-0014, Burlington, MA, Spectral Sciences, Inc., Jan. 1987, 26p. + append., Prepared for USA CRREL reis.

Richtsmeier, S.C. 42-274

42-274

ROAD ICING, PAVEMENTS, ICE DETECTION, ICE FORMATION, MEASURING INSTRUMENTS, DESIGN, SAFETY, EXPERIMENTATION, NOISE (SOUND).

MP 2264 EXOTHERMIC CUTTING OF FROZEN MATERIALS Garfield, D.E., et al, Aug. 1987, 14(2), p.181-183, 2

refs.

42-288

ICE CUTTING, GROUND THAWING, MELTING, GRAVEL, FROZEN GRO SANDS, EQUIPMENT, HEAT SOURCES. GROUND.

SANDS, EQUIPMENT, HEAT SOURCES.
A commercially available cutting torch which uses consumable steel cutting rods was evaluated for cutting ice, and frozen sand, gravel, and silt. This relatively simple, lightweight torch was envis med to have potential applications for producing shallow small-diameter holes in frozen ground for anchors, grounding rods, guy wire stakes, etc. Specific energies for cutting the frozen materials compared reasonably well with other thermal processes, but as espected, were much higher (i.e. less efficient) than mechanical cutting processes. Major advantages of the torch include portability, short setup time, and its ability to melt a variety of materials.

MP 2265

42-1194

SNOW METAMORPHISM AND CLASSIFICA-TION.

Colbeck, S.C., NATO Advanced Institute on Seasonal Snowcovers: Physics, Chemistry, Hydrology, Les Arcs, France, July 13-25, 1986. Proceedings. Edited by H.G. Jones and W.J. Orville-Thomas. Seasonal snowcovers: physics, chemistry, hydrology, Dordrecht, Holland, D. Reidel Publishing Co., 1987, p.1-35, Refs. p.29-35. 42-1148

METAMORPHISM (SNOW), ICE CRYSTAL GROWTH, WATER VAPOR, WATER FLOW, ISO-TOPES, CLASSIFICATIONS.

The flow of water vapor in dry snow and crystal growth from the vapor are reviewed to provide a basis for understanding the metamorphism of dry snow. The movement of isotopes with the vapor is also described. The growth of grains in water-saturated snow is described in some detail b.cause it is the best known example of metamorphism.

Grain clusters and melt-freeze grains dominate wet snow
at low liquid contents. After the principles and observations
are all described, a snow classification :cheme is proposed MP 2266

TECHNOLOGY AND COSTS OF WASTEWATER APPLICATION TO FOREST SYSTEMS.

Crites, R.W., et al, Institute of Forest Resources, Contribution No.56, Forest Land Applications Symposi-um, Seattle, WA, June 25-28, 1985. Proceedings. Edited by D.W. Cole, C.L. Henry and W.L. Nutter. Forest alternative for treatment and utilization of municipal and industrial wastes, Seattle, WA, University of Washington Press, 1986, p.349-355, 14 refs. Reed, S.C.

WASTE TREATMENT, FOREST LAND, WATER TREATMENT, LAND RECLAMATION, IRRIGATION, COST ANALYSIS, MAINTENANCE.

TION, COST ANALYSIS, MAINTENANCE.
Land treatment of menicipal wastewater on forest land has been practiced experimentally for over twenty years and on a full-scale basis for over ten. The technology of land application consists of sprinkler systems have been installed in existing forests using either buried or aboveground laterals. Desing guidance for sprinkler spacing and operating pressures for solid-set systems in forests is presented. Costs of installed forest land application systems are also given. Costs and design factors are reviewed for systems at Snoqualniic Pass, Washington; Wolfeboro, New Hampshire; Lake of the Pines, California; Clayton County, Georgia; West College, Pennsylvania. Operation and maintenance costs are provided for systems at Clayton County, Georgia; West Dover, Vermont, and Kennett Square, Pennsylvania. Reduction of the cost of future systems can be accomplished by minimizing the amount of effluent storage provided. Most forest systems can operate with thirty days storage or less. New technology and new plantations can allow reductions in the cost of wastewater application. Potential revenue from tree harvest can also reduce overali costs. MP 2267

MP 2267 FROST ACTION PREDICTIVE TECHNIQUES: AN OVERVIEW OF RESEARCH RESULTS. Johnson, T.C., et al. 1986, No.1089, p.147-161, 30

refs. R.L., DiMillio, A.

42-435 FROST ACTION, FROST HEAVE, THAW WEAT ENING, FROST RESISTANCE, FREEZE THAW TESTS, SOIL FREEZING, TESTS, FREEZE THAW CYCLES, MODELS.

CYCLES, MODELS.

A 6-year research program has materially advanced the state of knowledge regarding frost heave and thaw weakening affecting roads and airfield pavements. The investigations included development and performance of laboratory tests, development of computer models, testing and data collection at field pavement test sites, and validation of the laboratory procedures and computer models against field data. Specific advances include development of a new freezing test to assess the frost susceptibility of soil, development and validation of a mathematical model serving to predict frost beave and thaw consolidation: development of a laboratory test procedure to determine the resilient inodius of forcen, thawerd, and recuvering granular soils, and conceptualization and testing of a technique for combining the frost heave and thaw consolidation model, the laboratory resilient roudulus test, and a pavement response model to predict the refulnear resilient modulus of granular sels and base course materials as variables in time and space as variables in time and space

MP 2268

MILITARY SNOW REMOVAL PROBLEMS. Minsk, L.D., Aug. 1987, 79(516), p.452-453.

SNOW REMOVAL, MILITARY OPERATION

MP 2269

BIT DESIGN IMPROVES AUGERS. Sellmann, P.V., et al, Aug. 1987, 79(516), p.453-454 Brockett, B.E.

AUGERS, FROZEN GROUND,

MP 2270

GROUND FREEZING CONTROLS HAZARD-OUS WASTE.

Iskandar, I.K., Aug. 1987, 79(516), p.455-456. 42-675

FREEZING, ARTIFICIAL FREEZING, WASTE DISPOSAL.

FROST JACKING FORCES ON H AND PIPE PILES EMBEDDED IN FAIRBANKS SILT. Johnson, J.B., Mar. 1984, AK-RD-84-13, 42p. + appends., For another version see 40-676. 19 refs. 42-679

FROST HEAVE, PILE EXTRACTION, PERMA-FROST DISTRIBUTION, THERMOPILES, ANAL-YSIS (MATHEMATICS), TEMPERATURE EF-FECTS, FROZEN GROUND MECHANICS, COUNTERMEASURES, FROST PENETRATION.

MP 2272

BRITTLENESS OF REINFORCED CONCRETE STRUCTURES UNDER ARCTIC CONDITIONS. Kivekas, L., et al., 1985, No.4, p.111-121, 5 refs. For another version see 41-213 (CR 86-02).

Korhonen, C.

REINFORCED CONCRETES, CONCRETE STRENGTH, LOW TEMPERATURE TESTS, LOADS (FORCES), BRITTLENESS, CONCRETE STRUCTURES, IMPACT STRENGTH.

The behavior of reinforced and unreinforced concrete beams was studied under impact load at low temperatures, and the results were compared with the behavior of reinforcing steel in the Charpy-V impact-tests. Transition temperatures as high as -30 C were obtained in the Charpy-V test whereas at temperatures as low as -63 C no brittle failure occurred in the concrete beams, even in those beams where the rebars were intentionally notched. The impact strength of the relief and reserved constitutions of the strength and the strength of the strength as the strength of the of unreinforced concrete increased considerably at lower temperatures.

MP 2273

RIVER ICE MAPPING WITH LANDSAT AND VIDEO IMAGERY. Gatto, L.W., et al, William T. Pecora Memorial Symposium on Remote Sensing, 11th, Sioux Falls, SD, May 5-7, 1987. Proceedings, Silver Spring, MD, Institute of Electrical and Electronics Engineers, Com-

puter Society Press, 1987, p.352-363, 10 refs. Daly, S.F., Carey, K.L.

42-1526 RIVER ICE. ICE CONDITIONS, REMOTE SENS-ING, MAPPING, LANDSAT, AERIAL SURVEYS, PHOTOGRAPHY, ICE NAVIGATION.

PHOTOGRAPHY, ICE NAVIGATION.

As part of the Corps of Engineers River Ice Management Program, Landsat imagery and low-altitude video imagery were used to map ice conditions along the Ohio, Allegheny, Monongahela, Illinois, and Kankakee Rivers. The imagery was analyzed using photointerpretation techniques. Landsat imagery was used to map river ice from 1972 through 1984. The video imagery was used from 1984 to 1987. Ice conditions on these rivers can change rapidly, often daily, and the areal extent of ice is typically greatest from mid-Jan to mid-Feb. In spite of the small-scale and limited coverage of Landsat imagery, it is useful for analysis of general river ice conditions, especially during severe winters when ice becomes extensive. Video imagery is an economical means of documenting river ice conditions, although cloud cover, inclement weather, and low ceilings restrict opportunities for more frequent coverage. It also can provide near-real-time data when extreme ice conditions cause navigation emergencies. navigation emergencies.

MP 2274

ARCTIC MARINE NAVIGATION AND ICE DY-

NAMICS—SUMMARY FINDINGS.
Weeks, W.F., Arctic marine technology—Airlie House Workshop, Warrenton, VA. Feb. 26-28, 1973. (Proceedings). Washington, D.C., (1973), p.86-99.

ICE NAVIGATION, ICE MECHANICS, SHIPS, MARINE TRANSPORTATION, VEHICLES, EN-VIRONMENTAL IMPACT, METEOROLOGY.

MP 2275

BASELINE ACIDITY OF PRECIPITATION AT THE SOUTH POLE DURING THE LAST TWO MILLENNIA.

Cragin, J.H., et al, Aug. 1987, 14(8), p.789-792, 38

Giovinetto, M.B., Gow, A J.

ICE COMPOSITION, FIRN, CHEMICAL PROP-ERTIES, ANTARCTICA AMUNDSEN-SCOTT STATION.

Measurements of meltwater pH from annual layers of South Pole firn and ice samples ranging in age from 40 to 2000 years BP show that precipitation at this remote site has a higher natural acidity than that expected from atmospheric

equilibrium with CO2 The average pH of deaerated (CO2-free) samples was 564, while air-equilibrated samples averaged 537, a pH that is about a factor of two more acidic than the expected background pH of 565. The observed "excess" acidity can be accounted for by sulphur and nitrogen cation levels in the samples originating from non-anthropogenic H2SO4 and HNO3 Because of the presence of these naturally occurring acids in South Pole precipitation, a pH of 5.4 is considered a more representative baseline reference pH for acid precipitation studies. (Auth)

MP 2276 METEOROLOGICAL INSTRUMENTATION FOR CHARACTERIZING ATMOSPHERIC IC-INC

Bates, R.E., et al. June 1987, No 3439, International Workshop 10n1 Atmospheric Icing of Structures, 2nd, Trondheim, Norway, June 19-21, 1984 Proceedings. Edited by M. Ervik, p.23-30, 4 refs., Includes discussion.

Govoni, J.W. 42-923

ICING, STRUCTURES, METEOROLOGICAL FACTORS, HOARFROST, GLAZE, FROST, MEASURING INSTRUMENTS, ICE DETECTION.

SURING INSTRUMENTS, ICE DETECTION.

The accumulation of rime and glaze ice on structures depends on meteorological variables such as wind, precipitation rate, air temperature, fog density and atmospheric moisture content. However, highly accurate measurements of meteorological variables during periods of icing (including wet shows) that occur in the cold regions of the world are for the most part unavailable due to instrumentation failure or geographic remotences. For the last 5 years, USACRREL has been modify:

—csting, and utilizing state-of-the-art sensors and received systems for measuring winter environmental condition.

—paper discusses meteorological sensors (including ice detectors) seed in adverse cold environments, including the mountaingous areas of the northeastern United State. ice detectors, used in adverse cold environments, including the mountar outs areas of the northeastern United States. One of the state-of-the-art site-specific sensor packages, the newly developed Environmental Instruments Model 200 Dual Processor Meteorological System has been thoroughly evaluated during periods of adverse weather and icing. The system has no moving parts, but incorporates two static pair heated resistive sensing elements for measuring wind speed and direction, a platinum resistance thermometer for temperature, and a pressure transducer for atmospheric pressure. Results obtained and problem areas encountered using a number of different sensors in adverse weather conditions at both the CRREL spos-field experiment test sites. tions at both the CRREL snow-field experiment test sites and high elevation winter icing experiment sites are discussed

MP 2277

ICE DETECTOR MEASUREMENTS COM-PARED TO METEOROLOGICAL PARAME-TERS IN NATURAL ICING CONDITIONS. Tucker, W.B., et al, June 1987, No 3439, International

Workshop 10n3 Atmospheric Icing of Structures. 2nd, Trondheim, Norway, June 19-21, 1984 Proceedings. Edited by M. Ervik, p.31-37, 18 refs. Includes discussion.

Howc, J.B.

12-724
ICE DETECTION, ICING, ICE ACCRETION, STRUCTURES, AIR TEMPERATURE, WIND VELOCITY, UNFROZEN WATER CONTENT, CLOUD DROPLETS, MEASURING INSTRU-

CIOUD DROPLETS, WEASURING INSTRU-MENTS.

Several seasons of using data have been collected under natural using conditions on the summit of Mt Washington. New Hampshire Two models of the Rosemount Ice Detector were evaluated in the contest of providing using intensity data under various conditions. Average temperature, with speed, liquid water content and median droplet diameter were also recorded for each using event, the latter two parameters being provided by rotating muticipanders. A measure of ising rate has been calculated from the liquid water content and the wind speed, and has been compared to the ice detector cycling rates. For detectors with long heat-on times the upper limit invasumme cycling rates of the detector with long heat-on times also exhibits problems at higher temperatures. At environmental temperatures are freezing, the probe takes considerable time to zool below freezing and begin to again accumulate ice. Thus arisatinum cycle rate is reached under these conditions which can be well below the actual scing rate. Under prolonged scing conditions, see accumulations on the unheated parts of the probe and support structure can interfere with the artflow past the probe, significantly changing the collection efficiency. Under extreme conditions, this can result in a complete lack of cycling. The problems associated with annication Under extreme conditions, this can result in a complete lack of cycling. The problems associated with application of the ice detector cycling rates as a measure of accretion rates on more complex objects are also discussed. In particular, the fact that the collection efficiency is so alrongly dependent on the droplet size distribution may until is

SELF-SHEDDING OF ACCRETED ICE FROM HIGH-SPEED ROTORS.

Itagaki, K., June 1987, No.3439, International Workshop jong Atmospheric Icing of Structures, 2nd, Trondheim, Norway, June 19-21, 1984. Proceedings, Edited by M. Ervik, p.95-100, 18 refs, Includes dis-

ICING, PROPELLERS, HELICOPTERS, ICE ACCRETION, SUPERCOOLED FOG, ICE REMOVAL, ICE ADHESION, TEMPERATURE EFFECTS, COUNTERMEASURES, ICE COVER THICKNESS, TENSILE PROPERTIES.

NESS, TENSILE PROPERTIES.

Ice accreted on high-speed rotors operating in supercooled fog can be thrown off by centifugal force, creating severe unbalance and dangerous projectiles. A simple force balance analysis indicates that the strength of accreted ice and its adhesive strength can be obtained by measuring the thickness of the accretion, the location of the separation, the rotor speed and the density. Such an analysis was applied to field and laboratory observations of self-shedding events. The results agree reasonably well with other observations. MP 2279

COMPUTER MODELING OF ATMOSPHERIC ICE ACCRETION AND AERODYNAMIC LOAD-ING OF TRANSMISSION LINES.

Egelhofer, K.Z., et al. June 1987, No.3439, International Workshop (on) Atmospheric Icing of Struc-tures, 2nd, Trondheim, Norway, June 19-21, 1984. Proceedings. Edited by M. Ervik, p.103-109, 12 refs., Includes discussion.

Ackley, S.F., Lynch, D.R. 42-934

12-934
ICE ACCRETION, POWER: INE ICING, TRANSMISSION LINES, WIND PP SSURE, ANALYSIS
(MATHEMATICS), AIR FLOW, COMPUTER APPLICATIONS, ICE FORECASTING, MODELS, SUPERCOOLING

SUPERCOOLING.

A time-dependent computer model capable of predicting the accretion of rime ice on a wire free to rotate is desembed. A finite element technique is used to obtain the air velocity field adjacent to the wire. A local collision efficiency is calculated for several radial sectors of the wire by tracking supercoored water droplets of various sizes until they collide with the wire. The asymmetric buildup of ice causes the wire to rotate, changing the flow field around the wire and the rate of ice accretion. The finite element technique is a very effective method of analyzing this problem because the ice accretion shape is not limited to a simple geometric shape. The drag force is computed as a function of time to investigate the forces acting on the wire during an icing event. Model results are presented including compansions of icing simulations of wires of various rigidities and lengths.

MP 2280

MP 2280

FOREST LAND TREATMENT WITH MUNICIPAL WASTEWATER IN NEW ENGLAND.
Reed, S.C., et al, Institute of Forest Resources, contribution No 56. Forest Land Applications Symposium, Seattle, WA. June 25-28, 1985. Proceedings Editati Seattle, WA, June 25-28, 1985. Proceedings Edit-ed by D.W. Cole, C.L. Henry and W.L. Nutter. For-est alternative for treatment and utilization of municipal and industrial wastes, Seattle, WA, University of Washington Press, 1986, p.420-430, 12 refs. Crites, R.W.

WASTE TREATMENT, WATER TREATMENT, FOREST LAND, LAND RECLAMATION, DE-SIGN, WATER POLLUTION, COUNTERMEAS-LIRES

URES.

An overview of several case studies of forest and treatment with municipal wastewiter in New England is presented. One of the earliest land treatment systems in this area in modern times was installed in 1971 by the state of New Hampshire at Sunapee State Park, in a mature forest of mixed hardwoods and conities. The system is in excellent condition, and continued operation is planned for the foresceable future. Municipal forest land treatment systems are also operating successfully at West Dover Vermont, Wol feboto, New Hampshire and Greenville, Maine. Design and operating information is provided for all 4 systems. For West Dover the energy consumption is evaluated and the treatment performance is documented. West Dover operates thoughout most winters with minimal storage. The improvements in water quality at several of these systems are also discussed and a method for estimating phosphorus removal is described. removal is described

MP 2281 DETECTING UNDERGROUND OBJECT-S/UTILITIES.

Hironaka, M.C., et al, Workshop jong Facilitating Technology Advancement in the U.S. Construction Industry, Austin, TX, Oct. 28-29, 1987. Proceedings, Proceedings. (1987), p 36-43, 3 refs Bigl, S R

UNDERGROUND FACILITIES, DETECTION, RADAR ECHOES, MEASURING INSTRU-MENTS, PENETRATION TESTS

Hand-held detectors and ground penetrating radar systems have been field evaluated to determine their effectiveness in locating underground objects and utilities. The hand-held detectors are limited to locating either metallic or nonmetallic (by radio transmitter) lines and are best suited to tracing such lines. To trace such lines, at least a vague idea of their location must be known or a point of physical access must be available. Ground penetrating radar (GPR), on the other hand, has the capability to detect both metallic and nonmetallic objects without prior knowledge of their presence. However, as presently configured, GPRs have certain deficiencies that resulted in poor performance in field evaluation tests. The best system detected only 60% of the metallic and 36% of the nonmetallic objects that were present in our test site. We therefore have development efforts underway or completed to improve the capabilities of GPRs. These efforts include optimum GPR source signal, high-power focused antinna, and signal processing-image reconstruction software. image reconstruction software.

MP 2282 INFRARED TESTING FOR LEAKS IN NEW ROOFS.

Korhonen, C., Workshop ton; Facilitating Technology Advancement in the U.S. Construction Industry, Austin, TX, Oct. 28-29, 1987. Proceedings, (1987), p.49-54, 4 refs. 42-968

ROOFS, LEAKAGE, INFRARED RECONNAIS-SANCE, MOISTURE DETECTION, THERMAL INSULATION, TEMPERATURE VARIATIONS.

INSULATION, IEMPERATURE VARIATIONS.
Newly constructed roofs can develop leaks as soon as they are built, but these leaks may not manifest themselves insude the building until after the warranty has expired High resolution infrared scanners can be used during the warranty period to locate the wet insulation resulting from these leaks. When combined with detailed visual examination, infrared surveys can help to determine who is responsible for the leak. If the leak is the result of a design or workmanship error, then the building owner is saved the expense of pursuing remedial repairs on a new toof. temedial tenaits on a new tool.

MP 2283 COMPARISON OF SNOW COVER LIQUID WATER MEASUREMENT TECHNIQUES.

Boyne, H S., et al. Oct 1987, 23(10), p 1833-1836, 19 refs.

Fisk, D.J.

SNOW WATER CONTENT, UNFROZEN WATER CONTENT, SNOW MECHANICS, MELTWATER, MICROWAVES, REMOTE SENSING, TEMPERATURE MEASUREMENT, SEEPAGE.

The amount and distribution of liquid water are important for assessing the mechanical strength, meltwater generation, and meltwater transmission in snow. Liquid water also has a profound effect on the performance of active anipassive remote sensing systems operating in the microwave and millimiter wave region of the electromagnetic spectrum. New methods of measuring liquid water have been reported which show considerable promise. Our purpose is to address the question of measurement equivalence by comparing the three direct methods of freezing calorimetry, and didution and by comparing the precision of a calibrated capasitance probe with one of the direct methods. All comparisons were made in a laboratory cold from with snow having a mass liquid water content of 0-14 mlg per 100 mlg of snow. However, the operational achievement of equivalence is strongly dependent on a variety of factors such as sample size, missing of snow and working fluid, and operator skill. The amount and distribution of liquid water are important

MP 2284 CLIMATOLOGY OF RIME ACCRETION IN THE

GREEN AND WHITE MOUNTAINS.
Ryerson, C.C., Conference on Mountain Meteorology,
4th, Seattle, WA, Aug. 25-28, 1987 [Proceedings]. Boston, MA. American Meteorological Society, 1987. p 267-272, 9 refs 42-997

ICING, ICE ACCRETION, HOARFROST, MOUN-TAINS, CLIMATOLOGY, STATISTICAL ANAL-

MP 2285 METEOROLOGICAL SYSTEM PERFORM-ANCE IN ICING CONDITIONS.

Bates, R. r., Electro-Optical Systems Atmospheric Effects Library Tactical Weather Intelligence (EOSA-EL, TWI) Conference, "th. Las Cruces, 'Nd, Dec 2-4, 1986 Proceedings, U.S. Army Atmospheric Sciences Laboratory, 1987, p. 73-86, 5 refs

ICE FORMATION, ICING, METEOROLOGICAL INSTRUMENTS, HOARFROST, MODELS, CLI-MATIC FACTORS, AIR TEMPERS MATIC FACTORS, AIR FREEZE THAW CYCLES

Adverse weather that induces imming and glate formations severely affects most conventional meteorological field sentors and frequently causes system famore. Such conditions include temperatures mean or put below freeing, finite precipita-

tion and excessive humidity. These conditions usually accor pany major synoptic events which in most cases go unrecorded because of 1) the remoteness of the high elevations where extreme icing and wind normally occur, and 2) the failure of the instrumentation required to characterize the

EXTINCTION COEFFICIENT FOR A DISTRI-BUTION OF ICE FOG PAPIICLES.

Jordan, R., Electro Optical Systems Atmospheric Ef-Fortam, R., Electric Optional Systems Antiospheric El-fects Library/Tactical Weather Intelligence (EOSA-EL/TWI) Conference, 7th, Las Cruces, NM, Dec. 2-4, 1986. Proceedings, U.S. Army Atmospheric Sciences Laboratory, 1987, p.527-539, 15 refs. 42-1039

ICE FOG, INFRARED RADIATION, ELECTRO-MAGNETIC PROPERTIES, ATTENUATION, PARTICLE SIZE DISTRIBUTION, MATHEMATI-CAL MODELS.

CAL MODELS.

An approximation model is derived for the attenuation of visible and infrared radiation through ice fog. Assuming spherical particles and single scattering, a formula for estimating the extinction efficiency factor has been developed by combining the approaches of Hart-Montroll and Nussenziverg-Wiscombe. With the use of a Maxwell function to describe the size distribution of ice fog particles, a theoretical integration over the distribution, is possible. The resulting extinction coefficient is a function of the mode radius of the distribution, the wavelength of the incident radiation, and the complex refractive index of ice. Its simple formulation provides an efficient means of scaling infrared to visible attenuation.

MP 2287

INTENSITY OF SNOWFALL AT THE SNOW EX-PERIMENTS.

Bates, R.E., et al. Electro-Optical Systems Atmospheric Effects Library/Tactical Weather Intelligence (EOSAEL/TWI) Conference, 6th, Las Cruces, NM. Dec. 3-5, 1985. Proceedings, White Sands Missile Range, U.S. Army Atmospheric Sciences Laboratory, Feb. 1986, p.205-217, 7 refs.

G.G. King. 42-1062

SNOWFALL, SNOW WATER EQUIVALENT, MILITARY OPERATION, SNOW ACCUMULA-TION, VISIBILITY, SNOWSTORMS, REMOTE SENSING.

SENSING.

Snowfall intensities are currently classified by the National Weather Service Meteorological stations as "light, moderate and heavy" using visibility as a criterion. However, snowfall occurs with other obscurants, such as fog, making it extremely difficult to determine the actual snowfall intensity, therefore any enterior dependent on visibility alone should only be used as a guide. This paper presents a more quantitative method of determining snowfall using snow depth accumulation rate (cm/hr) and total hourly water equivalent (mm) is criteria. Intensive snowfall accumulation rates and water equivalent amounts were determined at the SNOW experiments at Fort Ethan Allen, Vermont, during the winters of 1980-81 and 1921-82, and at Camp Crayling, Michigan, during the winters of 1983-84 and 1984-85. These data are used to validate the preliminary snowfall intensity medel are used to validate the preliminary snowfall intensity model

MP 2288

PERSPECTIVES IN ICE TECHNOLOGY.

Ashton, G.D., [1986], 4p. Keynote address delivered at the International Conference on Ice Technology, MIT, June 10-12, 1935 (Unpublished manu-42-i 372

ICE PHYSICS, RESEARCH PROJECTS, ENGI-NEERING, ICING, ICE COVER.

MP 2289

EFFECT OF ICE-FLOE SIZE ON PROPELLER TORQUE IN SHIP-MODEL TESTS.

Tatinclaux, J.C., American Towing Tank Conference, 21st, Washington, D.C., Aug. 5-7, 1986. Proceed-ings. Edited by R.F. Messalle, Washington, D.C., National Academy Press, 1987, p.291-298, 4 refs. 42-1352

ICE LOADS, PROPELLERS, ICE NAVIGATION. ICE FLOES, ICE CONDITIONS, ICE SOLID IN-TERFACE, VELOCITY, ICE DENSITY, FRIC-TION, TESTS.

TION, TESTS.

Results of a laboratory study on sce-propeller interaction conducted with a model sechecaker are presented. The tests were made in sec-free water, precut channels with regularly shaped see flores of different sizes, and breat-filled ex channels. The test results showed that the propeller torque and its standard desistion increased with both see flore size and ship speed. The dominant frequency in the torque fluctuations was found to be either the propeller speed or the ratio of stap speed to flore width. The effect of tee ingestion on propeller thinst could not be determined because of malfunction of the thinst component of the peopeller Jayamometer. The results suggest that difference in see density and in sechull fraction coefficiarin between model tosts and full scale tituls may be at least partially responsible for the lack of agreement between reque and powering requirements predicted from model propusion test results and those measured during full-scale tituls.

MP 2290

CONFIDENCE IN HEAT FLUX TRANSDUCER MEASUREMENTS OF BUILDINGS.

Flanders, S.N., 1985, 91(1), p.515-531, 12 refs

42-1375 HEAT TRANSFER, BUILDINGS, HEAT FLUX. TEMPERATURE MEASUREMENT, MEASUR-ING INSTRUMENTS.

ING INSTRUMENTS.

Confidence in the validity of heat flux transducer (HFT) measurements is sufficiently high that ASTM is preparing a standard practice for the use of HFTs on buildings. A key issue the standard practice will address it how to adjust the calibration of the HFT to the thermal environment of the measurement. Confidence in the use of HFTs is based in part on a propaga in of error analysis of key thermal influences on the accuracy of measurement. The user can expect the HFT to render a standard deviation of 10% of the heat flux measured. Field measurements confirm this expectation. However, the variety of heat flux mechanisms inherent in building construction requires continum this expectation. However, the variety of first mechanisms inherent in building construction requires that the investigator choose the measuring situation carefully. Convection, even in "fully insulated" spaces, can cause unexpected lateral heat flux and results that are difficult to interpret. More werk should be done with HFTs to investigate convection in walls and attics, as well as to investigate either lateral heat thus transfer mechanisms. other lateral heat flux transfer mechanisms

MP 2291

PREVIEW OF THE SNOW-III WEST DATA BASE.

Lacombe, J., July 1987, SR 87-12, Snow Symposium, 6th, Hanover, NH, Aug. 1986 Proceedings, p 3-11, AD3-115 486, 5 refs.

42-1404 SNOW PHYSICS. MILITARY OPERATION. LIGHT TRANSMISSION. INFRARED RECON-NAISSANCE, VISIBILITY, METEOROLOGICAL FACTORS, DETECTION, SNOWFALL, PRECIPI-TATION GAGES.

Reduction of data recorded at the SNOW-III West field experiment is complete and a summary report is now being written. A preview of the organization and contents of the upcoming report is given in this paper

MP 2292

SCAVENGING OF INFRARED SCREENER EA

5763 BY FALLING SNOW. Cragin, J H., et al, July 1987, SR 87-12, Snow Symposium, 6th, Hanover, NH, Aug. 1986. Proceedings, .13-20, ADB-115 486, 4 refs.

p.13-20, ... Hewitt, A.D.

SNOWFALL, INFRARED RADIATION, LIGHT SCATTERING, SNOW CRYSTALS, AEROSOLS, VISIBILITY, ICE CRYSTALS, PRECIPITATION (METEOROLOGY), WIND VELOCITY, TESTS, CLOUD DISSIPATION.

Field tests conducted with EA 5°63 in Hanover, NH, Hollis, ME and E. Corinth, VT show that an order of magnitude more sereener is fermoved and deposited at the surface within 30 m downwind during anomafall than under clear-air conditions. Relative amounts of sereener deposited by diffusion gravitation. Relative amounts of screener deposited by diffusion gravitation under clear conditions were inversely proportional to the wind speed above a threshold value of about 1 m/s. A direct linear relationship exists between the miss precipitation rate and the fraction of smoke cloud scavinged by stellar, spatial dendritie, and clustered snow crystals. The scaving sig efficiency locus not appear to depend strongly on snow or ice crystal type although scatter in the data and the limited number (6) of texts may have masked any relationships. Snow is four to five times more efficient than raindrops in scavenging. EA. 5°63 from smoke clouds.

MP 2793

HUMIDITY AND TEMPERATURE MEASURE-MENTS OBTAINED FROM AN UNMANNED AERIAL VEHICLE

Ballard, H., et al. July 1987, SR 87-12, Snow Symposium, 6th, Hanover, NH, Aug. 1986 Proceedings p.35-45, ADB-115-486, I ref. Izquierdo, M., McDonald, C., Smith, J., Cogan, J., Tibuni, F., Greeley, H.P., 23,1407

42-1407

METEOROLOGICAL. INSTRUMENTS. TEMPERATURE, HUMIDITY, AIRPLANES, MEASURING INSTRUMENTS, TESTS, TEM-PERATURE EFFECTS, ACCURACY

PERATURE EFFECTS, ACCUMACY A small, high-tweight, low-power consuming instrument de-signed to measure aimospheric temperature and relative humid-ity from an instrument obtained from the UAV was faght texted. The measurements obtained from the UAV instrument were compared with time obtained from haloson borne instrument were from halosons were insuched prior to and just after the UAV fights. Although the measurement accuracy of the UAV instrument could not be exisbathed during these texts, the temperature and relative humidity strations noted were con-sistent with those obtained from the hanoson instruments the temperature variations conformed in the carected strike The temperature variations conformed to the expected apperates. Laboratory tests on the performance of the instrument package under varing, particularly cold, temperatures were conducted to determine the environmental effects on instra-ment sensitivity, accuracy and time constants. Resolved of three texts are presented.

MP 2294 ACOUSTIC-TO-SEISMIC COUPLING THROUGH A SNOW LAYER.

Peck, L., July 1987, SR 87-12, Snow Symposium, 6th, Hanover, NH, Aug. 1986. Proceedings, p.47-55,

ADB-115 486. 42-1408

ACOUSTICS, SNOW COVER EFFECT, SEIS-MOLOGY, SOUND WAVES, SOIL MECHANICS, MILITARY OPERATION, FROST PENETRA-TION, EXPERIMENTATION.

TION, EXPERIMENTATION.

The excitation of ground motion by airborne sound is termed acoustic-to-sensinic coupling. The occurrence of acoustic-to-sensinic coupling. The occurrence of a seismic sensor unless its contribution to the ground motion is compensated for, while it is the basis of aircraft detection and ranging by means of an acoustic-sensinic sensor. The variation in acoustic-to-sensinic coupling due to the winter environment must be known and understood so that the effects of the winter environment can be incorporated in the design and employment of sensor systems.

FORWARD SCATTER METER FOR MEASURING EXTINCTION IN ADVERSE WEATHER.
Koh, G., July 1987, SR 87-12, Snow Symposium, 6th,
Hanover, NH, Aug. 1986. Proceedings, p 81-84,
ADB-115 486, 2 refs.

ATTENUATION, LIGHT SCATTERING, RADIA-TION, SNOWFALL, LIGHT TRANSMISSION, MEASURING INSTRUMENTS, RAIN, FOG.

The estinction coefficient is a measure of the alternation of radiation as it propagates through the atmosphere. Techniques for measuring the estinction coefficient in optical wavelength regions are of interest, since many military devices detect visible and affaired radiation emitted or reflected by distant targets. Experimental results comparing estingby distant targets haperimental results comparing extinc-tion coefficients measured with a forward scatter meter and a transmissoreter show that it is feasible to use a forward scatter meter to measure extinction in winter precipitation (snow, rain and fog)

SLANT PATH EXTINCTION AND VISIBILITY MEASUREMENTS FROM AN UNMANNED AERIAL VEHICLE.

Cogan, J., et al., July 1987, SR 87-12, Snow Symposium, 6tb. Hanover, NH, Aug. 1986 Proceedings, p.115-126, ADB-115-786, 5 refs.

Greeley, H.P., Izquierdo, M., McDonald, C., Smith, J.

42-1414 INFRARED RADIATION, VISIBILITY, LIGHT TRANSMISSION, CLOUD COVER, TEMPERA-TURE EFFECTS, SOUNDING, COMPUTER AP-PLICATIONS

PLICATIONS
The potential for using measurements of infrared radiation from the Earth's surface in the wavelength range of \$13 mitten to obtain an estimate of infrared extinction is examined. The system depends on the reduction of detected radiation with increasing distance from the observed objects. The effects of clinid conter and the temperature and emissivity dependence are considered. Literaturous on the operational range are presented. This paper also presents a technique using a video image and computer processing to obtain a measure of susual range from the observed contrast differences in the image. A grace knowledge of scene centities when a measure of visualizary cross the study of scent contrast undertacts in the image. A price himsyldige of scent contrast when suchdity is known can be com, ared with the scent contrast obtained under arbitrary conditions in estimate visibility. A slightly different approach to obtain visual range views housion and terrain simultaneously. A contrast measurement can then be used to determine visual range if the distance to the housion is known.

MP 2297

WET PRECIPITATION IN SUBFREEZING AIR BELOW A CLOUD INFLUENCES RADAR BACKSCATTERING.

Calberk, S.C., July 1987, SR 87-12, Snow Symposium, 6th, Hanover, NH, Aug. 1986. Proceedings, p.135-144, ADB-115-486, 8 refs.

CRYSTAL GROWTH, SUPERCOOLED CLOUDS, RADAR ECHOES, ANALYSIS (MATH-EMATICS). BACKSCATTERING, TEMPERA-TURE EFFECTS. PRECIPITATION TURE EFFECTS. PRECIPITATION (METEOROLOGY), UNFROZEN WATER CON-

he particles faling through supercooled conds accrete waste dispetit fast immight on an a substantial temperature increase. Buring conditions of past we'l growth of fine size graspol particles, the temperature rise can reach several degrees. These wet or particles mound take bushteds of meters to effecte after faling became the closed. This was no particles can fail the horizont past become a supercommed cloud and enhance radat backsuitering. Whose this effect is possible with condits, the night content of logs in too lon to produce more than a few centre of a degree rise into temperature of faling one particles. Furthermore, only cumping conds base a sufficient named water content to give a 3 degree temperature rise. he particles falling through supercooled could accrete wants

MP 2298 KADLUK ICE STRESS MEASUREMENT PRO-

GRAM.

Cox, G.F.N., Technology assessment and research program for offshore minerals operations; 1986 report. Compiled and edited by J.B. Gregory and C.E. Smith, U.S. Dept. of Interior, Minerals Management Service, OCS study MMS 86-0083, [1987], p.100-107, 9 refs.

ICE LOADS, ICE PRESSURE, OFFSHORE STRUCTURES, CAISSONS, STRESSES, ICE CONDITIONS, ICE TEMPERATURE, WIND FAC-TORS.

MP 2299

MECHANICAL PROPERTIES OF MULTI-YEAR PRESSURE RIDGE ICE.

PRESOURE RIDGE ICE.
Richter-Menge, J.A., Technology assessment and research program for offshore minerals operations; 1986 report. Compiled and edited by J.B. Gregory and C.E. Smith, U.S. Dept. of Interior, Minerals Management Service, OCS study MMS 86-0083, [1987], p.108-119, 19 refs. 42-1495

42-1495
ICE MECHANICS, PRESSURE RIDGES, OFFSHORE STRUCTURES, ICE LOADS, ICE
STRENGTH, IMPACT STRENGTH, ICE SALINITY, ICE DENSITY, STRAIN TESTS, ICE STRUC-TURE, TEMPERATURE EFFECTS

MP 2300

MP 2300
OF: OVERLAND FLOW WASTEWATER TREAT-MENT AT EASLEY, S.C.
Martel, C.J., et al, Nov. 1986, p.1078-1079, Discussion of A.R. Abernathy's paper, 41-1899, and author's reply. 8 refs.

Jenkins, T.F., Abernathy, A.R. 42-1609

WASTE TREATMENT, WATER TREATMENT, LAND RECLAMATION, CHEMICAL ANAL-YSIS, DESIGN.

MP 2301

EFFECTS OF WATER AND ICE LAYERS ON THE SCATTERING PROPERTIES OF DIFFUSE

Jezek, K.C., et al, Dec. 1, 1987, 26(23), p 5143-5147, 7 refs.

Koh, G. 42-1651

ICE OPTICS, REFLECTIVITY, SCATTERING, DIFFUSION.

MP 2302 PROCEEDINGS.

International Symposium on Cold Regions Heat Transfer, Edmonton, Alta., June 4-6, 1987, New York, American Society of Mechanical Engineers, 1987, 270p., Refs. passim. For selected papers see 42-1689 through 42-1716.

Cheng, K.C., ed, Lunardini, V.J., ed, Seki, N., ed. 42-1688

42-1688
HEAT TRANSFER, ICE FORMATION, ICE
MELTING, SOIL FREEZING, ICING, FROST
HEAVE, PHASE TRANSFORMATIONS, ICE
WATER INTERFACE, SNOW MELTING, COLD
WEATHER CONSTRUCTION, MATHEMATI-CAL MODELS.

MP 2303 EVOLUTION OF FRAZIL ICE IN RIVERS AND

Daly, S.F., International Symposium on Cold Regions Heat Transfer, Edmonton, Alta., June 4-6, 1987. Proceedings. Edited by K.C. Cheng, V.J. Lunardinand N. Seki, New York, American Society of Mechanical Engineers, 1987, p.11-16, 35 refs.

42-1690 FRAZIL ICE, ICE CONTROL, TURBULENT FLOW, ICE FORMATION, STREAMS, FREEZE-UP, HEAT TRANSFER, ICE CRYSTALS, RIVER ICE, ICE PHYSICS, ICE MECHANICS.

ICE, ICE PHYSICS, ICE MECHANICS.

This paper presents a selective overview of the research into frazil ice. The development of theory, instrumentation, and control structures has not proceeded on parallel course for all stages of frazil evolution. The earliest, dynamic stage of frazil formation is probably the best described, yet there has as yet been no application of this theory to a practical situation. A fundamental understanding of frazil formation could lead to means of disrupting the formation, such as by artificial seedings, modification of the fluid turbulence, etc. The development of instrumentation, has increased our ability to view and sample frazil, but as yet has not provided much benefit for the design and siting of ice control structures. To date, the successful use of ice control structures. Theory or instrumentation has not made their job cavier, but the potential is large. A major task now is the synthesis of existing theory and instrumentation for application in ice control

MP 2304

SOME ANALYTICAL METHODS FOR CON-DUCTION HEAT TRANSFER WITH FREE-ZING/THAWING.

Lunardini, V.J., International Symposium on Cold Regions Heat Transfer, Edmonton, Alta., June 4-6, 1987. Proceedings. Edited by K.C. Cheng, V.J. Lunardini and N. Seki, New York, American Society of Mechanical Engineers, 1987, p.55-64, Refs. p 61-64. Reprinted in Northern engineer, Spring 1988, 20(1),

p.15-25. 42-1695

42-1093 HEAT TRANSFER, FREEZING, THAWING, HEAT BALANCE, PHASE TRANSFORMA-TIONS, SOIL FREEZING, PERMAFROST, FREEZE THAW CYCLES, ANALYSIS (MATH-EMATICS).

EMATICS).

One of the most difficult and yet most interesting areas of heat transfer is conduction (or convection) with freezing or thawing. The inherent non-linearity of the problem along with the unknown moving interface precludes exact solutions for most practical cases. This has purred great effort to devise approximate solution methods which are accurate and of general application. Many of the known exact solutions are listed here along with a brief discussion of two approximate methods; the quasi-static and the heat balance integral. Space limitations rule out the inclusions of such useful variational methods as that of Biot or of a treatment in more detail.

MP 2305 MODELLING TRASH RACK FREEZEUP BY

PRAZIL ICE.

Daly, S.F., International Symposium on Cold Regions
Heat Transfer, Edmonton, Alta., June 4-6, 1987.

Proceedings. Edited by K.C. Cheng, V.J. Lunardini
and N. Seki, New York, American Society of Mechanical Engineers, 1987, p.101-106, 10 refs.

42.1709. 42-1700

FREEZEUP, FRAZIL ICE, ICE SOLID INTER-FACE, ICE ADHESION, HEAT TRANSFER, ICE FORMATION, MATHEMATICAL MODELS, DRAINAGE.

FORMATION, MATHEMATICAL MODELS, DRAINAGE.

The freezeup of trash racks by frazil ice occurs in a sequence that has not been quantitatively described. Because of the difficulty in observation and measurement, very little is quantitatively known about the concentration of frazil ice at the intake, the mechanism(s) of underwater ice adhesion, the deposition efficiency of frazil ice, the contribution of different heat transfer modes to the ice growth on the rack, and the relationship of the head loss through the rack to the flow velocity as a function of the mass of ice present. A comparison of the ice generation by conduction and convection with the mass of ice deposited on the rack from the flow indicates that deposition is the most significant mode of ice formation on the rack. Based on this, and other assumptions, a first generation mathematical model that describes the head loss through a trash rack during freezeup is developed. The mathematical model is developed for the case of a trash rack through which a constant discharge is maintained. The model is applied to laboratory data with good results

were obtained by modelling a section of a trash rack in a flume located in a cold room. Frazil ice produced in the flume caused the rack to freeze up while a constant discharge was maintained. The mathematical model can be used to suggest means, both structural and operational, of extending the time until total freezeup of a trash rack coccurs. Improvements in the mathematical model are suggested. occurs gested.

ARCTIC RESEARCH OF THE UNITED STATES, VOL.1.

U.S. Interagency Arctic Research Policy Committee, Washington, D.C., Fall 1987, 121p.
Bowen, S.L., ed, Valliere, D.R, ed, Brown, J, ed

42-1746
RESEARCH PROJECTS, POLAR REGIONS, RE-

SEARCH PROJECTS.

SEARCH PROJECTS.

This new journal provides an overview of Federally funded research activities in Arctic regions and includes brief commentaries on specific programs being pursued by twelve departmental-level groups and thritten sub-groups. The range of research topics includes minerals, geology, wildlife, land, parks, mines, atmosphere, oceans, biology, glaciology, carthsciences, sea ice, snow, ice, Arctic engineering, medicine, disheries, weather forecasting, isunamis, ice edge, remote sensing, space plasma physics, permafrost, hydrology, tundra ecosystems, health, human services, cultural dynamics, archeology, ice breaking, iceberg reconnaissance, Aratic pollution, marine transportation, environmental protection, international Arctic coordination, forestry, soil conservation, Reports of meetings of the various committees and commissions involved in Arctic research, the Arctic Research and Policy Act of 1984, and Executive Order 12501 establishing the Arctic Research Commission and the Interagency Arctic Research Policy Committee are included.

MP 2307

OBSERVATIONS OF JÖKULHLAUPS FROM ICE-DAMMED STRANDLINE LAKE, ALASK IMPLICATIONS FOR PALEOHYDROLOGY.

Sturm, M., et al, Binghamton Symposia in Geomorphology: International series, No.18, Catastrophic flooding. Edited by L. Mayer and D. Nash, London, Allen and Unwin, 1987, p.79-94, 14 refs. Beget, J., Benson, C.

42-1013 FLOODING, ICE DAMS, GLACIAL LAKES, SUB-GLACIAL DRAINAGE, GLACIAL HYDROLO-GY, VOLUME, HYDROGRAPHY, PALEO-CLIM. "DLOGY, UNITED STATES—ALASKA— STRANDLINE LAKE

MP 2308

DC RESISTIVITY MEASUREMENTS OF MODEL SALINE ICE SHEETS.

Arcone, S.A., Nov. 1987, GE-25(6), p.845-849, 16

42-1754 ICE ELECTRICAL PROPERTIES, ELECTRICAL RESISTIVITY, SALT ICE.

MP 2309

ENVIRONMENTAL FACTORS AND STAND-ARDS FOR ATMOSPHERIC OBSCURANTS. CLIMATE AND TERRAIN.

Opitz, B.K., et al, AirLand Battlefield Environment Executive Committee, Environmental Standards for Material Design Group, Oct. 1987, 137p., 7 refs. First edition. ALBE report 1, ESMDG pamphlet. Miers, B.T., Shirkey, R.C., Bates, R.E., Robinson, J.H., West, H.W. 42-3145

42-3145
MILITARY OPERATION, SNOW LOADS, ENVIRONMENTS, ICING, VISIBILITY, ICE FOG,
SOUND WAVES, FREEZE THAW CYCLES,
TOPOGRAPHIC FEATURES, CLIMATIC FAC-TORS, MILITARY FACILITIES

MP 2310

HEAT LOSSES FROM THE CENTRAL HEAT DISTRIBUTION SYSTEM AT FORT WAIN-

Phetteplace, G., Dec. 1982, EPS 3-WP-82-6, Symposium on Utilities Delivery in Cold Regions, 3rd, Edmonton, Alta., May 25-26, 1982. Proceedings. Compiled by D.W. Smith, p.308-328, 5 refs. 42-1728

42-1728
HEAT LOSS, HEATING, UTILITIES, UNDER-GROUND PIPELINES, AIR TEMPERATURE, TEMPERATURE EFFECTS, ANALYSIS (MATH-EMATICS), COMPUTER PROGRAMS, SOIL TEMPERATURE, SEASONAL VARIATIONS.

STRAIN-RATE AND GRAIN-SIZE EFFECTS IN ICE.

Cole, D.M., 1987, 33(115), p.274-280, 22 refs. 42-1822

ICE DEFORMATION, ICE CRYSTAL STRUCTURE, STRAINS, GRAIN SIZE, TESTS, STRESS STRAIN DIAGRAMS.

This paper presents and discusses the results of constant deformation-rate tests on laboratory-prepared polyerystalline icc. Strain-rates ranged from 0.000,000,1 to 0.1/s, grain-size ranged from 1.5 to 5.8 mm, and the test temperature was -5 C. At strain-rates between 0.000,000,1 and 0.001/s, the stress-strain-rate relationship followed a power law with an exponent of n=4.3 calculated without regard to grain-size. However, a reversal in the grain-size effect was observed below a transition point near 0.000,004/s the peak stress increased grain-size, while above the transition point he peak stress decreased with increasing grain-size. This latter trend persisted to the highest strain-rates observed. At strain-rates above 0.001/s the peak stress became independent of strain-rate. The unusual trends exhibited at the lower strain-rates are attributed to the influence of the grain-size on the balance of the operative deformation mechanisms Dynamic recrystallization appears to intervene in the case of the finer-grained material and serves to lower the peak stress. At comparable strain-rates, however, the large-grained material still experiences internal micro-fracturing, and thin sections reveal extensive deformation in the grain-boundary regions that is quite unlike the appearance of the strain-rate of the s This paper presents and discusses the results of constant boundary regions that is quite unlike the appearance of the strain-induced boundary migration characteristic of the fine-grained material MP 2312

AIRBORNE RIVER-ICE THICKNESS PROFILING WITH HELICOPTER-BORNE UHF SHORT-PULSE RADAR.

Arcone, S.A., et al, 1987, 33(115), p.330-340, 14 refs.

RIVER ICE, ICE COVER THICKNESS, SCATTER-ING, REMOTE SENSING, PROFILES, EQUIP-MENT, LAKE ICE, SURFACE ROUGHNESS,

The ice-thickness profiling performance of a helicopter-mounted short-pulse radar operating at approximate center frequencies of 600 and 900 MHz was assessed. The antenna packages were mounted 1.2 m off the skid of a small helicopter cies of 800 and 900 Mr12 was assessed. In the antenna packages were mounted 1.2 m off the skid of a small helicopter whose speed and altitude were varied from about 1.8 to 9 m/s and 3 to 12 m. Clutter from the helicopter offered minimal interference with the ice data. Data were acquired in Alaska over lakes (as a proving exercise) and two rivers, whose conditions varied from open water to over 15 m of solid ice with numerous frazil-ice formations. The most readily interpretable data were acquired when the ice or snow surface was smooth. Detailed surface investigations on the Tanana River revealed good correlations of echo delay with solid ice depth, but an insensitivity to frazilice depth due to its high water content. On the Yukon River, coinciding temporally coherent surface and bottom reflections were associated with solid ice and smooth surfaces All cases of incoherent surface returns (scatter) occurred over ice rubble. Rough-surface scattering was always followed by the appearance of bottom scattering but, in many cases, including a hanging-wall formation of solid frazil ice, bottom scattering occurred beneath coherent, smooth-surface reflections. Areas of incoherent bottom scattering investicontrol scattering occurred beneath conerent, smooth-surface reflections. Areas of incoherent bottom scattering investi-gated by drilling revealed highly variable ice conditions, including frazil ice. The minimum ice thickness that could be resolved from the raw data was about 0.2 m with the 600 MHz antenna and less than 0.15 in with the 900 MHz

MP 2313

RATING SYSTEM FOR UNSURFACED ROADS TO BE USED IN MAINTENANCE MANAGE-MENT.

Eaton, R.A., et al, North American Conference on Managing Pavements, 2nd, Toronto, Ontario, Nov. 2-6, 1987. Proceedings, Vol.2, [1987], p.(2)51-(2)62, 24 refs.

Gerard, S., Dattilo, R.S. 42-1879

ROAD MAINTENANCE, PAVEMENTS, DRAIN-AGE, SURFACE PROPERTIES.

A system has been developed and field validated for rating A system has been developed and field validated for rating unsurfaced roads. The number obtained for each road by using this system can be used to prioritize or compare road conditions to develop a maintenance program. This unsurfaced road rating system can be used by itself or to supplement current pavement management systems.

ICE THICKNESS DISTRIBUTION ACROSS THE ATLANTIC SECTOR OF THE ANTARCTIC OCEAN IN MIDWINTER.

Wadhams, P., et al, Dec. 15, 1987, 92(C13), p.14,535-14,552, 9 refs.

Lange, M.A., Ackley, S.F.

42-1905

ICE COVER THICKNESS, SEA ICE, ICE FLOES, PHOTOGRAPHY.

PHOTOGRAPHY.

The entire width of the antarctic sea ice zone was traversed in the vicinity of 0 deg longitude from July 18 to Sep 10, 1986. Ice thicknesses were measured by direct drilling, by helicopter profiling using an Exstar 100-MHz impulse radar system and by aerial photography. The results of the point measurements (drilling) are reported in this paper together with an indication of how the radar and photography data will be used to extend them so as to yield area-averaged ice thickness distributions. The main ice type across the entire width of the ice cover was consolidated pancake ice occurring in vast floes, this formed out of a 250-km-wide band at the advancing ice edge which comprised a concentrated field of individual pancakes in a matrix of razil ice. Preferred thicknesses of undeformed floes were 40-60 cm of ice covered with 5-15 cm of snow. The individual pancakes attained almost all of this thickness before consolidation, subsequent congelation growth was slow, estimated at 0.4 cm/d. The floes contained much small-scale roughness on the upper and lower surfaces due to rafting of pancakes at the time of consolidation, but pressure ridging was modest except in the far south. A few very thick (8-11 m) multiyear floes were observed embedded ridging was modest except in the far south thick (8-11 m) multiyear floes were observed in the pack at latitudes beyond 66S (Aut

MP 2315

FLEXURAL AND BUCKLING FAILURE OF FLOATING ICE SHEETS AGAINST STRUC-TURES.

TURES.
Sodhi, D.S., Sep. 1987, 87-17, Working group on ice forces. 3rd state-of-the-art report. Edited by T.J.O. Sanderson, p.53-73, ADA-191 067, Refs p 70-73 For another source see 40-4604.

FLOATING ICE, OFFSHORE STRUCTURES, ICE LOADS, FLEXURAL STRENGTH, ICE SHEETS, ICE SOLID INTERFACE, ICF PRESSURE, ICE DEFORMATION

DEFORMATION

This is a review of work on bending and buckling failure of floating ice sheets, along with the forces generated during ice/structure interaction

The focus is on the work published after 1980. Estimation of ice forces as a result of bending and buckling failure of an ice sheet can be made with a fair degree of confidence when the ice, structure interaction leads to one of the two modes of failure. The problem of multimodal failure of floating ice sheets needs further study.

MP 2316

HISTORY OF SNOW-COVER RESEARCH. Colbeck, S.C., 1987, Special issue, p.60-65, 31 refs. 42-1959

COVER, SNOW HYDROLOGY, AVA-SNOW LANCHES, HISTORY.

LANCHES, HISTORY.

The history of snow-cover research is divided into 4 distinct periods. Before 1900 there were systematic observations of snow but the tools were just being developed to begin serious research. From 1900 to 1936, many investigations were made because of the practical considerations of snow hydrology and snow avalanches Individuals began the assessment of snow water equivalent for forecasting run-off and the observation of snow structure and texture. Quantitative and physical investigations quickened after government-sponsored laboratories were established in 1936, the same year as the founding of the International Glaciological Society From 1936 through the 1960s, many detailed investigations were made into snow's physical properties and behavior Professional societies organized national and regional meetings, and published the results of snow research Many more laborationes became involved as knowledge about snow was developed and applied to run-off forecasting and avalanche defense Snow research surged again during the 1970s with the establishment of a new generation of snow scientists using more advanced theory, computers, and instrumentation As demands continue for solutions to snow problems with new emphasis on old themes, snow instrumentation As demands continue for solutions to snow problems with new emphasis on old themes, snow research generates knowledge about snow for a wide variety of applications

MP 2317

PROCEEDINGS, VOL.4.

International Conference on Offshore Mechanics and Arctic Engineering, 7th, Houston, TX, Feb. 7-12, 1988, New York, American Society of Mechanical Engineers, 1988, 348p., Refs. passim. For individual papers see 42-2077 through 42-2119. Sodhi, D.S., ed, Luk, C.H., ed, Sinha, N.K., ed.

42-2076

OFFSHORE STRUCTURES, ICE LOADS, ICE MECHANICS, ICE PHYSICS, ENGINEERING, MEETINGS, SEA ICE, ICE CONDITIONS, ICE-BREAKERS.

MP 2318 FLEXURE AND FRACTURE OF MACROCRYS-TALLINE SI TYPE FRESHWATER ICE.

Dempsey, J.P., et al, International Conference on Off-shore Mechanics and Arctic Engineering, 7th, Hous-ton, TX, Feb. 7-12, 1988. Proceedings, Vol.4. Edit-ed by D.S. Sodhi, C.H. Luk and N.K. Sinha, New York, American Society of Mechanical Engineers, 1988, p.39-46, 31 refs.

Nigam, D., Cole, D.M.

42-2082

ICE STRENGTH, FLEXURAL STRENGTH, FRACTURING, ICE CRYSTAL STRUCTURE, ICE LOADS, GRAIN SIZE, ICE CRACKS.

LOADS, GRAIN SIZE, ICE CRACKS.

The four-point-bend loading configuration is used here to study the flexural strength and fracture toughness of macrocrystalline SI type freshwater ice. The emphasis in this investigation was to minimize testing errors, prepare geometrically similar specimens milled to good accuracy, and to use a mechanical and repeatable method of notch formation. The question under study is Would a wide scatter in flexural strengths and fracture toughness results still occur in SI see of the inaccuracies in specimen preparation and variations. strengths and tracture toughness results still occur in Si nee if the inaccuracies in specimen preparation and variations in notch acuity were minimized, and if the specimen size were increased significantly? The basic tenet then is that any scatter would be predominantly due to crystal orientation effects, grain size effects, variations in the predominant c-axis orientations, as well as both specimen size and specimen geometry.

MP 2319 GROWTH OF EG/AD/S MODEL ICE IN A

SMALL TANK. Borland, S.L., International Conference on Offshore Mechanics and Arctic Engineering, 7th, Houston, TX, Feb. 7-12, 1988. Proceedings, Vol.4. Edited by D.S. Sodhi, C H Luk and N K Sinha, New York, American Society of Mechanical Engineers, 1988, p.47-53, 9

rcfs. 42-2083

ICE MODELS, ICE STRENGTH, FLEXURAL STRENGTH, ICE ELASTICITY, SOLUTIONS, FREEZING, ICE MECHANICS, TESTS, ICE GROWTH, ICE SHEETS, TANKS (CONTAIN-ERS)

A new type of refrigerated model ice was tested for flexural A new type of refrigerated model ice was tested for flexural strength and elasticity in a small basin. This model coc, termed "EG, AD/S" ice by the developer, Timeo of NRCC, is produced by freezing a solution of three chemicals ethylene glycol, aliphatic detergent, and sucrose. A small-scale laboratory investigation was conducted to determine some of the mechanical properties of the EG, AD/S ice and to make modifications to the chemical formula as needed. The results of these extra were found to compare well were and to make moniteations to the centineal formula as necessor. The results of these tests were found to compare well with Timco's results for EG.AD.S i.e. as well as with tests on urea i.e. grewn in the same tank. Described are some of the problems with this new ice, including excessive sudsing

and bacterial blooms, and the techniques used to try to alleviate them Also discussed are several unique aspects of dealing with ice sheet growth and mechanical properties testing in a small tank.

HEAT TRANSFER PERFORMANCE OF COM-MERCIAL THERMOSYPHONS WITH IN-CLINED EVAPORATOR SECTIONS.

Haynes, F.D., et al, International Conference on Offshore Mechanics and Arctic Engineering, 7th, Houston, TX, Feb. 7-12, 1988. Proceedings, Vol 4 Edited by D.S. Sodhi, C.H. Luk and N.K. Sinha, New York, American Society of Mechanical Engineers, 1988, p.275-280, 14 refs. Zarling, J.P. 42-2110

PERMAFROST BENEATH STRUCTURES. HEAT TRANSFER, SUBGRADES, WIND TUNNELS, MEASURING INSTRUMENTS, WIND VELOCI-TY, TESTS, EVAPORATION, EQUIPMENT.

TY, TESTS, EVAPORATION, EQUIPMENT.
Laboratory tests have been conducted with two full-size, two-phase commercial thermosyphons in an atmospheric wind tunnel at the U.S. Army CRREL. The test variables were wind speed and evaporator inclination angle. The air speed ranged from 0 to 5.2 m/s. The evaporator angles were varied from 0 to 12 deg measured from the horizontal. The effect of nearby walls on thermosyphon performance was also investigated. Tests were conducted with walls oriented parallel, at 45 deg and at right angles to the air flow direction. The air temperature for all tests was about -18 C. Test results are presented with thermal conductance of the thermosyphon as a function of wind speed and evaporator inclination angle. The heat transfer conductance was found to increase with increasing wind speed and increasing evaporator inclination angle.

ON THE APPLICATION OF THERMOSY-PHONS IN COLD REGIONS.

Zarling, J.P., et al, International Conference on Off-shore Mechanics and Arctic Engineering, 7th, Hous-ton, TX, Feb. 7-12, 1988. Proceedings, Vol.4. Edit-ed by D.S. Sodhi, C.H. Luk and N.K. Sinha, New York, American Society of Mechanical Engineers, 1988, p.281-286, 14 refs.

Haynes, F.D., Daly, S.F. 42-2111

LOW TEMPERATURE TESTS, HEAT TRANS-FER, WIND VELOCITY, TEMPERATURE EF-FECTS, EQUIPMENT, WATER FLOW, ICE GROWTH, MEASURING INSTRUMENTS.

GROWTH, MEASURING INSTRUMENTS.

The exposure of portable electronic data logging equipment to extreme low temperatures usually leads to system failure. To overcome this difficulty at northern remote sites, the use of a thermosyphon to transfer energy stored in the ground to an insulated instrument shelter was tested. The results of the test showed that the thermosyphon maintained the instrument shelter well above the outdoor ambient air temperature during cold spells. Laboratory tests were conducted with two-phase full-size thermosyphons to freeze water in a test basin. The test variables were wind speed and in a test basin The test variables were wind speed and water velocity A single-phase thermosyphon was also tested for growing ice. The heat transfer conductances of the thermosyphons were estimated for various wind speeds. in a test basin of the thermosyphons were estimated for various wind speeds. The use of thermosyphons placed in rivers has been proposed to collect transported frazil ice to augment ice dam formation or prevent frazil ice from interacting with downstream hydraulic structures. Laboratory tests were conducted with model two-phase thermosyphons in a refrigerated flume to test this concept. Frazil ice was generated upstream of a thermosyphon array placed across the flume perpendicular to the flow. The ability to collect frazil was determined by measuring the head loss across the array with time. Comparisons were made with an array of solid aluminum rods with the same dimension as the model thermosyphons. The influence of wind was also investigated

MP 2322

MP 2312
POLAR COMMUNICATIONS: STATUS AND RECOMMENDATIONS. REPORT OF THE SCIENCE WORKING GROUP.
Rosenberg, TJ, ed, Greenbelt, MD, US. National Aeronautics and Space Administration, Dec. 1987, 202. 3 etc.

29p., 3 refs.

Jezek, K.C., ed.

SPACECRAFT, TELECOMMUNICATION, DE-SIGN, POLAR REGIONS, GLACIOLOGY, OCEANOGRAPHY, METEOROLOGY, GEO-PHYSICS.

This report summarizes the capabilities of existing communica-This report summarizes the capabilities of existing communication links within the polar regions, as well as between the polar regions and the continental United States. The report places these capabilities in the context of the objectives of principal scientific disciplines active in polar reverse and, in particular, of how discipline scientists both utilize and are limited by present technologies. Based on an assessment of the scientific objectives potentially achievable with improved communication capabilities, the report concludes with a list of requirements on and recommendations for communication capabilities necessary to support polar science over the next ten years (Auth)

NEW APPROACH FOR SIZING RAPID INFIL-TRATION SYSTEMS.

Martel, C.J., Feb. 1988, 114(1), p.211-215, 13 refs. 42-2246

WASTE TREATMENT, WATER TREATMENT, SEEPAGE.

MP 2324

ON THE DETERMINATION OF THE AVERAGE YOUNG'S MODULUS FOR A FLOATING ICE COVER

Kerr. A.D., et al, Feb. 1988, 15(1), p.39-43, 11 refs. Haynes, F.D.

FLOATING ICE, LOADS (FORCES), ICE ELAS-TICITY, ANALYSIS (MATHEMATICS), PRES-SURE

SURE.

First, the meaning of Young's modulus for a floating ice cover is discussed. A method often used for determining the average modulus of the cover, E(av), consisting of loading an ice cover vertically with a rigid disc, is then presented and a possible shortcoming of the calculation method used is pointed out. It is related to the fact that the contact pressure distribution between disc and ice cover is generally not known. To clarify this issue, a comparative study was conducted to establish the effect of related pressure distributions on the calculated E(av)-value. It was found that the limiting cases—like the uniformly distributed pressure and the uniform line distribution along the disc boundary—yield E(av) that are close to each other. Also, for the range of parameters under consideration, the E(av) obtained using the solution for a concentrated force is close. The using the solution for a concentrated force is close. The paper concludes by showing how the generated graphs may be used to simplify the calculation of E(av) for an ice

MP 2325 CRACK NUCLEATION IN POLYCRYSTALLINE ICE.

Cole, D.M., Feb. 1988, 15(1), p.79-87, 14 refs.

ICE CRACKS, ICE CRYSTAL STRUCTURE, GRAIN SIZE, CRACK PROPAGATION, ANISO-TROPY, TESTS, MODELS.

TROPY, TESTS, MODELS.

This paper examines in detail two likely mechanisms of microcrack formation in polycrystalline ice and pays special attention to the grain size dependencies of each mechanism Under consideration are the Zener-Stroh dislocation pileup mechanism and an elastic mechanism based on the anisotropy of the ice lattice. Calculations for the pileup mechanism indicate that although the dislocation velocity is relatively low, a critical-sized pileup can form under plausible test conditions. Quantification of the elastic anisotropy mechanism indicates that it operates over approximately the same stress levels as the pileup mechanism and exhibits the same grain size dependency. The results of observations on grain size dependency. The results of observations on the microcracking of laboratory-prepared freshwater ice having randomly oriented equiaxed grains are used to test the model predictions. The work gives detailed descriptions of the methods used to quantify each model

MP 2326 MASS CONCENTRATION AND PRECIPITATION RATE Koh, G., et al, Feb. 1988, 15(1), p 89-92, 7 refs. Lacombe, J., Hutt, D.L.

42-2293

SNOW ACCUMULATION, PRECIPITATION GAGES, SNOWFALL, MEASURING INSTRUMENTS, VELOCITY

MP 2327 MEASURED INSULATION IMPROVEMENT POTENTIAL FOR TEN U.S. ARMY BUILDINGS. Flanders, S.N., 1987, No.922, Thermal insulation, materials and systems A conference sponsored by ASTM Committee C-16 on Thermal Insulation, Dallas, TX, 2-6 Dec. 1984 (Proceedings). Edited b F.J. Powell and S.L. Matthews, p.202-220, 6 refs

THERMAL INSULATION, BUILDINGS, HEAT TRANSFER, MILITARY FACILITIES, CONVECTION, HEAT FLUX, ACCURACY, ECONOMIC ANALYSIS, THERMAL CONDUCTIVITY

ANALYSIS, THERMAL CONDUCTIVITY
As-built drawings and handbook calculations of R values are often inadequate bases for investment decisions regarding improved insulation of U.S. Army buildings. Reported field and laboratory experience indicates that a technique employing surface-mounted heat flux sensors (HFSs) in conjunction with infrared thermography (IRT) can yield reliable estimates of R values. This technique employs IRT to position HFSs and thermocouples at representative locations on walls and roofs or attus to sequent heat flow and temperature data for estimating R values. This paper reports on the application of this technique at Ft. Carson, Colorado, and Ft. Richardson, Alaska, to 8 family housing units, a temporary office building, and a barracks. Infrared thermography of these buildings detected few thermal anomalies, but measurement of several walls with HFSs and thermocouples (typically at 6 locations spaced vertically on each wall) revealed significant variation in estimated R values, this variation is attributable to convection, even within fully insulated walls.

is significant for proper placement of sensors and indicates that installed fibrous insulation can lack the ability to quell convection. The insulating ability of walls containing poorly installed mineral fiber batt insulation was much worse than would be indicated by the design handbook values. Somattic insulation performed exactly as expected; some was at least 40% worse than expected.

MP 2328 EVALUATION OF DISPOSABLE MEMBRANE FILTER UNITS FOR SORPTIVE LOSSES AND SAMPLE CONTAMINATION.

Walsh, M.E., et al, 1988, Vol.9, p.45-52, 13 refs. Knapp, L.K., Jenkins, T.F.

FILTERS, SAMPLING.

MP 2329

SHAPE OF CREEP CURVES IN FROZEN SOILS AND POLYCRYSTALLINE ICE.

Fish, A.M., Nov. 1987, 24(4), p.623-629, 12 refs.

SOIL CREEP, ICE CREEP, FROZEN GROUND MECHANICS, ICE MECHANICS, RHEOLOGY, MATHEMATICAL MODELS, STRESSES, TEM-PERATURE EFFECTS.

A new method was developed for determining creep parameters, particularly the time to failure, from a single linear plot in which an individual creep curve forms a straight line for primary and tertiary creep. Secondary creep is considered to be a principal point on this line that predetermines the onset of failure. The times to failure can be predicted, even when creep tests are not complete, by extrapolating information obtained for primary creep. Based upon T.H. Jacka's test data, prediction of creep strain was evaluated using the constitutive equation of A.M. Fish for entire creep and compared with the modified Sinha equation of M.F. Ashby and P. Duval for attenuating creep as well as with models for primary and secondary creep. It is shown that the shape of the creep purves, and thus the creep parameters, varies with stress, temperature, and other factors. Hence, a family of creep curves cannot be described by a constitutive equation with a single set of creep parameters that do not take into account these variations without loss in the accuracy of the creep strain calculations. MP 2330 A new method was developed for determining creep parame-

MP 2330 MODELING THE ELECTROMAGNETIC PROP-

ERTY TRENDS IN SEA ICE; PART 1.
Kovacs, A., et al, Oct. 1987, 14(3), p.207-235, 33 refs.
Morey, R.M., Cox, G.F.N.

ICE PHYSICS. ELECTROMAGNETIC PROPER-TIES, SEA ICE, DIELECTRIC PROPERTIES, MATHEMATICAL MODELS, ELECTRICAL RESISTIVITY, ICE COVER THICKNESS, PRESSURE RIDGES, BRINES.

MP 2331 CAMP CENTURY SURVEY 1986.

Gundestrup, N S., et al, Oct 1987, 14(3), p.281-288, 24 refs.

Clauser H.B., Hansen, B.L., Rand, J.H.

BOREHOLES SURFACE MIGRATION. REMOTE SENSING, ICE MECHANICS, VELOCI-TY, TOPOGRAPHIC FEATURES, DRILLING, GREENLAND—CAMP CENTURY.

OREENLAND—CANIT CENTORI.

Directional surveys of the bore-hole at Camp Century, Greenland were made in 1966, 1967 and 1969. From these sirveys a surface velocity of \$5 myr in the direction 10 deg was computed. The position of the 60 m meteorological tower near the bore-hole was measured in 1977 and 1986 with satellite navigation equipment. These measurelogical tower near the bore-hole was measured in 1977 and 1986 with satellite navigation equipment. These measurements show a surface velocity of 3.5 m/yr in the direction 235 deg. Measurement of the surface topography in 1986 shows the bore-hole is situated on a local sloping ite divide. A differential magnetometer was used to locate the drill tower. Hand augering verified the location and showed the drill tower was buried 6.5 to 7 m beneath the 1986 snow surface, as expected from the depth-age relation. The casing was not identified. Extension of the easing to the snow surface and resurvey of the bore-hole will provide urgently needed information on the variation of ice flow urgently needed information on the variation of ice flow urgently needed information on the variation of ice flow with depth

MP 2332

AIRBORNE ELECTROMAGNETIC SOUNDING OF SEA ICE THICKNESS AND SUB-ICE BATH-

Kovacs, A., et al. Oct. 1987, 14(3), p.289-311. For another source see 42-2551 21 refs. Valleau, N.C., Holladay, J.S.

42-2565

ICE COVER THICKNESS, SUBGLACIAL OBSER-VATIONS, ELECTROMAGNETIC PROSPECT-ING, AIRBORNE RADAR, SNOW COVER THICKNESS, ICE CONDITIONS, SOUNDING, SEA ICE, PROFILES, UNITED STATES—ALAS-KA PRUDHOE BAY

A study was made in May 1985 to determine the feasibility of using an arborne electromagnetic sounding system for profiling sea ice thickness and the sub-ice water depth and conductivity. The study was made in the area of Prudhoe

Bay, Alaska Bay, Alaska The multifrequency airborne electromagnetic sounding system consisted of control and recording electronics sounding system consisted of control and recording electronics and an antenna. The electronics module was installed in a helicopter, and the 7 m long tubular antenna was towed beneath the helicopter at about 35 m above the ice surface. For this electromagnetic system, both first-year and second-year sea ice could be profiled, but the resolution of ice thickness decreased as the ice became rough. This decrease was associated with the large footprint of the system, which effectively smoothed out the sea ice relief Under-ice water depth was determined, as was seawater conductivity. The results of the feasibility study were encouraging, and further system development is therefore warranted.

MP 2333 SINGLE-HORN REFLECTOMETRY FOR IN SITU DIELECTRIC MEASUREMENTS AT MI-CROWAVE FREQUENCIES.

Arcone, S.A, et al, Jan 1988, 26(1), p.89-92, 10 refs. Larson, R.W. 42-2803

DIELECTRIC PROPERTIES, REF REMOTE SENSING, ICE PHYSICS. REFLECTIVITY,

LIQUID SAMPLER.

Rand, J.H., Aug. 31, 1982, 4 col., USP-4,346,612, 10 refs.

UNFROZEN WATER CONTENT, FRAZIL ICE, SAMPLERS, MEASURING INSTRUMENTS, DE-

COLLAPSIBLE RESTRAINT FOR MEASURING TAPES

Ueda, H.T., Mar. 8, 1983, 12 col., USP-4,375,721, 19 refs. 42-2608

ICE COVER THICKNESS, MEASURING INSTRUMENTS, BOREHOLES, DESIGN.

ONSHORE ICE PILE-UP AND RIDE-UP: OB-SERVATIONS AND THEORETICAL ASSESS-MENT.

Kovacs, A, et al, Arctic coastal processes and slope protection design Edited by AT Chen and CB Lei-dersdorf, New York, American Society of Civil Engineers, 1983, p.108-142, Refs. p.138-142. Sodhi, D.S.

FAST ICE, ICE PILEUP, ICE OVERRIDE, ICE LOADS, OCEAN CURRENTS, WIND FACTORS, SEASONAL VARIATIONS, ICE SHEETS, PRES-SURE RIDGES.

An overview of shore ice pile-up and ride-up observations is presented and the forces associated with ice rubble formation are discussed. Historical and recent observations indicate that the onshore movement of ice is generally a spring or fall event associated with wind and/or water driving forces. The occurrence of this phenomenon is relatively unpredictable and has resulted in the destruction of structures and loss of life. The analytical and experimental works. and loss of life The analytical and experimental work undertaken to date tends to show that low driving forces per unit width can cause shore ice pile-up or ride-up, but that high concentrated forces can occur during such events and loss of life along local areas of resistance. An analysis of the ice sheet failure process is given which indicates that the average ice rubble building force per unit width is a function of rubble height, to a power between 1 and 2, depending on the total ice sheet width undergoing failure

WETTING OF POLYSTYRENE AND URE-THANE ROOF INSULATIONS IN THE LABORATORY AND ON A PROTECTED MEM-THANE BRANE ROOF.

Tobiasson, W, et al. Oct. 1987, 11(2), p.108-119, 13 refs. For another source see 42-2926

Greatorex, A., Van Pelt, D. 42-3182

ROOFS, INSULATION, CELLULAR PLASTICS.

RADIOGLACIOLOGY BY V.V. BOGORODSKII, ET AL.

Jezek, K.C., Jan 1988, 69(1), p 55-56, Book review For the book being reviewed see 40-1650. 42-3070

GLACIER ICE, AIRBORNE RADAR, RADAR ECHOES, GLACIOLOGY, PHOTOINTERPRE-TATION, GEOPHYSICAL SURVEYS, ICE PHY-

MP 2339 KINETIC FRICTION OF SNOW. Colbeck, S.C., 1988, 34(116), p.78-86, 18 refs.

42-334 METAL SNOW FRICTION, WATER FILMS, SNOW COVER, SNOW MELTING, GRAIN SIZE, TEMPERATURE EFFECTS, VELOCITY, SHEAR STRENGTH, FRICTION, ANALYSIS (MATH-

EMATICS).

Three components of the kinetic friction of snow are described but only the lubricated component of friction is treated in detail. This component depends upon the thickness of water films which support a slider on snow grains over a small fraction of its area. The thickness of the film decreases with ambient temperature in a manner which is sensitive to the thermal conductivity of the slider. The minimum value of friction at any temperature is reached at an intermediate value of speed because friction decreases as the slider first begins to move and the films form but then increases at higher speeds because of the shear resistance At sub-freezing temperatures a small area in the front part of the slider is dry and the friction is high. Once the water film is formed it increases in thickness towards an equilibrium value which can be very sensitive to slider properties, speed, and temperature. It appears that the mechanisms may be very different for hydrophobic and hydrophilic sliders. From the equations derived here it is clear why friction decreases with repeated passes over the same snow.

MP 2340 WOOD-FRAME ROOFS AND MOISTURE. Tobiasson, W., Mar. 1988, 3(3), p.33-37. 42-3397

ROOFS, MOISTURE, WOODEN STRUCTURES.

VIBRATION ANALYSIS OF A DEW LINE STA-TION.

Haynes, F.D., et al, International Modal Analysis Conference, Kissimmee, Florida, Fcb. 1-4, 1988. Proceedings. Vol.2, Schenectady, Union College, 1988, p.1513-1518, 5 refs. Tobiasson, W., Morse, J.S.

TELEMETERING EQUIPMENT, ANCHORS, VI-BRATION, SNOW MECHANICS.

GLACIOLOGICAL INVESTIGATIONS USING THE SYNTHETIC APERTURE RADAR IMAG-ING SYSTEM.

Bindschadler, R.A., et al, 1987, Vol 9, Symposium on Remote Sensing in Glaciology, 2nd, Cambridge, Sep. 8-9 and 11-12, 1986. Proceedings, p.11-19, 19 refs Jezek, K.C., Crawford, J. 41-4428

ICE SHEETS, REMOTE SENSING, GLACIOLO-GY, AIRBORNE RADAR, ICE SURFACE, ICE CREEP, CREVASSES, ICEBERGS, LAKE ICE, RIVER ICE, LANDSAT, GREENLAND.

Numerous examples of synthetic aperture radar (SAR) imagery

of ice sheets are shown and prominent features of glaciological importance which appear in the images are discussed. Fea-tures which can be identified include surface undulations. tures which can be identified include surface undulations, ciec-flow lines, crevasses, iccbergs, lakes, and streams (even lakes and streams which are inactive or covered by snow, and possibly, the extent of the ablation and wet snow zones SAR images presented here include both L-band data from the Seasat satellite and X-band data from an airborne radar These two data sets werlap at a part of eastern Greenland where a direct comparison can be made between two images Comparison is also made between SAR and Landsat images in western Greenland. It is concluded that SAR and addest are bigsbly complements, instrument, Landsat, imin western Greenland. It is concluded that SAR and Landsat are highly complementary instruments. Landsat images contain minimal distortion while SAR's all-weather, day/night capability plus its ability to penetrate snow provide glaciologists with an additional and very powerful tool for research.

MP 2343 RATIONAL DESIGN OF SLUDGE FREEZING

Martel, C.J., 1988 Joint CSCE-ASCE National Con-Martel, C.J., 1988 Joint CS.E. ASCE National Conference on Environmental Engineering, Vancouver, B.C., July 13-15, 1988 Proceedings. Edited by S.C. Liptak, J.W. Atwater and D.S. Mavinic, Montreal, Quebec, Canadian Society for Civil Engineering, 1988. p.575-581, 6 refs. 42-3536

SLUDGES, WASTE TREATMENT, WATER TREATMENT, FREEZING, FREEZE THAW CY-CLES, ICE CRYSTAL FORMATION, IMPURI-

A new unit operation for studge dewatering called a freezing bed is described. This operation uses the natural seasonal temperature changes in cold regions to freeze and thaw the studge. Equations for prefetting the design depth of the bed are presented along with an example of how they can be used

MP 2344 ALASKA SAR FACILITY.

Weeks, W.F., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings, Vol.1. Edited by W.M. Sackinger and M.O. Jeffres. (Port and ocean engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Institute, 1988, p.103-110, 16 refs. 42-3549

ICE WATER INTERFACE, REMOTE SENSING, DRIFT, AIRBORNE RADAR, ICE MECHANICS, SEA ICE

A short description is given of the general characteristics A short description is given of the general characteristics of the ice/ocean and applications demonstrations research programs that are anticipated as part of the Alaskan SAR Facility (ASF) program. Also described are the characteristics of the three satellite SAR (Synthetic Aperture Radar) systems that will supply data to the ASF and the design and analysis capabilities of the different components of the ground station.

MP 2345 AIRBORNE MEASUREMENT OF SEA ICE THICKNESS AND SUBICE BATHYMETRY.

Kovacs, A., et al, International Conference on Port Kovacs, A., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings, Vol.1. Edited by W.M. Sackinger and M.O. Jeffries. (Port and ocean engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Institute, 1988, p.111-120, 8 refs. Valeau, N.C.

42-3550 ICE COVER THICKNESS, AIRBORNE EQUIP-MENT, ELECTROMAGNETIC PROSPECTING, SOUNDING, SEA ICE, PROFILES.

SOUNDING, SEA ICE, PROFILES.

A pilot study was made in May 1985 to determine the feasibility of using an airborne electromagnetic sounding system for profiling sea ice thickness and the subice water depth and conductivity. The study was made in the area of Prudhoe Bay, Alaska

The multi-frequency airborne electromagnetic sounding system consisted of control and recording electronics and an antenna

The electronics module was installed in a helicopter and the 7-m-long tubular antenna was towed, beneath a helicopter, at about 35 m above the ces surface

Examples of the profiling results are presented, they indicate that, for the electromagnetic system used, both first-year and second-year sea use could be profiled, but the resolution decreased as the ice became rough

This decrease was associated with the large footprint of the system, which effectively smoothed out the sea ice relief

Underwhich effectively smoothed out the sea ice relief Under-iec water depth was determined, as was seawater conductivity. The results of the feasibility study were considered high encouraging and further system development is therefore

ELECTROMAGNETIC MEASUREMENTS OF A SECOND-YEAR SEA ICE FLOE.

Kovacs, A, et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings, Vol.1. Edited by W.M. Sackinger and M.O. Jeffries. (Port and oc an engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Insti-tute, 1988, p 121-136, 7 refs Morey, R.M.

ICE FLOES, ELECTROMAGNETIC PROSPECTING, SEA ICE, ICE COVER THICKNESS, DIELECTRIC PROPERTIES, BRINES, ATTENUA-TION.

TION.
"Impulse" radar and ice property data were obtained on a second-year sea ice floe. These data were used to develop a relationship for estimating the ice thickness from just the two-way time-of-flight of the impulse radar electromagnetic wavelet traveling from the surface to the ice "bottom" and back to the surface. The relationship developed allows estimation of the thickness of sea ice from about 1 to 8 m, with or without a snow cover. The data revealed that the apparent dielectric constant of sea ice decreased with increasing ice thickness until the thickness reached about 4 m. For sea ice thickness that the apparent dielectric constant became relatively constant. With the use of a model for determining the electromagnetic prop.rit.s. of sea ice from its physical properties, as determined from ice cores, the electromagnetic properties were calculated sersis depth. The model results were then compared with the electromagnetic properties determined from field measurements. The two results were in good agreement.

MP 2347
EVALUATION OF AN OPERATIONAL ICE
FORECASTING MODEL DURING SUMMER.
Tucker, W.B., et al, International Conference on Port

and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug 17-22, 1987 Proceedings, Vol 1. Edited by W.M. Sackinger and M.O. Jeffries (Port and ocean engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Institute, 1988, p.159-174, 10 refs. Hibler, W.D., III.

42-3554

42-3334 ICE FORECASTING, DRIFT, ICE CONDITIONS, ICE EDGE, SEASONAL VARIATIONS, MOD-ELS, SEA ICE.

ELS, SEA ICE.

The Polar Ice Prediction System (PIPS) is an ice forecasting model run on a daily basis at the U.S. Navy's Fleet Numerical Oceanographic Center (FNOC). The model was originally developed by Hibler (1979) and subsequently modified by Preller (1985) to run on FNOC'S Cyber 205. Atmospheric forcing fields are derived from the Naval Operational Global Atmospheric Prediction System (NGGAPS). PIPS is run on a 127-km resolution 47 x 25 grid, which covers the entire Arctic Basin and substantial parts of the Greenland and Norwegian Seas. The system produces forecasts of ice drift, thickness, concentration and divergence at 24-hr intervals out to 144 hr (6 days). Although PIPS is run on a daily basis, the concentration field is initialized weekly using a digitized version of the concentration analysis field prepared by the Naval Polar Oceanography Center at Sutland, Maryland. The system's ability to forecast tee drift, concentration and ice edge location was assessed for the period, prepared by the Naval Polar Oceanography Center at Sutland, Maryland
The system's ability to forecast use drift, concentration and ice edge location was assessed for the period, from June 15 to October 15, 1986. The PIPS drift predictions were generally excessive, although the predicted drift directions were reasonable Mean concentration differences between the PIPS forecasts and the analyses were about 12%
Although ice edge location was reasonably predicted in most cases, the model demonstrated a trend of rapid in most cuses, the model demonstrated a trend of rapid ice retreat in the Chukchi and East Siberian Seas that was unrealistic.

MP 2348 EXPERIMENTAL DETERMINATION OF THE FRACTURE TOUGHNESS OF UREA MODEL

, et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings, Vol 1 Edited by W M Sackinger and M O Jeffries. (Port and ocean engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Institute, 1988, p.289-297, 16 refs. Sodhi, D.S., Dempsey, J.P.

42-3000 ICE CRACKS, ICE MODELS, UREA, ICE SOLID INTERFACE, OFFSHORE STRUCTURES, LOADS (FORCES), FRACTURING, EXPERIMENTATION, ICE LOADS, ICE COVER THICKNESS, FLEXURAL STRENGTH.

THICKNESS, FLEXURAL STRENGTH.
The use of different types of model ice in examining ice/structure interactions requires a better understanding of the fracture behavior of these materials in order to accurately interpret the results of model tests. There have been only a limited number of fracture tests performed on model ice. A preliminary experimental study of the fracture toughness of the urea-doped model ice used in the test basin at CRREL lass been completed. An "in-situ" wedge-loaded TDCB (tapered double-cantilever beam) specimen geometry was chosen. An expression for the fracture toughness as a function of applied load, specimen geometry, and ice thickness was developed using a finite element program.

COMPUTER-CONTROLLED DATA ACQUISITION SYSTEM FOR A HYDRAULIC FLUME.

Zabilansky, L.J. International Instrumentation Symposium, 34th, Albuquerque, N.M., May 2-6, 1988. Proceedings, Research Triangle Park, N.C., Instrument Society of America, 1988, p 453-460, 2 refs

CHANNELS (WATERWAYS), ICE FORMATION, FRAZIL ICE, ICE MECHANICS, TEMPERATURE EFFECTS, DATA PROCESSING, ICE ACCRETION, EXPERIMENTATION

MP 2350 COMPARISON OF EXTRACTION TECH-NIQUES FOR MUNITIONS RESIDUES IN SOIL.

Jenkins, T.F., et al, May 1, 1987, 59(9), p.1326-1331, 23 refs. Grant, C.L.

SOIL POLLUTION, MILITARY OPERATION, SOIL COMPOSITION, CHEMICAL ANALYSIS, COUNTERMEASURES

MP 2351
DATA ACQUISITION FOR REFRIGERATED
PHYSICAL MODEL.
Zufelt, J.E., National Conference on Microcomputers
in Civil Engineering, 5th, Orlando, Fl., Nov. 1987.
Proceedings. Edited by W.E. Carroll, [1987], p.338-341, 3 refs. 43-8

LOCKS (WATERWAYS), RIVERS, WINTER OP-ERATION, NAVIGATION, HYDRAULIC STRUCTURES, MODELS.

VENTS AND VAPOR RETARDERS FOR ROOFS. Tobiasson, W., Nov. 1987, 40(11), p 80-90, 22 refs. For another source see 41-4575.

ROOFS. AIR LEAKAGE, MOISTURE, VENTILA-TION, INDOOR CLIMATES, WATER VAPOR, AIR TEMPERATURE, CONDENSATION, COUNTERMEASURES, HUMIDITY.

VERIFICATION TESTS OF THE SURFACE INTEGRAL METHOD FOR CALCULATING STRUCTURAL ICE LOADS.

Johnson, J.B., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings Vol.1. Edited by W.M. Sackinger and M.O. Jeffnes (Port and ocean engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Insti-tute, 1988, p.449-456, 6 refs. Sodhi, D.S.

42-3579

ICE LOADS, OFFSHORE STRUCTURES, STRESSES, ICE CRACKS, EXPERIMENTATION, MEASURING INSTRUMENTS, ACCURACY, ICE SHEETS

Experiments were conducted to determine the accuracy of calculating ice loads on offshore structures using ice stress measurements and a surface integral method. Biaxially-sensitive stress sensors were installed near an ice sheet edge and a flat plate instrumented indentor was pushed against the ice edge to simulate a distributed load on the boundary of a semi-infinite plate. Two experiments were conducted. The first determined the agreement between stress measurements and calculated results for the corresponding analytic solution and examined the accuracy of the surface integral method. The second examined the influence of cracks in the ice sheet on the accuracy of the surface integral method. The measured ice stresses were of the same order but less than the calculated using theory. The calculated indentor loads using the plane surface integration were within 8 to 30% of th: measured loads. Calculated loads using a cylindrical integration surface were only within 40 to 50% of the measured loads due to stress sensor resolution limitations. The surface integral method is a viable way to calculate structural ice loads using in-situ stress measure-Experiments were conducted to determine the accuracy of limitations. The surface integral method is a viable way to calculate structural ice loads using in-situ stress measurements. Accuracy of the load calculations is limited by the fidelity of representing the stress along the surface of the integration using widely-spaced stress measurements

MP 2354 MUKLUK ICE STRESS MEASUREMENT PRO-GRAM.

GRAM.

Cox, G.F.N., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings, Vol.1. Edited by W.M. Sackinger and M.O. Jeffries. Port and ocean engineering under Arctic conditions), Fairbanks, University of Alaska, Geophysical Institute, 1988, p.457-463, 8 refs.

Johnson, J.B., Bosworth, H W, Vincent, T J

42-3580
ICE LOADS, ARTIFICIAL ISLANDS, STRESSES,
TENSILE PROPERTIES, COMPRESSIVE PROPERTIES, GRAVEL, ICE MECHANICS, ICE
STRENGTH, ICE SALINITY, SHEAR STRESS,
BEAUFORT SEA.

BEAUFORT SEA.

During the spring of 1985, 23 biaxial ice stress sensors were deployed at seven sites around Mukluk, a man-made gravel island in Harrison Bay in the Beaufort Sea. The maximum measured compressive and tensite stresses were 240 and 340 kPa, respectively. However, stresses were usually less than 100 kPa and seldom exceeded 200 kPa. There were no major storms, and net ice motions varied from 16 to 5 3 m during the measurement program. White significant warming of the ice sheet occurred during the latter part of the study, thermal ice stresses were much lower than those previously measured in Mackenzie Bay was more saline and had a lower modulus and yield strength than the ice in Mackenzie Bay.

MP 2355 FOX PERMAFROST TUNNEL: A LATE QUAT-ERNARY GEOLOGIC RECORD IN CENTRAL ALASKA

Hamilton, T.D., et al. June 1988, 100(6), p.948-969, 70

Craig, J.L., Sellmann, P.V.

PERMAFROST, TUN NELS, GEOLOGIC STRUC-TURES, QUATERNARY DEPOSITS.

MP 2356

MP 2350
DIELECTRIC PROPERTIES OF STRAINED
ICE. 1: EFFECT OF PLASTIC STRAINING.
Itagaki, K., Mar. 1987, 48(3 Suppl.), Symposium on
the Physics and Chemistry of Ice, 7th, Grenoble,
Irance, Scp. 1-5, 1986. (Proceedings), p.1-3-147,
5 refs., With French summary.

ICE ELECTRICAL PROPERTIES, ICE RELAXA-TION, ICE PLASTICITY, DIELECTRIC PROPER-TIES, STRAIN TESTS.

The effect of plastic straining on single crystals of ice was exemined. As strain increased plastically, relaxation strength increased linearly as the relaxation time increased

DIELECTRIC PROPERTIES OF STRAINED ICE. 2: EFFECT OF SAMPLE PREPARATION METHOD.

Istagaki, K., et al, Mar. 1987, 48(3 Suppl.), Symposium on the Physics and Chemistry of Ice, 7th, Grenoble, France, Sep. 1-5, 1986. [Proceedings], p.149-153, 5 refs. With French summary. emieux, G.E.

42-3793 ICE ELECTRICAL PROPERTIES, ICE CRYSTAL STRUCTURE, ICE SAMPLING, DIELECTRIC PROPERTIES, STRAIN TESTS, FREEZING.

Since most commonly used sample preparation methods for ice dielectric studies involve rather heavy mechanical straining, the effects of straining were studied and compared with more strain-free sample preparation methods.

MP 2358

MP 2358
PRELIMINARY STUDY OF FRICTION BETWEEN ICE AND SLED RUNNERS.
Itagaki, K., et al, Mar 1987, 48(3 Suppl.), Symposium
on the Physics and Chemistry of Ice, 7th, Grenoble, France, Sep. 1-5, 1986. [Proceedings], p.297-301, 5 refs.. With French summary. Lemieux, G.E., Huber, N.P.

42.3811 ICE FRICTION, SLEDS, WATER FILMS, ICE MELTING, TEMPERATURE EFFECTS, LUBRICANTS, MODELS.

The effects of runner material and surface conditions on the friction between runners and ice were studied by measuring the velocity of a free-sliding sled. Smooth runners showed lower friction at around -1 C than around -10 C as expected, but the friction of rough runners showed little temperature

MP 2359 ON THE MICROMETEOROLOGY OF SUR-FACE HOAR GROWTH ON SNOW IN MOUN-TAINOUS AREA.
Colbeck, S.C., July 1988, 44(1-2), p.1-12, 16 refs.

HOARFROST, SNOW SURFACE, SNOW AIR IN-TERFACE, TURBULENCE.

NATURAL GROUND TEMPERATURES IN UP-LAND BEDROCK TERRAIN, INTERIOR ALAS-

Collins, C.M., et al, International Conference on Permafrost, 5th, Trondheim, Norway, Aug 2-5, 1988. Proceedings, Vol.1. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, (1988), p 56-60, 20 refs.

Haugen, R.K., Kreig, R.A.

42:3984
TAIGA, PERMAFROST IHERMAL PROPERTIES, SOIL TEMPERATURE, DISCONTINUOUS PERMAFROST, SLOPE ORIENTATION, VEGETATION, ALTITUDE, TOPOGRAPHIC EFFECTS, UNITED STATES—ALASKA.

FEC15, UNITED STATES—ALASKA.
Surface and subsurface ground temperature measurements were made in drill holes representing a variety of permafrost-non-permafrost, slope exposure, elevation, vegetation, and soil conditions within the upland targa of interior Alaska Algorithms representing equivalent latitude and air temperature/elevation relationships are developed to more precisely define permafrost-non-permafros boundaries within this complex terrain.

MF 2361 : IICROSTRUCTURE OF *ROZEN SOILS EX-AMINED BY SEM.

Kumai, M., International Concrence on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.1. Edited by K. Senne et, Trondheim, Norway, Tapir Publishers, [1988], p.: 90-395, 8 refs. 42-4049

FROZEN GROUND PHYSICS, OIL STRUCTURE, MICROSTRUCTURE, SCALLYING ELECTRON MICROSCOPY, X RAY ANALYSIS, CLAY, POROSITY, ICE SUBLIMATION, CHEMICAL ANALYSIS, GRAIN SIZE.

ANALYSIS, GRAIN SIZE.
Physical properties of bentonite, dickite and sand samples for freezing experiments were examined with a scanning electron microscope (SEM), and elemental compositions were measured with an energy dispersive x-ray (EDX) analyzer. Bentonite from Umiat, Alaska, is a typical cold-regions swelling clay with thin, crumpled and folded structures. The soil samples with relatively high water contents were frozen, and the frozen characteristics were examined with the SEM equipped with a cold stage. SEM images of frozen bentonite and dickite showed characteristics segregated re and coagulated soil patterns formed during freezing processes and porous structures formed during the sublimation stage of ice in frozen soils. However, frozen sand showed no typical ice segregation and sand grain coagulation because of the large grain size. The freeze sublimation process of frozen clay and silt increases the permeability to water vapor because of the porous structure formation.

MP 2362

METHOD FOR MEASURING THE RATE OF WATER TRANSPORT DUE TO TEMPERATURE GRADIENTS IN UNSATURATED FROZEN

Nakano, Y., et al. International Conference on Permarost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol 1. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, (1988), p.412-417, 7 refs.

Tice, A.R. 42-4053

42-4053
TEMPERATURE GRADIENTS, FROZEN
GROUND TEMPERATURE, SOIL WATER MIGRATION, SATURATION, WATER CONTENT,
ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).

A new experimental method is introduced to determine the rate of water movement caused by temperature gradients in unsaturated frozen soils. When a linear temperature distribution is imposed on a closed soil column with initially a uniforin water content, a redistribution of water occurs in the co. unm. As time increases, the profile of water is stabilized to appreach a stationary profile, which is used to calculate the rate of water movement due to temperature gradient. The theoretical justification of the method is presented and the feasibility of the method is demonstrated by experiments with a matine-deposited clay.

MEASUREMENT OF THE UNFROZEN WATER CONTENT OF SOILS: A COMPARISON OF NMR AND TOR METHODS.

Smith, M.W., et al, International Conference on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988.
Proceedings, Vol.1. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, [1988], p.473-477, 10 refs.

Tice, A.R. 42-4064

UNFROZEN WATER CONTENT, SOIL WATER, FROZEN GROUND, TEMPERATURE EFFECTS, DIELECTRIC PROPERTIES, EXPERIMENTATION. NUCLEAR MAGNETIC RESONANCE, REFLECTIVITY, WATER CONTENT.

REFLECTIVITY, WATER CONTENT.

A laboratory testing program was carried out to compare two independent methods for determining the unfrozen water content of soils. With the TDR method, the unfrozen water content is inferred from a calibration curve of apparent inelectric constant versus volumetric water content, determined by experiment. Previously, precise calibration of the TDR technique was hindered by the lack of a reference comparison method, which NMR now offers. This has provided a much greater scope for calibration, including a wide range of soil types and temperature (unfrozen water content). The results of the testing program yielded a relationship between that is largely unaffected by soil type, although a subtle but apparent dependency on the texture of the soil was noted. It is suggested that this effect originates from the lower valued dielectric constant for adsorbed soil water. In spite of this, the general equation was cented may be considered adequate for most practical program of the standard error estimate is 0.015 cu cm/cu cm, ai, hough, if desirable, this may be reduced by calibrating for individual soils. But guidelines on system and probe design are offered to help ensure that use of the TDR method will give results consistent with the relationship presented. with the relationship presented

BOREHOLE INVESTIGATIONS OF THE ELEC-TRICAL PROPERTIES OF FROZEN SILT.

Arcone, S.A., et al, International Conference on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, [1988], p.910-915, 16 refs.

Delaney, A.J.

42-4148
FROZEN GROUND PHYSICS, ELECTRICAL
PROPERTIES, BOREHOLES, GROUND ICE,
FROZEN GROUND TEMPERATURE, DIELECTRIC PROPERTIES, ATTENUATION, SEDI-MENTS, WATER CONTENT.

MEN'IS, WATER CONTENT:
The dielectric constant and attenuation rate of short radiowave pulses in frozen Fairbanks silt have been measured between boreholes 12 m deep and spaced between 4.4 and 176 m. The ranges for volumetric ice content and temperature were 44 to 79% and -60 (surface, early Apr.) to -0.7 C (bottom) respectively.

The pulses lasted approximately 30 ns, had a power spectrum centered near 100 MHz, and were transmitted and received at the same depth Diesertic constants were determined from the propagation. and were transmitted and received at the same depth Dielectric constants were determined from the propagation time
delay of the the leading edge and there was no significant
dispersion. Attenuation rates (dB/m) were determined
by comparing signal levels received between different borehole
pairs and were adjusted for geometric spreading losses Concurrent borehole de resistivity measurements allowed estimates
of the separate contributions of various loss mechanisms
The results show the dielectric constant to vary between
4.3 and 7.0 and to correlate well with the volumetric ice
content, but not with temperature. Average attenuation
rates at any particular depth varied between 14 and 40
dB/m. The lowest values occurred in the sections with
the higher ice content. No more than 08 dB/m could
be ascribed to conductive absorption losses, suggesting that
scattering is an important loss mechanism

SEASONAL VARIATIONS IN RESISTIVITY AND TEMPERATURE IN DISCONTINUOUS PERMAFROST.

Delaney, A.J., et al, International Conference on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, (1988), p.927-932, 16 refs.

Sellmann, P.V., Arcone, S.A.

42-4151

42-4151
DISCONTINUOUS PERMAFROST, PERMAFROST THERMAL PROPERTIES, ELECTRICAL
RESISTIVITY, FROZEN GROUND PHYSICS,
BOREHOLES, SEDIMENTS, UNFROZEN
WATER CONTENT, GRAIN SIZE, FROZEN
GROUND TEMPERATURE.

Electrical resistivity and temperature were measured in two 12.2-m-deep boreholes in interior Alaska in perennially frozen ice-rich sit and in coarse-grained alhvium. Seasonal temperature and resistivity changes were most noticeable in the upper 6 m at both sites, with resistivity varying more than several thousand ohm-m during, no year. Resistivity profiles were compared with lithology, temperature and moisture content. At the alluvium site reristivity and grain size strongly correlated. Values ranging over 10,000 ohmmoccurred with coarse-grained material and values an order of magnitude lower occurred in the fine-grained material section. At the ice-rich site site, resistivity values were generally lower, but in agreement with values for the fine-grained part of the alluvial section. Lithologic variations in the discontinuous permafrost zone can be as important as the high permafrost temperatures and correspondingly large unfrozen water contents in accounting for significant seasonal resistivity changes in fine-grained sediment. Electrical resistivity and temperature were measured in two

MP 2366

MP 2306
D.C. RESISTIVITY ALONG THE COAST AT
PRUDHOE BAY, ALASKA.
Sellmann, P.V., et al, International Conference on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988
Proceedings, Vol.2. Edited by K. Senneset, Frondheim, Norway, Tapir Publishers, [1988], p.988-993,

Delancy, A.J., Arcone, S.A.

42-416 SUBSEA PERMAFROST, PERMAFROST DISTRIBUTION, TUNDRA, MODELS, PERMAFROST PHYSICS, SHORELINE MODIFICATION, ELECTRICAL RESISTIVITY, SOUNDING. SHORE TRICAL RESISTIVITY, SOUNDING. EROSION. UNITED STATES—A UNITED STATES-ALASKA PRUDHOE BAY.

PRUDHOE BAY.

Electrical resistivity measurements, at three sites in Prudhoe Bay, Alaska, were made to provide an understanding of manne modification to coastal permafrost, and to evaluate D.C. resistivity techniques for coastal subsea permafrost studies. The measurements were made using Wenner electrical resistivity soundings. Profiles extended 2.8 km offshore and inland beyond the last signs of tundra modification by coastal processes of tundra modification with a floating cable, and inland measurements were made using driven electro-les. The observations indicate that

the electrical properties of permafrost beneath the coastal bluff and adjacent tundra are rapidly modified by coastal erosion and periodic flooding during storms. Along one control line, apparent resistivity changes corresponded with the configuration of the top of ice-bonded permafrost observed by Baker (1987). Modeling supported by the control data permitted a close interpretation of the position of the top of ice-bounded subsea permafrost and provided a range of real resistivities for offshore materials.

FROST HEAVE FORCES ON H AND PIPE FOUNDATION PILES.

Buska, J.S., et al, International Conference on Perma frost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, [1988], p.1039-1044, 6

Johnson, J.B.

42-4173
FROST HEAVE, PILE EXTRACTION, PIPELINE SUPPORTS, SHEAR STRESS, LOADS (FORCES), ACTIVE LAYER, ADHESION, FOUNDATIONS, AIR TEMPERATURE, FROZEN GROUND TEMPERATURE, UNITED STATES—ALASKA— FAIRBANKS.

FAIRBANKS.

The magnitude and variation of forces and shear stresses, caused by frost heaving in Fairbanks silt and the adfreeze effects of a surface ice layer and a gravel layer, were determined as a function of depth along the upper 275 m of a pipe pile and an H pile for three consecutive winter seasons (1982-1985)

The peak frost heaving forces on the H pile during each winter were 752, 790 and 802 kN

Peak frost heaving forces on the pipe pile of 1118 and 1115 kN were determined only for the second and third winter seasons.

Maximum average shear stresses acting on the pipe pile were 627 and 972 kPa for the second and third winter seasons.

The surfficial cell layer may have contributed pipe pite were 02/ and 9/2 kfa for the second and third winter seasons. The surfficial feel leyer may have contributed 15 to 20% of the peak forces measured on the piles. The gravel layer on the H pile contributed about 35% of the peak forces measured.

MP 2368

NEW FREEZING TEST FOR DETERMINING FROST SUSCEPTIBILITY.

Chamberlain, E.J., International Conference on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, [1988], p.1045-1050, 6 refs.

FROST RESISTANCE, SOIL FREEZING, PAVE-MENTS, FROST HEAVE, ARTIFICIAL FREEZ-ING, TESTS, FREEZE THAW CYCLES, TEMPF R-

ING, TESTS, FREEZE THAW CYCLES, TEMPF R-ATURE CONTROL, EQUIPMENT.

A new freezing test for determining the frost susceptibility of soils used in pavement systems is designed to supplaint estandard CREEL freezing test. This new test cuts the time required to determine frost susceptibility in half it also allows for the determination of both the frost heave and thaw weakening susceptibilities and considers the effects of freeze-thaw cycling. The new freezing test also eliminates much of the variability in test results by completely automating the temperature control and the data observations.

MP 2369

USE OF GEOTEXTILES TO MITIGATE FROST HEAVE IN SOILS.

Henry, K., International Conference on Permafrost, Sth, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol 2 Edited by K Senneset, Trondheim, Norway, Tapir Publishers, [1988], p 1096-1101, 14 refs. 42-4183

42-4183
FROST HEAVE, FROZEN GROUND MECHAN-ICS, MATERIALS, GRAIN SIZE, WATER TABLE, COUNTERMEASURES, SOIL WATER MIGRA-TION, CAPILLARITY, POROSITY.

TION. CAPILLARITY, POROSITY.

One potential use of geotextiles is horizontal placement in soil above the water table to act as a capillary break orbarrier to mitigate frost heave. A capillary break works because larger pore sizes and/or wetting angles of the material than surrounding soil result in 10 er unsaturated hydraule conductivity and lowered height of capillary rise of water. This reduces frost heave by limiting the rate of upward water migration. Fix series of open-system, unidirectional frost-heave tests were run in which 3 nonwoven polypropylene geotextiles were tested for their ability to mitigate frost heave. Certain fabries were successful in reducing frost heave by as much as 35%. Test results also indicate that the optimum fabric thickness required to mitigate frost high ce is a function of soil type as well as properties of the geotextile.

MP 2370

EFFECT OF VARIABLE THERMAL PROPERTIES ON FREEZING WITH AN UNFROZEN WATER CONTENT.

Lunardin, V.J., International Conference on Perma-frost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Pro-ceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, 1988₁, p.1127-1132, 17 refs.

TREEZING POINTS, THERMAL CONDUCTIVITY, UNFROZEN WATER CONTENT, HEAT TRANSFER, PERMAFROST THERMAL PROPERTIES, PHASE TRANSFORMATIONS, TEMPERATURE EFFECTS, GROUND THAWING, ANALYSIS (MATHEMATICS).

ANALYSIS (MATHEMATICS).
While many materials undergo phase change at a fixed temperature, the variation of unfrozen water with temperature causes a soil system to freeze or thaw over a finite temperature range. Exact and approximate solutions are given for conduction phase change of plane layers of soil with unfrozen water contents that vary linearly and quadratically with temperature. The temperatures and phase change depths are found to vary significantly from those predicted for the constant temperature (Neumann) problem. The thermal conductivity and specific heat of the soil within the mushy zone varied as a function of unfrozen water content. The effect of specific heat is negligible and the effect of variable thermal conductivity can be accounted for by a proper choice of thermal properties used in the constant thermal property solution.

MP 2371

TRIAXIAL COMPRESSIVE STRENGTH OF FROZEN SOILS UNDER CONSTANT STRAIN RATES.

Zhu, Y., et al, International Conference on Permafror, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Aug. 2-6, 1988. way, Tapir Publishers, (1988), p.1200-1205b, 10 refs.

Carbee, D.L. 42-4204

FROZEN GROUND STRENGTH, STRAIN TESTS, COMPRESSIVE PROPERTIES, FROZEN FROZEN GROUND MECHANICS, STRESSES, SANDS, DEFORMATION, LOADS (FORCES), SHEAR STRENGTH.

STRENGTH.

Traxial compressive strength tests were conducted on remolded, saturated Fairbanks silt and Northw'st sand taken from Alaska under various constant strain rates ranging from 5-27/10,000,000 to 9 841/0,000/s and confining pressures up to 3 43 MPa at -2 C The average dry density of the samples tested were 120 g/cu cm for silt and 1.52 g/cu cm for sand, respectively. It was found that, within the range of confining pressure employed, the maximum deviator stress for the silt did not vary.

MP 2372 DEVELOPING A THAWING MODEL FOR SLUDGE FREEZING BEDS

Martel, C.J., International Conference on Permafrost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Proceedings, Vol.2. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, (1988), p.1426-1430, 7 refs. 42-4247

SLUDGES, THAW DEPTH, FREEZE THAW CY-CLES, WASTE TREATMENT, WATER TREAT-MENT, MATHEMATICAL MODELS, FORE-CASTING, DRYING, FREEZING.

This paper presents the development of a model that can be used to predict the thawing design depth of a sludge freezing bed. A sludge fir ezing bed is a new unit operation for dewatering sludges from water and wastewater treatment plants. Preliminary results obtained from a pilot-scale freezing bed indicate that this valed is valid.

MP 2373 OBSERVATIONS OF MOISTURE MIGRATION IN FROZEN SOILS DURING THAWING.

Cheng, G., et al., International Conference on Perma-frost, 5th, Trondheim, Norway, Aug. 2-5, 1988. Pro-ceedings, Vol 1. Edited by K. Senneset, Trondheim, Norway, Tapir Publishers, (1988), p.308-312, 14

Chamberlain, E.J. 42-4032

GROUND THAWING, SOIL WATER MIGPA-TION, FROZEN GROUND, WATER CONTENT, TESTS, ICE LENSES, FROST HEAVE, ICE FOR-

MATION.

Open and closed system tests on prefrozen silt and elay were conducted to investigate moisture migration in frozen soils during thawing. In all tests, an increase in water content just below the thawing front was observed. In some cases, a thawing fringe, ice lenses and frost heave were recorded. Water migration into the frozen part of thawing soil was greatly reduced after a continuous ice lens had formed across a sample. A regelation mechanism for ice formation in frozen soil during thawing is suggested.

PATTERNS OF VEGETATION RECOVERY AFTER TUNDRA FIRES IN NORTHWESTERN ALASKA, U.S.A.

Racine, C., et al, Nov. 1987, 19(4), p.461-469, 17 refs. Johnson, L.A., Viereck, L.A.

43-194
REVEGETATION, PLANT ECOLOGY, TUN-DRA. FIRES.

M^o 2375

MANAGEMENT OF NORTHERN GRAVEL SITES FOR SUCCESSFUL RECLAMATION: A REVIEW.

Johnson, L.A., Nov. 1987, 19(4), p.530-536, 29 refs.

REVEGETATION, GRAVEL.

MP 2376

EVALUATION OF THE X-RAY RADIOGRAPHY EFFICIENCY FOR HEAVING AND CONSOLIDATION OBSERVATION.

Akagawa, S., International Symposium on Ground Freezing, 5th, Nottingham, England, July 26-28, 1988. Proceedings. Ground freezing 88, Vol.1, Rotterdam, Netherlands, A.A. Balkema, 1988, p.23-28, 3 refs.

FROST HEAVE, SOIL FREEZING, CLAYS, STRAINS, FROZEN GROUND MECHANICS, FROZEN GROUND PHYSICS, X RAY ANALYSIS, TESTS, FROST RESISTANCE, ATTENUATION, COMPUTER APPLICATIONS

The step freeze tests were conducted during which 136 radiographs were taken. These were used to test the feasibility of utilizing X-rays as a nondestructive method for observing changes in a soil's physical and mechanical properties due to frost heave. The radiographs were properties due to frost heave. The radiographs were analyzed using computer image processing techniques to measure the position of lead spheres embedded in the soil column and to examine the spatial distribution of intensity changes of the transmitted X-rays. An analysis of the attenuation properties of frozen soil is presented. A linear correlation between the soil's attenuation of X-rays and the amount of heave and consolidation is determined. This relationship is utilized to compute their distributions are filler. is utilized to compute strain distribution profiles.

MP 2377 STATE OF THE ART: MECHANICAL PROPER-

STATE OF THE ART: MECHANICAL PROPERTILS OF FROZEN SOIL.
Sayles, F.H., International Symposium on Ground Freezing, 5th, Nottingham, England, July 26-28, 1988.
Proceedings. Ground freezing 88, Vol.1, Rotterdam, Netherlands, A.A. Balkema, 1988, p.143-165, Refs. p.160-165.

93-12
SOIL CREEP, FROZEN GROUND MECHANICS, FROZEN GROUND PHYSICS, STRESS STRAIN DIAGRAMS, FROZEN GROUND STRENGTH, ANALYSIS (MATHEMATICS), COMPRESSIVE PROPERTIES, RHEOLOGY.

MP 2378 FREEZING A TEMPORARY ROADWAY FOR TRANSPORT OF A 3000 TON DRAGLINE.

Maishman, D., et al, International Symposium on Ground Freezing, 5th, Nottingham, England, July 26-28, 1988. Proceedings. Ground freezing 88, Vol.1, Rotterdam, Netherlands, A.A. Balkema, 1988, p.357-365, 16 refs.

Powers, J.P., Lunardini, V.J.

SOIL FREEZING, ROADS, FROZEN GROUND STRENGTH, ARTIFICIAL FREEZING, SOIL STABILIZATION, MATHEMATICAL MODELS, DESIGN, TEMPERATURE EFFECTS, THERMAL CONDUCTIVITY.

This unusual ground freezing operation – probably the biggest ever accomplished in the United States—enabled a giant dragline 24 m wide to walk 700 m across the alluvial flood plain of the Green River in Kentucky in one day. The paper describes the environmental constraints that made the procedure necessary and the special pipelaying and ground insulation methods employed. The thermal progress of the preject is reviewed and appropriate design methods are elaborated.

MP 2379

ARCTIC RESEARCH OF THE UNITED STATES, VOL.2.

U.S. Interagency Arctic Research Policy Committee. Washington, D.C., Spring 1988, 76p., For selected papers see 42-4274 through 42-4276.

Brown, J., ed. Cate, D. ed. Bowen, S.L. ed. Valliere.

42-4273

PROJECTS, POLAR REGIONS. DATA PROCESSING. MEETINGS

The articles in this first issue of 1988 are divided into three main sections. The first focuses on non-Federal research in Alsaka and selected Federal support activities involving data and information acquisition, storage and dissemi-

nation The second section presents reports on meetings and activities of international interest predominantly onginating outside the U.S. The third section contains brief reports of other Arctic research activities, primarly in the U.S. Reports of meetings of the Arctic Research Commission and the Interagency Committee and notices of upcoming meetings are a regular feature of the journal.

MP 2380 ALASKA SAR FACILITY: AN UPDATE. Weller, G., et al, Spring 1988, Vol.2, p.27-31, 5 refs. Weeks, W.F.

42-4274 DATA PROCESSING, SEA ICE, RADAR ECHOES.

MP 2381

FRAZIL ICE IN RIVERS AND STREAMS. Daly, S.F., Fall/winter 1987, 19(3-4), p.19-26, For another source see 42-1690. 34 refs. 42-4284

FRAZIL ICE, SUPERCOOLING, LABORATORY TECHNIQUES.

MP 2382 ON THE EFFECT OF THE 4 C DENSITY MAX-IMUM ON MELTING HEAT TRANSFER.

Yen, Y.-C., International Symposium on Phase Change Heat Transfer, Chongqing, Sichuan, China, May 20-23, 1988. Proceedings. Advances in phase change heat transfer. Edited by M. Xin, Beijing, China, International Academic Publishers, 1988, p.362-367, 15 refs. 42-4309

HEAT TRANSFER, ICE MELTING, ICE WATER INTERFACE, DENSITY (MASS/VOLUME), CONVECTION, ANALYSIS (MATHEMATICS).

The effect of the 4 C density maximum on heat transfer in a water layer formed by melting ice has been investigated. The anomalous density maximum of water at about 4 C has been attributed to the occurrence of a constant temperature region within the layer and has resulted in variable critical Rayleigh numbers dependent on both the warm boundary temperature and the direction of melting

MP 2383 PHASE CHANGE HEAT TRANSFER PROGRAM FOR MICROCOMPUTERS.

Buzzell, G.M., et al, International Symposium on Phase Change Heat Transfer, Chongqing, Sichuan, China, May 20-23, 1988. Proceedings. Advances in phase change heat transfer. Edited by M. Xin, Beij-ing, China, International Academic Publishers, 1988, p.645-650, 22 refs.

p.645-650, 22 reis.
Farag, I.H., Phetteplace, G.
42-4312
HEAT TRANSFER, PHASE TRANSFORMATIONS, COMPUTER PROGRAMS, ELECTRIC
EQUIPMENT, FREEZE THAW CYCLES, MELTING, ANALYSIS (MATHEMATICS), FREEZING,
1 ATENT HEAT LATENT HEAT.

The development of a microcomputer based finite element The development of a microcomputer based finite element program featuring phase change (melting and freezing) simulation facilities is outlined. A closed form Galerkin finite element method derived from a delta function formulation of the latent heat discontinuity in the heat capacity versus temperature function is used within phase change elements of the solution domain. Storage reduction data structures are implemented and compared on the basis of overall program execution time. Analytical solutions for melting and freezing are used to verify program accuracy and to explore other simulation parameters such as time step size, mesh density and start-up technique. Several "life like" phase change simulations are compared to the results obtained from other numerical models, main frame and microcomputer performance based on execution time is tabulated for each of these cases.

MP 2384

APPROXIMATE ANALYTICAL SOLUTION OF A STEFAN'S PROBLEM IN A FINITE DOMAIN. Takagi, S., June 1988, 46(2), p.245-266, 17 refs. 43-154

STEFAN PROBLEM.

MP 2385 MICROCOMPUTER-BASED IMAGE-PROC-

ESSING SYSTEM.
Perovich, D.K., et al. 1988, 34(117), p 249-252, 14

Hirai, A. 43-172

SEA ICE. ICE COVER, ICE STRUCTURE, COM-PUTERS, SURFACE PROPERTIES, STATISTI-CAL ANALYSIS, SNOW COVER, MI-**CROWAVES**

CROWAVES.
Inexpensive add-on boards are currently available that enable personal computers to be used as digital image-processing systems. The capabilities of one such system are illustrated by two specific cases examining the surface characterization of a sea ice cover and the statistical description of sea-ice structure. The unit discussed digitares video input into a 512 x 512 array of pixels, assigning each a gray shade from 0 to 255. A key feature of the system is

that the primitive commands of the board can be accessed through higher-level programming languages. This allows users to customize easily the system for their own needs.

MP 2386 ATMOSPHERIC STABILITY FROM SCINTIL-LATION MEASUREMENTS.

Andreas, E.L., June 1, 1988, 27(11), p.22 11-2246, 39 refs. 43-283

ATMOSPHERIC PHYSICS PHENOMENA, TURBULENCE PHYSICS. OPTICAL

MP 2387 MEASUREMENT AND EVALUATION OF TIRE PERFORMANCE UNDER WINTER CONDI-TIONS

Blaisdell, G.L., 1985, No.35, Vinterkunskap och vinblaisdeli, G.L., 1963, No.35, Vinterkunskap och vinterdata _Ikonferens₁, Örnsköldsvik, Sweden, Mar. 26-28, 1985. (Winter Knowledge and Winter Data Conference, Örnsköldsvik, Sweden, Mar. 26-28, 1985), p.198-228, 8 refs.

COLD WEATHER OPERATION, TIRES, SNOW COVER EFFECT, ROADS, MODELS, TRAFFICA-BILITY, VEHICLES, TRACTION, SNOW COM-PACTION, FORECASTING.

PACTION, FORECASTING.

With the advent of sophisticated instrumented vehicles, the study of vehicle mobility on cold regions materials is seeing numerous changes. This includes the development of new methods of measuring traditional mobility parameters, new insight into the mechanics of the tire-surface material interaction, and the generation of new predictive models. This paper reviews (a) the techniques currently used in the United States for the measurement and analysis of vehicle mobility in snow which utilize instrumented vehicle technology, 60 the current state of prediction of wheeled vehicle mobility in snow and (c) suggests directions for future studies. in snow and (c) suggests directions for future studies.

MODEL STUDY OF ICE FORCES ON A SINGLE PILE.

Zabilansky, L.J., IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol.3, (1986), p.77-87, 2 refs. 43-262

ICE LOADS, PILE STRUCTURES, OFFSHORE STRUCTURES, ICE PRESSURE, ICE SOLID INTERFACE, PILE EXTRACTION, TESTS, CON-STRUCTION MATERIALS, STRESSES.

STRUCTION MATERIALS, STRESSES.

Water level variations caused by wind, tides or seiche action during periods of open water seldom test the integrity of marine structures. Yet these same variations combined with an ice sheet may severely damage or completely destroy the same structures. Light-duty, pile-founded dock structures, typical of marinas, are especially susceptible to this type of environmental damage. As a wave passes under the ice sheet. Subsequently the piles are subjected to an uplifting force equivalent to the hydrostatic force associated with the ice sheet deflection. Over the course of a winter this repeated loading may incrementally extract the pile from its foundation. This laboratory study used a two-step approach for investigating the uplifting ice force phenomenon. First, a testing technique that reproduced the ice condition surrounding a prototype pile was developed in the second phase, the testing technique was used to evaluate methods of passively protecting the piles from induced uplift. Highlights of the tests are reported here, but a complete discussion of the tests are reported by Zabilansky (1987)

STATIC AND DYNAMIC ICE LOADS ON THE YAMACHICHE BEND LIGHTPIER, 1984-86.

Frederking, R., et al. IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol.3, (1986), p.115-126. 14 refs

Haynes, F.D., Hodgson, T.P., Sayed, M.

ICE LOADS, PIERS, STRESSES, STATIC LOADS, MEASURING INSTRUMENTS. LOADS

lee load measuring sensors were installed on the Yamachiche Bend lightpier in the St. Lawrence Riser downstream from Montreal. Panels consusting of steel plates supported on load cells are used to measure static loads while accelerometers are used to monitor dynamic loads. Operation of the system over the winters of 1983-84 to 1985-86 is described and some preliminary estimates of the total ice forces on the pier are presented. MP 2390 FIELD TECHNIQUES FOR OBTAINING ENGI-NEERING CHARACTERISTICS OF FRAZIL ICE **ACCUMULATIONS**

Dean, A.M., Jr., IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol.3, 1986, p.265-278, 9 refs. Proceedings, Vol.3,

FRAZIL ICE, ICE FORMATION, ICE PHYSICS, ICE NAVIGATION, CHANNELS (WATER-WAYS), ICE JAMS, WATER FLOW, ICE STRENGTH, MEASURING INSTRUMENTS.

STRENGTH, MEASURING INSTRUMENTS.

With the increased utilization of flood plains, navigation and power generation in northern climates, it becomes increasingly important to understand the engineering characteristics of frazil ice accumulations. Frazil is generated and accumulates over large areas in waterways. Navigation through such great amounts of frazil will be impeded. Power generation suffers from the restricted flow caused by frazil accumulation. Having been generated in large quantities and attached as underhanging dams, frazil significantly increases flooding potentials through channel restrictions and an increase in the total ice volume in a waterway. Techniques for measuring the physical properties of frazil ice are presented. These data will assist in predicting the flow patterns and the jamming potential in a waterway, the properties include porosity, density, vane shear strength, permeability and a measure of the structural strength (expressed through plate load bearing, dilatometer, and penetrometer or rammsonde data). Further characteristics include remote sensing of the accumulation and flow profiling beneath the accumulations. Examples of the acquired data are given

MP 2391 CONTROL ED RIVER ICE COVER BREAKUP; PART 1. HUDSON RIVER FIELD EXPERI-

MENTS. Ferrick, M.G., et al, IAHR Symposium on Ice, 8th, lowa City, Aug. 18-22, 1986. Proceedings, Vol.3, §1986, p.281-291, 5 refs.

emieux, G.E., Mulherin, N., Demont, W. 43-274

RIVER ICE, ICE BREAKUP, ICE JAMS, WATER FLOW, RIVER FLOW, DAMS, VELOCITY, ICE CONDITIONS, UNITED STATES—NEW YORK -HUDSON RIVER.

—HUDSON RIVER.
Field studies of a reach of the Hudson River have focused on developing a technique to induce the controlled breakup of an ice cover or ice jam by releasing water from an upstream dam. A series of abrupt dam releases generated long-period river waves of different magnitudes, durations and spacings that caused changes in river stage, water surface slope, flow velocity, energy gradient of the flow, and integrity of the ice cover. We monitored river stage and ice cover response at several locations, and repeated the stage measurements with the same releases during open water conditions. These studies have revealed that pulsed releases of a practical magnitude were effective in removing the ice cover from the reach, and they provide basic data for more general analysis of river ice cover breakup.

MP 2392 CONTROLLED RIVER ICE COVER BREAKUP: PART 2. THEORY AND NUMERICAL MODEL STUDIES

Ferrick, M.G., et al. IAHR Symposium on Ice, 8th, Iowa City, Aug. 18-22, 1986. Proceedings, Vol.3, 1986, p.293-305, 5 refs
Lemieux, G.E., Mulherin, N., Demont, W.

RIVER ICE, ICE BREAKUP, HYDRODYNAMICS, ICE STRENGTH, MATHEMATICAL MODELS, THEORIES, DYNAMIC PROPERTIES, ICE

We have formulated a theory of dynamic ice breakup that is based on the data and observations presented in part 1 of this paper and additional observations of breakup on other rivers. The hydrodynamic forces that cause a dynamic breakup depend on the flow energy gradient, and resistance is a function of ice strength and ice cover support. In this paper we focus on the factors that affect the energy this paper we locus on the factors that affect the energy gradient, and we treat ice strength and breakup empirically Data that directly test the theory and quantify the relationship between river waves and ice breakup observed in the field were obtained by adapting a numerical model to the Hudson River study reach. The theory provides a basis for understanding the wide spectrum of observations of ice cover breakup and ice jam formation and release.

MP 2393 ESTIMATING CN SQUARE OVER SNOW AND SEA ICE FROM METEOROLOGICAL DATA. Andreas, E.L., Apr. 1988, 5A(4), p. 481-495, 69 refs

REFRACTION. REFRACTION, ATMOSPHERIC PHYSICS SNOW COVER EFFECT, ICE COVER EFFECT. PHYSICS.

MP 2394 COMMENT ON "ATMOSPHERIC BOUNDARY LAYER MODIFICATION IN THE MARGINAL BY T.J. BENNETT, JR. AND K. HUNKINS.

Andreas, E.L., Apr. 15, 1987, 93(C4), p.3965-3969, Includes reply by Bennett and Hunkins. 19 refs. For the paper being critiqued see 41-1861 (1-34897) and for the Andreas et al paper which included the data used by Bennett and Hunkins, see 38-1819 (141-29231). 41-3064

SEA ICE, ICE EDGE, ICE AIR INTERFACE, MATHEMATICAL MODELS.

MAINEMAILAL MODELS.

Andreas bnelly commends Bennett and Hunkins for an important contribution to MIZ research but points out numerous
serious shortcomings in their methods, data interpretations,
misure freemations, misuse of mathematical equations, and
a generally careless approach in the use of his data. In
their reply, Bennett and Hunkins seem to agree that the
enticism is justified.

ON THE DESIGN OF POLYMERIC COMPOS-ITE STRUCTURES FOR COLD REGIONS AP-PLICATIONS

Lord, H.W., et al, Sep. 1988, 7(5), p 435-458, 46 refs. Dutta, P.K. 43-303

POLYMERS, CONSTRUCTION MATERIALS, DEGRADATION, FREEZE THAW CYCLES, TEMPERATURE EFFECTS, HUMIDITY.

TEMPERATURE EFFECTS, HUMIDITY.

This study focuses attention on low-temperature hygrothermal effects which influence the short- and long-term behavior and characterization of polymeric composite materials. A review of the literature reveals a searcity of low-temperature material performance data needed for design of composite materials for cold regions applications. Four problem areas are identified (1) hygrothermal residual stresses, (2) material degradation due to low-temperature environmental cycling; (3) moisture effects on freeze-thaw cycling; and (4) long-term synergistic effects of combined loading history and environmental exposure on material durability. A brief review of past work is presented and areas identified where more research is needed to develop the data base required for design of composite materials for cold environments.

WMO SOLID PRECIPITATION MEASURE-MENT INTERCOMPARISON AT SLEEPERS RIVER RESEARCH WATERSHED. Bates, R.E., et al, 1987, 44th, p.1-7, 6 refs. Pangburn, T., Greenan, H. 43-384

SNOWFALL, PRECIPITATION GAGES, MEA-SURING INSTRUMENTS, ACCURACY, WATER-SHEDS, SNOWSTORMS. SNOWFALL

The US Army Cold Regions Research and Engineering Laboratory is a member of the World Meteorological Organization (WMO) group tasked with evaluation of solid precipitation measurement procedures and instrumentation. The NOAA/CRREL Sleepers River Watershed in Danville, VT, was selected as the site for these tests in 1986, and precipitation was selected as the site for these tests in 1980, and precipitation gauges and sup-orting meteorological instrumentation were installed in the fall of 1986. This paper gives descriptions of the precipitation gauges evaluated and preliminary results obtained for a few snowstorms that occurred during the first winter of operation.

MP 2397 SOME OBSERVATIONS ON THE CHARACTER OF SNOW.

Townsend, R.A., et al, 1987, 44th, p.48-53, 19 refs. Hogan, AW.

SNOW CRYSTAL GROWTH, SNOWFALL, ICE CRYSTAL STRUCTURE, ICE CRYSTAL GROWTH, PRECIPITATION (METEOROLOGY). TEMPERATURE EFFECTS, HUMIDITY.

TEMPERATURE EFFECTS, MUSIDIT.

Typical snowfalls in castern Canada and the northeastern
United States are associated with complex and deep weather
systems Attempts to apply the ice crystal habit characteri
ration of Nakaya, and Magono and Lee, to determine the
temperature and humidity regimes where the snow originates
often fail due to these complexities
Precipitation in the
polar regions occurs in and beneath well-stratified layers,
which are much less complex and permit more direct compariwhich are much less complex and permit more direct comparison of snow crystal type to the temperature humidity regime. Many of these precipitation events occur in conjunction with clouds that approximate the conditions at the leading edge of midiatitude warm fronts, although the cloud is only a few hundred meters above the surface. It has been possible to calculate the growth rate of primary ice crystals in these conditions from fundamental concepts. Additional cases have been observed where we crystal onto all phenomers. in these conditions from fundamental concepts. Additional cases have been observed where ice crystal optical phenomena have been quite precisely associated with ice crystal type and temperature-humidity regime. Analysis of polar ice crystal falls indicates that there is sufficient and continuous production of small, plate-type crystals that can survive fails through layers below.

MP 2398 FORECASTING OF SNOWMELT RUNOFF USING WATER TEMPERATURE DATA.

Pangburn, T., 1987, 44th, p.108-113, 7 refs.

SNOWMELT. RUNOFF FORECASTING. TEMPERATURE, MELTWATER. STREAMS, MODELS.

STREAMS, MODELS.

For the 1986 snowmelt season at the W-3 subwatershed of the Steepers River Research Watershed, a technique was developed to quantify the volume and timing of snowmelt runoff using stream water temperature. A method reported by Kobayashi (1985) for separation of the snowmelt hydrograph was tested. A method employing air temperature and solar radiation was developed which was used to calibrate the SSARR model Improvements in the predictive capabilities of SSARR were attained using this method

MP 2399

TICE JAMS AND AN ANALYSIS OF THE WINTER CLIMATE AT TWO SITES NEAR THE WHITE RIVER IN SOUTH DAKOTA.

Bilello, M.A., 1987, 44th, p.154-162, 10 refs. 43-398

ICE JAMS, CLIMATIC FACTORS, AIR TEMPER-ATURE, RIVER ICE, PRECIPITATION (METEOROLOGY), METEOROLOGICAL FACTORS, UNITED STATES—SOUTH DAKOTA— WHITE RIVER.

Weather records for stations in South Dakota for the winter months from 1921-1984 were examined to detect any long-term trends, and to determine possible relationships between climate and ice-jam occurrence on the White River. Analysis climate and ice-jam occurrence on the White River. Analysis of the observed average monthly winter air temperatures at Kennebec. South Dakota, revealed warmer Decembers and Januaries occurring between 1930 and 1950. Five of the seven ice-jam winters that were atuded in detail occurred after 1950, and during this period significantly lower temperatures were recorded in Jan. However, no consistent pattern between below-normal seasonal freezing temperatures, or above-normal precipitation amounts, and ice-jams was noted

MP 2400 STUDY OF DYNAMIC ICE BREAKUP ON THE CONNECTICUT RIVER NEAR WINDSOR, VER-MONT.

Ferrick, M.G, et al, 1987, 44th, p.163-177, 8 refs. Lemieux, G.E., Demont, W., Weyrick, P.B.

ICE BREAKUP, RIVER ICE, FLOODS, RIVER FLOW, ICE CONDITIONS, DAMAGE, BRIDGES, ICE CONTROL, STATISTICAL ANALYSIS, ICE JAMS, UNITED STATES—VERMONT—CON-NECTICUT RIVER.

JAMS, UNITED STATES—VERMONT—CONNECTICUT RIVER.

The Cornish-Windsor bridge is the longest covered bridge in the United States and has significant historical value At a large peak flow, dynamic ice breakup of the Connecticut River can threaten the bridge and cause flood damage in the town of Windsor, Vermont. Throughout the 1985-86 winter we regularly monitored ice conditions, including a midwinter dynamic ice breakup on 27 January, and conducted a series of controlled release tests over the operating range of the turbines at Wilder Dam upstream. These observations were analyzed in light of more than 60 years of temperature and discharge records. Our analysis indicates that river regulation, escents alternatives for ice management that would minimize the probability of bridge damage and flooding during breakup. The flow can be regulated early in the winter to promote the growth of a stable ice cover, minimizing the total ice production in the reach. In the weeks prior to breakup, sustained releases and above freezing air temperatures cause melting, weakening and gradual breakup of the ice, greatly reducing the flooding potential. Also it is possible to produce a controlled ice breakup at lower stage and discharge than now occurs during major natural events. All of these ice control alternatives have associated power production costs.

MP 2401 COMPARISON OF SNOWFALL AMOUNTS AND SNOW DEPTHS FOR LOCATIONS IN GERMANY AND THE NORTHEAST UNITED

Bates, R.E., et al, LOSAEL, TWI Conference, 8th, Las Cruces, New Mexico, Dec 1-3, 1987. Proceedings, Vol I, White Sands Missile Range, NM, U.S. Army Atmospheric Sciences Laboratory, May 1988. p 107-117. 9 rcfs.

Bilello, M.A 43-602

SNOWFALL, SNOW DLPIH, SNOW ACCUMULATION, MILITARY OPERATION, CLIMATIC FACTORS, AIR TEMPERATURE, STATISTICAL ANALYSIS, UNITED STATES, GERMANY.

ANALYSIS, UNITED STATES, GERMANY.
Winter field experiments associating snowfall intersity, crystal habit and snowcover backgrounds with the operational effectiveness of electromagnetic systems have been conducted at five locations in northeastern 1.5 over the past? years. The purpose of this report is to determine if climatic regimes fineliding snowfall and snow depthsy similar to these five sites exist in critical military areas of central Europe, specifical by in Germany.

This study compiles data on total seasonal

snowfall amounts, mean maximum snow depths, and average mid-winter air temperatures so that comparisons based on regional distributions could be made. Statistical relation-ships between these terrain features were used to make maps which show the regional distribution of these parameters Germany and a large region of northeastern United

MP 2402
PREDICTION OF WINTER BATTLEFIELD **WEATHER EFFECTS**

WEARIEM EFFEUIS.
Ryerson, C.C., et al, EOSAEL/TWI Conference, 8th,
Las Cruces, New Mexico, Dec. 1-3, 1987. Proceedings, Vol.2, White Sands Missile Range, NM, U.S.
Army Atmospheric Sciences Laboratory, May 1988,
p.357-362, 14 refs.
Bates, R.E.
43-602

43-603

MILITARY OPERATION, SNOWSTORMS, CLI-MATIC FACTORS, AIRCRAFT ICING, WEATH-ER FORECASTING, SUPERCOOLED CLOUDS. ER FORECASTING, SUPERCOOLED CLOUDS. Battlefield weather forecasters ideally require similar, if not greater, amounts and qualities of data than peacetime forecasters. In conflicts the quality, type and amount of data available, however, will be inadequate and will be a function of battle zone size, location, season, time of day and elapsed time. The forecast problem is most difficult during winter operations when icing snowfall, fog. or combinations therefore result from subtle meso- and micro-scale changes in weather. This report reviews current weather forecast requirements for remote regions and suggests a conceptual approach for ideal forecast procedures when normal data flows are interruted. ws are interrupted.

MP 2403 CONFINED COMPRESSIVE STRENGTH OF MULTI-YEAR PRESSURE RIDGE SEA ICE

Cox, G.F.N., et al, Aug. 1988, Vol. 110, p. 295-301, For another source see 40-3162. 17 refs.

Richter-Menge, J.A.

43.971

PRESSURE RIDGES, COMPRESSIVE PROPER-TIES, ICE STRENGTH, SEA ICE.

MP 2404

NUMERICAL SIMULATIONS OF THE PRO-FILE PROPERTIES OF UNDEFORMED FIRST-YEAR SEA ICE DURING THE GROWTH SEA-SON

Cox, G.F.N., et al, Oct. 15, 1988, 93(C10), p.12,449-12,460, 31 refs. Weeks, W.F.

43-721 SEA ICE, ICE GROWTH, ICE SALINITY, ICE COVER STRENGTH, ICE COVER THICKNESS, MODELS

A simulation scheme is developed that estimates salinity A simulation scheme is developed that estimates salinity profiles for first-year sea ice during the growth season as a function of the growth his ory of the ice. The model considers the dependence of the initial ice salinity on ice growth velocity and seawater salinity and also the subsequent drainage of brine from the ice. The equation for ice growth assumes a linear temperature profile within the ice and is driven by surface heat balance equations that are based on smoothed climatic data for the central Arctic Basin. based on smoothed climatic data for the central Arctic Basin The estimated salinity profiles are in good agreement with natural profiles. Although temperature and salinity profiles depend upon the time of the year when ice growth is initiated, the brine volume profiles which they specify are essentially a unique function of ice thickness; a conclusion that holds even when the insulative effects of snow are considered. The temperature and brine volume profiles are then utilized to calculate the ice strength and clastic modulus profiles, which in turn specify the composite mechanical properties of the ice sheets. Significant differences, which are largest for this ice sheets are observed between ice sheet properties or the ice sneets. Significant differences, which are largest for thin ice sheets, are observed between ice sheet properties as calculated using composite plate theory and properties calculated from uniform plate theory and average ice properties. These results provide a justification for the practice, common within the ice modeling community, of parameterizing the mechanical behavior of pack ice on the basis of the ice thickness distribution

MP 2405 STRUCTURAL FIBER COMPOSITE MATERI-ALS FOR COLD REGIONS.

Dutta, P.K., Sep. 1988, 2(3), p 124-134, 9 refs. 43-873

CONSTRUCTION MATERIALS, LOW TEMPER-ATURE TESTS, COLD WEATHER PERFORM-ANCE, FREEZE THAW TESTS

MP 2406 ICE REGIME RECONNAISSANCE, YUKON RIVER, YUKON

Gerard, R., et al, International Specialty Conference on Cold Regions Engineering, 3rd, Edmonton, Alber-ta, Apr. 4-6, 1984. Proceedings, Vol.3. Edited by D.W. Smith, rEdmonton, University of Alberta, 1984, p.1059-1073, 8 refs. Kent, T.D., Janowicz, R., Lyons, R.O. 43-670

43-570
RIVER ICE, ICE CONDITIONS, AERIAL SUR-VEYS, FREEZEUP, ICE BREAKUP, POLYNYAS, OFFSHORE LANDFORMS, CANADA—YUKON

RIVER.

Aerial reconnaissance of the ice regime over some 800 km of the Yukon River, from Lake Laberge to the U.S.-Yukon border, was carried out over two years. The paper describes the nature and rate of freeze-up and break-up progression observed in the two years, and the number and distribution of polynyas in mid-winter. The latter were found to be closely related to the presence of islands. Freeze-up progressed reasonably steadily over the whole reach after initial lodgement occurred some 700 km downstream of Lake Laberge. Break-up had a totally different character in the two halves of the reach: downstream it was rapid and dynamic; upstream it was slow and thermal. It is concluded that field observations are still essential to develop an understanding of the ice regime of a river reach. of the ice regime of a river reach.

MP 2407

ICE FORCES ON INCLINED MODEL BRIDGE

riaynes, F.D., et al, International Specialty Conference on Cold Regions Engineering, 3rd, Edmonton, Alberta, Apr. 4-6, 1984. Proceedings, Vol.3. Edited by D.W. Smith, [Edmonton, University of Alberta, 1984], p.1167-1173, 4 refs. Sodhi, D.S. 43.67?

43-677

ICE LOADS, PIERS, BRIDGES, ICE STRENGTH, ICE PRESSURE, ICE CRACKS, MODELS, TESTS, ICE MECHANICS, ICE COVER THICKNESS, FLEXURAL STRENGTH.

Tests have been conducted to measure ice forces on model inclined bridge piers. The angle of inclination ranged from 81 to 45 deg from the downstream horizontal. Other test variables were ice velocity, ice thickness and ice flexural strength. The model piers were also inverted to bend ice downward. The paper describes the measured ice forces and the modes of observed ice failure.

ALASKA SYNTHETIC APERTURE RADAR (SAR) FACILITY PROJECT.

Carsey, F., et al, June 23, 1987, 68(25), p.593-596, 7

Jezek, K.C., Miller, J., Weeks, W.F., Weller, G.

43-781
SEA ICE DISTRIBUTION, ICE CONDITIONS, REMOTE SENSING, GLACIOLOGY, HYDROLOGY, OCEANOGRAPHY, GEOLOGY, VEGETATION, UNITED STATES—ALASKA. ARCTIC OCEAN.

A receiver

ARCTIC OCEAN.

A receiving station for the acquisition and processing of spaceborne synthetic aperture radar (SAR) data is being established by the National Aeronautics and Space Administration (NASA) at the University of Alaska, Fairbanks. The data that will be received from a number of SAR satellites that are to be faunched starting in 1990 will allow US researchers to study sea ice, oceanographic and geological features, hydrological processes, glaciers, and segetation cover in Alaska and its surrounding seas.

MP 2409

MP 2409
SUBSIDENCE, INUNDATION, AND SEDIMENTATION: ENVIRONMENTAL CONSEQUENCES OF THE 1964 ALASKA EARTHQUAKE IN THE PORTAGE, ALASKA, AREA. Ovenshine, A.T., et al, Nov.-Dec. 1974, 6(6), p.3-9. Lawson, D.E., Bartsch-Winkler, S.R.

EARTHQUAKES, SUBSIDENCE, SEDIMENTS.

PLACER RIVER SILT—AN INTERTIDAL DEPOSIT CAUSED BY THE 1964 ALASKA EARTHQUAKE.

Ovenshine, A.T. et al. Mar - Apr 1976, 4(2), p.151-162, 5 rcfs.

Lawson, D E., Bartsch-Winkler, S.R 43-830

EARTHQUAKES, SEDIMENTS, SOIL EROSION. FROST HEAVE, SHEAR STRESS.

CORPS OF ENGINEERS RESEARCH IN ARC-TIC AND ARCTIC-RELATED ENVIRONMEN-TAL SCIENCES.

Smallidge, P.D., et al, Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.81-87. Tucker, W.B., Ashton, G.D.

MILITARY OPERATION, COLD WEATHER OP-ERATION, SNOW SURVEYS, ICE SURVEYS, MILITARY ENGINEERING, PERMAFROST, FROZEN GROUND PHYSICS

COUPLED AIR-ICE-OCEAN MODELS. Hibler, W.D., III, Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-

30, 1987. Proceedings, Vol.1, p.131-137, 9 refs. 43-850

WATER INTERFACE, ICE AIR INTERFACE, ICE WATER INTERFACE, OCEAN CURRENTS, ICE MECHANICS, ATMOSPHERIC CIRCULATION, RHEOLOGY, VELOCITY, DRIFT.

SNOW PROPERTIES AND PROCESSES. Colbeck, S.C., Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.145-150, 14 refs. 43.852

43-852 SNOW SURVEYS, SNOW COVER DISTRIBU-TION, METAMORPHISM (SNOW), SNOW PHY-SICS, AVALANCHES, SNOW HYDROLOGY, SNOW COVER STRUCTURE, CHEMICAL PROP-ERTIES, HEAT TRANSFER, MICROWAVES, BLOWING SNOW.

DOD FLOATING ICE PROBLEMS.

DOD FLOATING ICE PROBLEMS.
Cox, G.F.N., Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1. p.151-154.

SUBMARINES, ICE PHYSICS, ICE NAVIGA-TION, FLOATING ICE, MILITARY OPERA-TION, ICE COVER EFFECT, ICE MECHANICS, ICE CONDITIONS, ICE CROSSINGS, BEARING STRENGTH, ICE STRENGTH.

STRENGTH, ICE STRENGTH.

To operate effectively in the cold regions, technology must be developed to contend with floating ice. Of particular importance are the morphology and physical properties of the tec cover. Long-term statistics on ice formation, growth, decay, ice extent, pressure ridges, etc., need to be obtained for areas of interest, theoretical models describing these processes need to be developed as well. Not only are such statistics required for U.S. and allied waters, but also for enemy waters where we may possibly operate, or at least assess the enemy's operating capability. Remote sensing of ice features and ice thickness from both aircraft and satellites is a means of obtaining ice statistics and rapid real-time measurements, additional studies on the electromagnetic properties of ice will enhance this capability. Constitutive laws and failure enteria need to be developed to solve analytical ice engineering problems. This requires that work on the mechanical properties of ice continue, with emphasis on multi-axial tests, tests at higher temperatures, and fracture mechanics. It is entical that any analytical work be supported by scale-model tests and full-scale field measurement programs. In all ice studies more attention should be given to the ice structure and the ice air and brine content. Without this information it is difficult to interpret the results and compare them to those of other investigators. Finally, conventional equipment should be tested in the field, evaluated for arctic applications, and, if accessary, redesigned

MP 2415
MECHANICAL AND PHYSICAL PROPERTIES
OF SOILS IN COLD REGIONS.
Chamberlain, E.J., Nov. 1987, No.2174 (Vol. 1), DOD
Symposium and Workshop on Arctic and ArcticRelated Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.155-161, 7 refs. 73.84Z

MILITARY OPERATION, PERMAFROST PHY-SICS, FROZEN GROUND PHYSICS, FREEZE THAW CYCLES, FROZEN GROUND MECHANICS, COLD WEATHER CONSTRUCTION, PER-MAFROST DISTRIBUTION, BEARING STRENGTH, SOIL RHEOLOGY. BEARING FREEZING.

SNOW/ICE/FROZEN GROUND PROPERTIES: WORKING GROUP REPORT.

Sterrett, K.F., et al, Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Pro Ashton, G.D. 43-855 Proceedings, Vol.1. p.163-166.

SNOW SURVEYS, ICE SURVEYS, FROZEN GROUND PHYSICS, FREEZE THAW CYCLES, REMOTE SENSING, SNOW COVER DISTRIBU-TION, ICE COVER DISTRIBUTION.

OBSCURATION AND BACKGROUND DYNAM-

OBSCURATION AND BACKGROUND DYNAM-ICS IN AND OVER SNOW. Hogan, A.W., Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.181-185, 15 refs. 43-856 HAZE,

HAZE, ICE FOG, MILITARY OFERATION, SNOW COVER EFFECT, WAVE PROPAGATION, REMOTE SENSING, SUPERCOOLED CLOUDS, TRANSMISSIVITY, VISIBILITY, ICE CRYSTALS, SNOWFLAKES.

RECENT RESEARCH ON ACOUSTIC TO SEIS-MIC COUPLING.

Albert, D.G., Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.223-225, 33 refs. 42.857

ACOUSTICS, MILITARY OPERATION, SOIL MECHANICS, SOIL FREEZING, SNOW COVER EFFECT, SEISMIC PROSPECTING, EX-EFFECT, SEISMI PERIMENTATION.

MP 2419

SEISMIC AND ACOUSTIC WAVE PROPAGA-TION: WORKING GROUP REPORT. Albert, D.G., et al., Nov. 1987, No.2174 (Vol.1), DOD

Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1. p.253-255. Howdyshell, P.

43-158 43-358
WAVE PROPAGATION, ACOUSTICS, SEISMIC PROSPECTING, SNOW COVER EFFECT, PERMAFROST, ICE COVER EFFECT, FROZEN GROUND, ACTIVE LAYER.

WEHICLE MOBILITY OVER SNOW.
Blaisdell, G.L., Nov. 1987, No.2174 (Vol.1), DOD
Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1. p.265-266.

43-539
VEHICLES SNOW COVER EFFECT. TRACTION, SNOW DEPTH, TRANSPORTATION, MOBILITY, CLIMATIC FACTORS, SHEAR PROPERTIES, ADHESION, SNOW COMPACTION, TIRES, VELOCITY, TRAFFICABILITY.

MP 2421

Abele, G., Nov. 1987, No 2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan 28-30, 1987. Proceedings, Vol.1. p.267-269. 43-860

VEHICLES, SNOW COVER EFFECT, SOIL STRENGTH, TRANSPORTATION, MOBILITY, TRAFFICABILITY, TOPOGRAPHIC FEATURES, TRACKED VEHICLES, ENVIRONMENTS, WEATHER, CLIMATIC FACTORS, IMPACT STRENGTH.

In the arctic regions mobility of vehicles is frequently influenced more by the environmental (climatic) conditions than by the terrain. Weather has a profound effect on the performance of the vehicle, on the efficiency of the operator, and on the characteristics of the terrain, however, this effect produces mixed results. Mobility over many arctic terrains, such as muskeg, tundra with abundant lakes and meandering, braided streams, is greatly improved during the winter when the soil and water bodies are frozen and the terrain micro-relief features are masked by the snow cover. Thus, the arctic environment, while degrading the performance of people and machines, can be beneficial to the terrain trafficability characteristics. It is inonic, therefore, that as the environment becomes more pleasant for the people and the vehicles during summer it have an unfavora ble effect, due to thawing, on the trafficability of many types of arctic terrains. It can be generalized, therefore, that in the winter most mobility problems in the Arctic In the arctic regions mobility of vehicles is frequently in-

are caused by the environment (weather), while during the summer most mobility problems are caused by the terrain

MP 2422
AIRCRAFT OPERATIONS IN THE ARCTIC.
DenHartog, S.L., Nov. 1987, No.2174 (Vol.1), DOD
Symposium and Workshop on Arctic and ArcticRelated Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1. p.271-272

AIRCRAFT LANDING AREAS, AIRPLANES, COLD WEATHER OPERATION, NAVIGATION, MAINTENANCE, POLAR REGIONS, SNOW COVER EFFECT.

MOBILITY: WORKING GROUP REPORT. Blaisdell, G.L., et al, Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arc-tic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1. p.273-274. Janosi, Z.

43.862

TRACKED VEHICLES, AIR CUSHION VEHI-CLES, COLD WEATHER OPERATION, AIR-PLANES, ICING, MOBILITY, TRAFFICABILITY, NAVIGATION, MAINTENANCE, ICE NAVIGA-

MP 2424

BUILDINGS AND UTILITIES IN VERY COLD REGIONS: OVERVIEW AND RESEARCH NEEDS.

NEEDS. Tobiasson, W., Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.299-303, Reprinted in Northern engineer, Fall/Winter 1988, 2(3,4) p.4-11

43-864

43-304
COLD WEATHER CONSTRUCTION, UTILITIES,
MILITARY FACILITIES, SNOWDRIFTS,
MAINTENANCE, DESIGN, METEOROLOGICAL DATA, WATER SUPPLY, WASTE TREAT-MENT.

MENT.
Research conducted on a wide variety of topics from habitability to roof leaks has played an important role in improving the design, construction, operation and maintenance of buildings and utilities in very cold regions. Documents such as the Cold Climates Utilities Manual have facilitated implementation of research findings. Other improvements have been the result of innovation by manufacturers and practicing engineers. Nonetheless, buildings are still being built that are uncomfortable or unsafe to live in Others have chronic moisture problems or deteriorate much more rapidly than expected. Pipes still freeze and effluent quality does not always meet standards. Additional research is needed since new materials, systems and processes are available that can solve some problems but pose others.

MP 2425 FOUNDATION TECHNOLOGY IN COLD RE-

Quinn, W.F., Nov. 1987, No.2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1, p.305-310, 28 refs 43-865

FROST HEAVE, COLD WEATHER CONSTRUC-TION, FOUNDATIONS, PILES, ROADS, AIR-PORTS, GROUND THAWING, ENGINEERING, DESIGN, MAINTENANCE, DAMS, LEVEES, BEARING STRENGTH.

ARCTIC CONSTRUCTION: WORKING GROUP REPORT

Marvin, E.L., et al. Nov. 1987, No 2174 (Vol.1), DOD Symposium and Workshop on Arctic and Arctic-Related Environmental Sciences, Laurel, MD, Jan. 28-30, 1987. Proceedings, Vol.1 p.311-314 Smallidge, P.D.

43-866

COLD WEATHER CONSTRUCTION, MILITARY ENGINEERING, FOUNDATIONS, UTILITIES, BUILDINGS, OFFSHORE STRUCTURES, ICE CONDITIONS, DESIGN CRITERIA. PAVE-MENTS, EARTHWORK, ROADS

MP 2427

SNOW LOAD DATA ANALYSIS, WINTER 1976-

O'Rourke, M., Troy, NY, Rensselser Polytechnic Institute, July 1, 1977, 9p. + appends., Report prepared for the U.S. Army CRREL, Hanover, NH. Under contract DACA89-76-2465. 3 refs.

43-931

SNOW LOADS, ROOFS, SNOW ACCUMULA-TION, SLOPE ORIENTATION, SNOWDRIFTS, SNOW DEPTH, SNOW DENSITY, WIND FAC-TORS, THERMAL EFFECTS, HEAT FLUX.

MP 2428

MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE.

SEA ICE.

Richter-Menge, J.A., et al, June 1987, No.141, Workshop on Extreme Ice Features, Banff, Alberta, Nov. 3-5, 1986. Proceedings. Compiled by G.R. Pilkington and B.W. Danielewicz, p.121-153, Refs. p.134-137. Cox, G.F.N. 43-905

ICE MECHANICS, SEA ICE, OFFSHORE STRUC-TURES, ICE STRENGTH, ICE LOADS, OFF-SHORE DRILLING, PRESSURE RIDGES, ICE FLOES, COMPRESSIVE PROPERTIES, STATIS TICAL ANALYSIS, TESTS, TENSILE PROPER-TIES

REMOTE SENSING OF ICE AND SNOW (RE-VIEW)

Jezek, K.C., Jan. 27, 1987, 68(4), p.51, For book being reviewed sec 40-1794. 43-919

GE SURVEYS, SNOW SURVEYS, PERMA-FROST, REMOTE SENSING, WATER BAL-ANCE, RUNOFF, MAPPING, MICROWAVES, SEASONAL VARIATIONS.

MP 2430

ACOUSTIC EMISSIONS FROM COMPOSITES AT DECREASING TEMPERATURES.

AT DECREASING TEMPERATURES.

Dutta, P.K., et al, International Congress on Experimental Mechanics, 6th, Portland, OR, June 6-10, 1988. Proceedings. Vol.2, Bethel, CT, Society for Experimental Mechanics, Inc., 1988, p.1090-1095, 13

Farrell, D. 43-979

CONSTRUCTION MATERIALS, THERMAL STRESSES, COMPOSITION, ACOUSTICS, MICROSTRUCTURE, ANISOTROPY, LOW TEMPERATURE TESTS, THERMAL EXPANSION, DAMAGE, COUNTERMEASURES.

RECENT GLACIER-VOLCANO INTERACTIONS ON MT. REDOUBT, ALASKA. Sturm, M., et al, June 1988, 88-9, 18p., 21 refs.

Benson, C., MacKeith, P.

43-790 GLACIER MASS BALANCE, VOLCANOES, GLACIER FLOW, GLACIER OSCILLATION, GLACIER ABLATION, VOLCANIC ASH, VELOCITY, PHOTOGRAMMETRY, UNITED STATES—ALASKA—REDOUBT MOUNTAIN.

EXPERIMENTAL AND THEORETICAL STUDIES OF ACOUSTIC-TO-SEISMIC COUPLING. Albert, D.G., Army Science Conference, Fort Monroe, VA, Oct. 25-27, 1988. Proceedings, Vol.1, Washington D.C., U.S. Dept. of the Army, Office of the Assistant Secretary, Oct. 1988, p.19-31, 14 refs. 43-1036

MILITARY OPERATION, DETECTION, SNOW COVER EFFECT, FROZEN GROUND, ACOUSTICS, SEISMIC VELOCITY, SEASONAL VARIATIONS, EXPERIMENTATION.

MP 2433
PERFORMANCE OF LAMINATED COMPOS-ITES IN COLD.

Dutta, P.K., et al, Army Science Conference, Fort Monroe, VA, Oct. 25-27, 1988. Proceedings, Vol 1, Washington, D.C., U.S. Dept of the Army, Office of the Assistant Secretary, Oct. 1988, p 269-281, 15 refs. Kalafut, J., Farrell, D.

MILITARY RESEARCH, LOW TEMPERATURE TENTS, MATERIALS, STRESS STRAIN DIA-GRAMS, TENSILE PROPERTIES, ELASTICITY, STRENGTH, TEMPERATURE EFFECTS.

MP 2434 ESTIMATING AVERAGING TIMES FOR POINT AND PATH-AVERAGED MEASUREMENTS OF T! 'RBULENCE SPECTRA. Andreas, E.L., Mar. 1988, 27(3), p.295-304, 44 refs.

TURBULENT BOUNDARY LAYER.

INFLUENCE OF LOW TEMPERATURE THER-MAL CYCLING ON TENSILE STRENGTH OF FIBER COMPOSITES

Dutta, P.K., et al, ASME Pressure Vessels and Piping Conference, Pittsburg, PA, June 19-23, 1988. Advances in Macro-Mechanics of Composite Material Vessels and Components. Edited by P. Hui and T.J. Kozik, New York, NY, American Society of Mechanical Engineers, 1988, p.141-147, PVP 146, PD18, 11

refs. Kalafut, J., Lord, H.W.

43-1213

MATERIALS TEMPERATURE EFFECTS, FREEZE THAW TESTS.

Tests were performed to assess the effects of low temperatures Tests were performed to assess the effects of low temperatures (-50 C) and low temperature thermal cycling (10 cycles at -180 C to 24 C) on the mechanical properties of fiberglassepoxy and graphite-epoxy composite laminates. Results of these tests show various degrees of degradation of thematerials. At low temperatures, strengths associated with fiber-dominated modes of failure show decreases while those of matrix-dominated modes of failure show increases. Composites subjected to low temperature thermal cycling show strength reduction in matrix-dominated failure modes and strength increase in fiber-dominated modes. These results conform to the microcrack-growth-based damage mechanism of composite materials. composite materials.

MP 2436
METHOD FOR CONDUCTING AIRBORNE IN-FRARED ROOF MOISTURE SURVEYS.

Tobiasson, W., April 1988, Vol.934, International Conference on Thermal Infrared Sensing for Diagnostics and Control (Thermosense X), Criando, FL, Apr. 5-8, 1988, edited by R.D. Lucier, p.50-61, 8 refs.

ROOFS, MOISTURE DETECTION, INFRARED PHOTOGRAPHY, AERIAL SURVEYS.

MP 2437 ON THE KOLMOGOROV CONSTANTS FOR THE TEMPERATURE-HUMIDITY COSPEC-TRUM AND THE REFRACTIVE INDEX SPEC-TRUM.

Andreas, E.L., Sep. 1, 1987, 44(17), p.2399-2406, 44 43-1278

REFRACTIVITY, SPECTRA, TEMPERATURE, HUMIDITY.

MP 2438 REVIEW OF THE METAMORPHISM AND CLASSIFICATION OF SEASONAL SNOW COVER CRYSTALS.

Colbeck, S.C., 1987, No 162, Avalanche formation, movement and effects. Proceedings of the Davos Symposium, Sep. 14-19, 1986. Edited by B. Salm and H. Gubler, p.3-34, Refs. p.29-33. With French summary. 1 Includes discussion.

SNOW CRYSTAL GROWTH, SNOW WATER SNOW CRYSTAL GROWTH, SNOW WATER CONTENT, ICE CRYSTAL GROWTH, METAMORPHISM (SNOW), FREEZE THAW CYCLES, CLASSIFICATIONS, UNFROZEN WATER CONTENT, TEMPERATURE GRADIENTS, ANALYSIS (MATHEMATICS).

YSIS (MATHEMATICS).

Knowledge of the growth of tee crystals in both wet and dry snow has evolved steadily over many years. Dry snow is characterized by rounded crystals growing slowly at low temperature gradients. Wet snow is characterized by clusters of grains at low liquid contents and poorly bonded slush at high liquid contents. Meti-freere cycles greatly influence wet snow as well. Information was first gained through field observations, then laboratory tests, and then physical modeling. Advances have been made through application of phase-equilibrium thermodynamics and knowledge of see crystal growth although much remains to be learned about the slow growth of tee crystals over a range of temperatures. The grain-to-grain nature of vapor flow in dry snow is complicated by the geometry of snow and this topic is being studied through stereology. Given recent advances in our understanding of snow metamorphism, a reclassification of snow seems necessary.

MP 2439 FIELD OBSERVATIONS OF THERMAL CON-VECTION IN A SUBARCTIC SNOW COVER. Johnson, J.B., et al, 1987, No.162, Avalanche forma tion, movement and effects. Proceedings of the Davos Symposium, Sep. 14-19, 1986. Edited by B. Salm and H. Gubber, p.105-118, 20 refs., With French summary. Includes discussion. Sturm, M., Perovich, D.K., Benson, C.

43-1223 SNOW THERMAL PROPERTIES. CONVEC TION, SNOW WATER CONTENT, VAPOR DIF-FUSION, SNOW HEAT FLUX, SNOW DEPTH, TEMPERATURE GRADIENTS, METAMOR-PHISM (SNOW), DEPTH HOAR, TEMPERA-TURE VARIATIONS.

TURE VARIATIONS.
Dry snow, under the influence of strong temperature gradients, metamorphoses to depth hoar. This process requires a vapor flux through the snow, which can be driven by diffusion or convection. Convection in natural snow covers has been suggested but never previously detected. A three-dimensional array of 103 thermistors was monitored through the winter of 1914-85 to try to detect convection. A convection event lasting 8 days occurred in early winter during which large horizontal temperature gradients were measured. Because the snow was a nearly perfect, horizontally homogeneous layer, these temperature variations could only have been caused by convection. Analysis of possible sources of error in the temperature measurements, such as vertical misplacement of the thermistory, indicates that the observed temperature variations would have required uncervertical maplacement of the thermistors, indicates that the observed temperature variations would have required uncertainties in vertical position five times larger than were observed and thermistors that moved up and down with time. Rayleigh number calculations indicated that it reached its critical value only during the period in which the large horizontal temperature gradients were present and convection was occurrent.

ESTIMATING CN SQUARE OVER SNOW AND SEA ICE FROM METEOROLOGICAL QUANTI-

Andreas, E.L., 1988, Vol.926, Optical, Infrared, and Millimeter Wave Propagation Engineering, Orlando, FL, Apr. 5-7, 1988, p.258-267, 27 refs. 43-2025

REFRACTION, ATMOSPHERIC PHYSICS SNOW COVER EFFECT, ICE COVER EFFECT.

MP 2441 ICE ENGINEERING FOR CIVIL WORK: BASE-LINE STUDY.

Carey, K.L., et al, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, Aug. 1973, 91p.

Ashton, G.D., Frankenstein, G.E. 43-1312

43-1312
ICE JAMS, ICE LOADS, ENGINEERING, BRIDGES, ICE NAVIGATION, ICE MECHANICS, DESIGN CRITERIA, CHANNELS (WATERWAYS), DAMAGE, ICE FORECASTING.

MP 2442 REMOVAL OF TRACE ORGANICS BY OVER-LAND FLOW.

Legett, D.C., et al, Specialty Conference on Environ-mentally Sound Water and Soil Management, Orlan-do, FL, July 20-23, 1982. Proceedings. Edited by E.G. Kruse, et al, New York, American Society of Civil Engineers, 1982, p.176-184, 21 refs. Jenkins, T.F. 43-1285

WASTE TREATMENT, WATER TREATMENT, EVAPORATION, LAND RECLAMATION, WATER TEMPERATURE, MATHEMATICAL MODELS.

MODELS.

The removal of a number of trace organics from wastewater was studied on an outdoor prototype overland flow land treatment system.

For most of the substances, the observed removal rate could be described by the sum of two mass transport-limited first order processes representing volatilization and sorption. A model was developed by non-linear multiple regression analysis in which the observed removal rate constants were regressed against three properties of each substance—'Henry's constant, octanol-water partition coefficient and molecular weight.

The dependence of the removal processes on water temperature was also determined. removal processes on water temperature was also determined but not included in the initial model. The observed decrease in removal rate as the temperature declines is supported by the known dependence of Henry's constant and diffusivity n temperature.

MP 2443
THERMOSYPHONS AND FOUNDATION DESIGN IN COLD REGIONS.

On 1968 15/3\ n.251-259, 15

Haynes, F.D., et al, Oct. 1988, 15(3), p.251-259, 15

Zarling, J.P. 43-1346

COLD WEATHER CONSTRUCTION, FOUNDA-TIONS, AIR FLOW, EVAPORATION, WIND TUNNELS, PERMAFROST HEAT BALANCE, TESTS, HEAT TRANSFER, DESIGN, PERMA-FROST PRESERVATION, PIPES (TUBES), AIR TEMPERATURE, THERMAL INSULATION.

TEMPERATURE, THERMAL INSULATION.
Laboratory tests were conducted with two full-size, two-phase commercial thermosyphons in an atmospheric wind tunnel at the U.S. Army Cold Regions Research and Engineering Laboratory. The test variables were air velocity maged from 0 to 5.2 m/s. The evaporator angles were varied from 0 to 5.2 m/s. The evaporator angles were varied from 0 to 1.2 de., measured from the horizontal. The effect of nearby walls on thermosyphon performance was also investigated. The air temperature for all tests was about 15 C. Test results are presented with thermal conductance of the thermosyphon as a function of air velocity and evaporator slope angle. The use of thermosyphons in a slab-ongrade foundation design on permafront was modeled using the finite element technique. Depth of thew within the fill decreases with increased thermosyphon conductance and increased insulation thickness. The simulations indicate that it is slightly better to place the thermosyphon evaporator vertically towards the fill base.

MP 2444 THERMOSYPHON FOR HORIZONTAL AP-PLICATIONS.

DenHartog, S.L., Oct. 1988, 15(3), p.319-321. 43-1351

HEAT TRANSFER, PIPES (TUBES), COLD WEATHER CONSTRUCTION, EVAPORATION, TESTS, SLOPE ORIENTATION.

MP 2445 PRIMARY EFFLUENT AS A HEAT SOURCE FOR HEAT PUMPS.

Phetteplace, G.E., et al, 1989, 95(1), p.141-146, 4 refs. Ueda, H.T.

43-2160 HEAT SOURCES, HEAT TRANSFER, HEAT RECOVERY, WASTE TREATMENT, SEWAGE TREATMENT.

MP 2447 CALIBRATION MEASUREMENTS OF ROCK STRESS BY VIBRATING WIRE STRES. METER

AT HIGH TEMPERATURES.
Dutta, P.K., et al, International Symposium on Field Measurements in Geomechanics, 2nd, Kobe, Japan, Apr. 6-9, 1987. Field Measurements in Geomechanics. Edited by S. Sakurai, Rotterdam, A.A. Balkema, 1988, p.43-58, 5 refs. Hatfield, R.W.

43-1484

ROCK MECHANICS, STRESSES, MEASURING INSTRUMENTS.

This report summarizes the studies of the Vibrating Wire Stressmeter (VWS) in a high temperature environment in Climax granite considered for use as a nuclear waste repository. The study also included calibration tests of the meter in

The study also included calibration tests of the meter in Barre granite, aluminum, and Lucite under umanial, basial and triaxial stress fields. Biasial tests were performed by setting stressmeters into cylindrical rock cores loaded hydrostatically around their periphery, leaving the ends unloaded. Triaxial tests were conducted by repeating the basial tests, with the addition of end loading. The effects of temperature on calibration characteristics were evaluated by conducting uniaxial, biaxial and triaxial tests in the range from room temperature to 100 C. The results showed that the uniaxial stress sensitivity factor for a rock can vary over a wide margin. For Climax granite it varied from 2.7 to 4.5 The stressmeter setting preload has a major influence on the sensitivity factor and, to reduce this influence, an optimum preloading of the stressmeter must be ensured. The temperature rise increased the sensitivity factor under basial and triaxial loading significantly (up to 25%) but very little (less than 5%) under uniaxial loading. fup to loading.

ESTIMATING TURBULENT SURFACE HEAT FLUXES OVER POLAR, MARINE SURFACES. Andreas, E.L., Conference on Polar Meteorology and Oceanography, 2nd, Madison, WI, Mar 29-31, 1988, Pre-print volume, Boston, American Meteorological Society, 1988, p.65-68, 19 refs.

43-1495 TURBULENT FLOW, HEAT FLUX, ICE AIR IN-TERFACE, POLYNYAS, ICE EDGE.

DYNAMIC ICE BREAKUP CONTROL FOR THE CONNECTICUT RIVER NEAR WINDSOR, VER-

Ferrick, M.G., et al. 1988, 19(4), p.245-258, 11 refs. Lemieux, G.E., Weyrick, P.B., Demont, W.

ICE BREAKUP, MONITORS, BRIDGES, ICE CONTROL, ICE JAMS.

CONTROL, ICE JAMS.

The Cornish-Windsor bridge is the longest covered bridge in the United States and has significant historical value. Dynamic ice breakup of the Connecticut River can threaten the bridge and cause flood damage in Windsor, VT. We monitored ice conditions throughout the 1985-86 winter, observed a mid-winter dynamic ice breakup, conducted controlled release tests during both open water and ice cover conditions, and analyzed more than 60 years of temperature and discharge records. Biver templation presents afternatives. constitutions, and analyzed more tians so years or temperature and discharge records. River regulation presents alternatives for ice management that would minimize water levels during breakup. In this paper we develop the basis of a method to produce a controlled ice breakup at lower stage and discharge that occur during major natural events.

MP 2450

PRESSURE RIDGE MICROBIAL SEA-ICE COMMUNITIES.

Ackley, S.F., 1986, 21(5), p.172-174, 7 refs. 43-1639

MICROBIOLOGY, ALGAE, PLANKTON, PACK ICE, ICE DEFORMATION, ANTARCTICA-WEDDELL SEA.

WEDDELL SEA.

Pressure ridges—the ice pileups above and below the ice surface that result from pack ice deformation—apparently contribute unique environments for the development of ice microbial communities. The significance of pressure-ridge communities to the total productivity of the pack ice is linked to the level of deformation resisting in increased ridge density of one region compared to another. In this article, two mechanisms are described which can lead to the development of microbial communities near pressure ridges. The first mechanism is associated with the instill ridge formation process which occurs during deformation periods in the intense reposs of the pack ice. The second effect arises after the ridges have formed and is related to flow breakup processes near the ice edge in the decay phase of the pack ice cycle.

MP 2451

MP 2451

AIRFIELDS IN ARCTIC ALASKA. Crory, F.E., Nov. 1988, No.27, p.49-55, 25 refs. 43-1724

AS-1/24
AIRPORTS, AIRCRAFT LANDING AREAS, RUNWAYS, COLD WEATHER CONSTRUCTION, PERMAFROST BENEATH STRUCTURES, ICE RUNWAYS, SNOW ROADS, GRAVEL, BOOK STRUCTURES, ICE RUNWAYS, GRAVEL, BOOK STRUCTURES, ICE RUNWAYS, ICE RUNWAYS, ICE RUNWAYS, ICE RUNWAY ROCK FILLS.

ROCK FILLS.

Airplanes provide an important means of transportation for villages and petroieum-related activities in remote areas of northern Alaska. Accordingly this review discusses temporary and permanent airfields which have been constructed in that region, ranging from snow and see winter airstrays to gravel and rock fills for all-season airfields, which can eventually be paived to provide permanent airports.

IMPACT OF URBAN WASTEWATER REUSE IN COLD REGIONS ON LAND TREATMENT SYS-

Iskandar, I.K., International Congress for Agrochemicals in Soil, Jerusalem, June 14-18, 1976 ings, (1976), 32p., 38 refs. 43-1830

WATER TREATMENT, WASTE DISPOSAL, SOIL WATER, NUTRIENT CYCLE.

MP 2453

ELEMENTS OF FLOATING-DEBRIS CONTROL SYSTEMS.

Perham, R.E., Sep. 1988, REMR-HY-3, 54p. + appends., 34 refs. 43-1808

BUBBLING, FLOATING ICE, ICE BREAKUP. OFFSHORE STRUCTURES, DAMAGE

MP 2454
DEVELOPMENT OF ANALYTICAL METHODS FOR MILITARY-UNIQUE COMPOUNDS.

Walsh, M.E., et al. Annual Environmental Quality R&D Symposium, 13th, Williamsburg, VA, Nov. 15-17, 1988 Proceedings. Hosted by U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Aberdeen Proving Ground, MD, USATHAMA, 1988, p.370-380, 14 refs. Jenkins, T.F.

43-1811 MILITARY OPERATION. ENVIRONMENTAL IMPACT, SOIL POLLLTION, WATER POLLUTION, WATER TREATMENT, EXPLOSIVES. CHEMICAL ANALYSIS, WASTE TREATMENT, TESTS

RP-HPLC analytical methods were developed to determ trace levels of natrogramatics, natramines, tetratene, and ne-

troguanidine in soil and water. The method to determine nitrogramatics and nitramines in soil has been thoroughly tested with soils from a wide variety of sites, and it has been found to be reliable and inexpensive to implement. A full-scale collaborative test proved that acceptable performance enteria were attainable in everyday use. Methods for tetrazene and nitroguanisme have not been evaluated by a full-scale collaborative test because few areas need to be tested for contravination by these commonsts. Methods to be tested for contamination by these compounds. Methods will continue to be deseloped at CRREL as the need arises for other military-unique compounds.

MP 2455 COMPARISON OF EPA AND USATHAMA DE-TECTION CAPABILITY ESTIMATORS

Grant, C.L., et al, Annual Environmental Quality R&D Symposium, 13th, Williamsburg, VA, Nov. 15-17, 1988. Proceedings. Hosted by U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). Aberdeen Proving Ground, MD, USATHAMA, 1988. p.405-418, 16 refs. Hewitt, A.D., Jenkins, T.F.

43-1812

ENVIRONMENTAL PROTECTION, POLLU-TION, ORGANIZATIONS, EXPERIMENTA-TION, ORGANIZATION, DETECTION.

INFLUENCE OF WELL CASING MATERIALS ON CHEMICAL SPECIES IN GROUND WATER. Parker, L.V., et al, Annual Environmental Quality R&D Symposium, 13th, Williamsburg, VA, Nov. 15-17, 1988. Proceedings. Hosted by U.S. Army Texic 17, 1988. Proceedings. Hosted by U.S. Army Texts and Hazardous Materials Agency (USATHAMA). Aberdeen Proving Ground, MD, USATHAMA, 1988, p.450-461, 19 refs. Hewitt, A.D., Jenkins, T.F.

43-1813

WATER POLLUTION, GROUND WATER, WELL CASINGS, MATERIALS, CHEMICAL ANALYSIS, IMPURITIES, ENVIRONMENTAL IMPACT. ENVIRONMENTAL PROTECTION. WATER CHEMISTRY.

MP 2457

SURFACE HYDROLYSIS OF DIISO-PROPYLFLUOROPHOSPHATE (DFP).

Leggett, D.C., U.S. Army Chemical Research, Development and Engineering Center Scientific Conference on Chemical Defense Research, Nov. 17-20, 1988. Proceedings, Vol.2. Prepared by M.D. Rausa, Aber-deen, 1988, p.809-815, 9 refs.

ICE SURFACE, EVAPORATION, SOLUTIONS, HYDROLYSIS, LABORATORY TECHNIQUES.

MP 2458

EFFECT OF STRATIGRAPHY ON RADAR-AL-TIMETRY DATA COLLECTED OVER ICE

lezek, K.C., et al. 1988, Vol. 11, International Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, Sep. 7-11, 1987 Proceedings, p.60-63, 19 refs. Alley, R.B. 43-1945

ICE SHEETS, ICE MODELS, ICE DENSITY, DATA PROCESSING, RADAR.

DATA PROCESSING, RADAR.

A method for calculating the impulse response of a layered defective is used to investigate the effect of near-outlace density stransfeation on the interpretation of radia-altimetry data collected over see sheets. Results are compared for a model consisting of a measured density profile that is artificully interrupted by an see layer morted at successively greater depths. The impotent radar signal is modeled by a 10 ns long pulse modelated at 1 GHz. Analysis using a simple scheme for estimating the one-way travel time of the wave inductive as much as a 2 ns (expandent to 60 cm in range) apparent time delay for a density profile that has been modeled by inclusion of an ice layer relative to the ice-layer-free case. This suggests that layering may be a factor in interpreting repeated altimeter measurements of the ice sheets in terms of net growth or decay. (Auth.)

MP 2459 MULTIFREQUENCY PASSIVE MICROWAVE OBSERVATION OF SALINE ICE GROWN IN A TANK

Grenfell, T.C., et al. International Geoscience and Remote Sensing Symposium, Edinburgh, U.K., Sep. 12-16, 1988. Proceedings, Vol.3, Noordank, The Netherlands, European Space Agency, 1988, p. 1687-

Bell, D.L., Lohanick, A., Swift, C.T., St. Germain, K. 43-1896

ICE GROWTH, ICE SALINITY, TANKS (CONTAINERS), MICROWAVES, SEA ICE, RADIOMETRY, ICE COVER THICKNESS, SPECTRA. ICE OPTICS, ICE SURFACE, SURFACE ROLGH YESS.

The present set of observations suggests several phenomena of interest for interpreting micronave seguitates of national

sea ice. During initial ice growth, interference fringe effects can occur both from changing ice thickness and snow or frost which may prove useful in interpreting layer thicknesses. A simulation of multipear ice was attempted by allowing the ice to desainate, but the resulting emissivity spectrum was more characteristic of lake ice. A multipearlike spectrum was obtained when rubble was deposited on the ice surface.

MP 2460

CAN RELICT CREVASSE PLUMES ON AN-TARCTIC ICE SHELVES REVEAL A HISTORY OF ICE-STREAM FLUCTUATION.

MacAyeal, D.R., et al. 1988, Vol.11, International Symposium on Antarctic Glaciology, 4th, Bremerhav-en, FRG, Sep. 7-11, 1987. Proceedings, p.77-82, 8

Bindschadler, R.A., Jezek, K.C., Shabtaie, S.

ICE MODELS, CREVASSES, ICE SHELVES, MO-RAINES

Configurations of relict surface-crevasse bands and medial moraines that emanate from the shear megian of ice streams are simulated, using a numerical model of an ideal rectangular tee shelf to determine their potential for recording a post-ice stream discharge chronology. (Auth.)

MP 2461

PREDICTING FREEZING DESIGN DEPTH OF SLUDGE-FREEZING BEDS

Martel, C.J., Dec. 1988, 2(4), p.145-156, 12 refs.

WATER TREATMENT, SLUDGES, FREEZE THAW CYCLES, FROST PENETRATION, WIND FACTORS.

MP 2462 USE OF LOW VISCOSITY ASPHALTS IN COLD

BEGIONS.

Janoo, V.C., International Cold Regions Engineering
Specialty Conference, 5th, St. Paul, MN, Feb. 6-8,
1949. Proceedings. Edited by R.L. Michalowski.
Cold regions engineering. New York, American Society of Civil Engineers, 1989, p.70-80, 17 refs. 43-2090

COLD WEATHER CONSTRUCTION, BITUMINOUS CONCRETES, VISCOSITY, CRACKS, ROAD MAINTENANCE, THERMAL STRESSES, FREEZING INDEXES, AIR TEMPERATURE, CONCRETE STRENGTH, TENSILE PROPERTIES, LOW TEMPERATURE TESTS, PENETRA-TION

TION.

The U.S. Army Coeps of Engineers specifies low viscosity or commonly called "soft grade" asphilts for use in cold reports. These soft grade asphilts are premarily used for controlling low temperature cracking in some ports of northern U.S. and Canada. The Coeps, besides specifying the usual asphilt specifications, also defines the allowable temperature susceptibility of the asphilt using the Penetration Viscosity Number (PVN) index. It specifies a monomous PVN of 40.5 in moderately cold areas and 40.2 in regions where the design freezing index is greater than 1000 day F days. Field studies have been conducted that clearly show the benefits of using soft grade asphilt for minimizing low temperature cracking in cold regions, however, field studies relating ruring to asphilt type are scarce. A major concern is whether or not soft grade asphilts are susceptible to retine during the hot summer months. A literature review and field study was conducted by the U.S. Army Cold Regions Research and Engineering Laboratory (USACRRELL) on the performance of pasements constructed with soft grade asphilts. The results of the literature review and field studies are presented in this paper. presented in this paper

MP 2463 PERFORMANCE OF PAVEMENT AT CENTRAL WISCONSIN AIRPORT.

Stark, J., et al. International Cold Regions Engineering Specialty Conference, 5th, 5t. Paul, MN, Feb. 6-8, 1939. Proceedings. Edited by R.L. Michalowski. Cold regions engineering, New York, American Society of Civil Engineers, 1989, p.92-103, 6 refs.

Berg. R.L. 43.2092

43:2022
COLD WEATHER CONSTRUCTION, AIRPORTS, PAVEMENTS, RUNWAYS, FROST ACTION, CRACKING (FRACTURING), ROAD
MAINTENANCE, FROST HEAVE, DAMAGE. GLACIAL DEPOSITS, TESTS

GLACIAL DEPOSITS, TESTS

The Central Wincomm Auport was first opened in 1989 with a 6700-ft runway, in 1972 a 5700-ft runway was added in 1973, the original runway was extended to 7500-ft and secretal runway and trainays have been added since. Since the operang, secretal segments of the runway and tainway pasterious have been secrety damaged by differential frequencies have been secrety damaged by differential frequency here highly weathered bedrock was chose to the surface. A reput and reconstruction program involving most of the damaged areas was completed during the mid-1980s. Daring reconstruction the bedrock was escaused to a depth of it least 4 th below subgrade. Observations of front action on both the preconstruction and post-construction passements acre made to evaluate the ade many the greats. Lette or me front beave occurred in the sents reputied passimilatis.

WASTE MANAGEMENT PRACTICES IN AN-TARCTICA.

Sletten, R.S., et al, International Cold Regions Engi-Sietten, R.S., et al, international Cold Regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb. 6-8, 1989. Proceedings. Edited by R.L. Michalowski. Cold regions engineering, New York, American Society of Civil Engineers, 1989, p.122-130, 8 refs. Reed, S.C.

WASTE TREATMENT, WATER TREATMENT, WASTE DISPOSAL, ENVIRONMENTAL IMPACT, WATER SUPPLY, ENVIRONMENTAL PROTECTION, ANTARCTICA—MCMURDO STATION.

Waste management practices at U.S. stations in Antarctica were reviewed in the context of applicable laws, regulations and environmental practices. The study considered both solid and liquid waste production, handling, and disposal. Water supply operations were also considered. The study concluded that waste disposal practices currently in use at U.S. antarctic stations are reliable, effective, and environmentally compatible and should be continued. (Auth)

MP 2465 FLOW DEVELOPERS FOR MELTING ICE—EX-

PERIMENTAL RESULTS.
Ashton, G.D., International Cold Regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb. 6-8, 1989. Proceedings. Edited by R.L. Michalowski. Cold regions engineering, New York, American Socie-ty of Civil Engineers, 1989, p 151-160, 3 refs. 43-2098

WATER FLOW, ICE MELTING, HEAT TRANS-FER, FLOATING ICE, ICE BOTTOM SURFACE, ANALYSIS (MATHEMATICS), PROPELLERS, ENGINES, PUMPS, EXPERIMENTATION.

ENGINES, PUMPS, EXPERIMENTATION.
The distribution of heat transfer coefficients induced at the underside of floating ice covers by flow developers submerged beneath the ice cover are reported. The experiments consisted of suspending flow developers (submersible electric moisors with propellers) beneath an ice sheet and measuring either the melted profile or the rate of hole enlargement to obtain the heat transfer coefficient. The results may be made comparable to existing empirical results for impinging airjet heat transfer by proper consideration of the Prandtl number and by relating the initial induced flow to the equivalent flow from a submerged orifice.

MP 2466 REBUILDING INFRASTRUCTURE FOR PLEASURE BOATING.

Wortley, C.A., et al, International Cold Regions Engiwortey, C.A., et al, international cold regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb. 6-8, 1989. Proceedings. Edited by R.L. Michalowski. Cold regions engineering, New York, American Society of Civil Engineers, 1989, p 188-201, 5 refs. Frankenstein, G.E.

43-2102
DOCKS, ICE CONDITIONS, OFFSHORE STRUCTURES, COLD WEATHER CONSTRUCTION, PORTS, MAINTENANCE, DESIGN, STRUCTURES, ENGINEERING, ICE NAVIGATION, ICE SOLID INTERFACE, DAMAGE.

Small-craft harbor infrastructure: Sciencrating in many northern cities due to years of use and the harsh winter environment. People desire safe access to water for recreation and leisure. Civil engineers face many challenges in rebuilding harbor facilities. The performance of various types of small-craft structures in ice and methods to characterize ice conditions in harbors are presented Construction techniques and types of manufactured products are recommended to rebuild and replace deteriorating harbor structures Examples of case studies where Great Lakes cities have successfully replaced harbor infrastructure are given.

MP 2467 PRESSURE BUILDUP IN PERMAPROST PILE SUPPORTS INDUCED BY FREEZEBACK.

Ayorinde, O.A., International Cold Regions Engineering Specialty Conference, 5th, St Paul, MN, Feb 6-8, 1989. Proceedings Edited by R L. Michalowski Cold regions engineering, New York, American Socie-ty of Civil Engineers, 1989, p 236-251, 6 refs

43-2106

43-2106
PERMAFROST, PILE STRUCTURES, SUPPORTS, PRESSURE, WELL CASINGS, TEMPERATURE VARIATIONS, CONCRETE STRUCTURES, SEASONAL VARIATIONS, LOADS (FORCES), HEAT PIPES, SANDS, FREEZING, ANALYSIS (MATH-EMATICS).

EMATICS).

Pressure buildup due to internal freezeback of saturated sand in permafrost pile supports should be considered in the design of pile support casings. The internal pressure buildup is caused by nonuniform freezing resulting from seasonal temperature variations and the fact that the pile supports are partially buried in permafrost. An analytical elastic model is developed to determine the internal freezeback pressure in the support casing resulting for a top concrete sealer or plug is also studied.

Different internal freezeback geometries are considered to simulate the freeze-

back process of the early design consideration of filling the casing with saturated sand fill The computed results are compared with the allowable shear resistance of the concrete scaler. With a completely saturated and confined concrete sealer. With a completely saturated and confined system, the freezeback pressure exerted on the casing and the concrete sealer is significant for all freezeback geometries. The results indicate that an undersaturated sand fill or a saturated fill only to the ground level with an air cap should be used to protect both the casing and the concrete sealer

MP 2468 UNIQUE NEW COLD WEATHER TESTING FACILITY.

Eaton, R.A., International Cold Regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb. 6-8, 1989. Proceedings. Edited by R.L. Michalowski. Cold regions engineering. New York, American Society of Civil Engineers, 1989, p.335-342.

43-2114
LABORATORIES, COLD WEATHER CONSTRUCTION, BUILDINGS, LOW TEMPERATURE RESEARCH, EQUIPMENT, DESIGN, MILITARY RESEARCH, TESTS.

MILITARY RESEARCH, TESTS.

The US Army Cold Regions Research and Engineering Laboratory has a new controlled-environment test facility, the Frost Effects Research Facility (FERF), now in use The 29,000-sq foot (2694-sq m) building comprises a principal test area 182 ft long by 45 ft wide (56 m by 138 m) that incorporates 12 test basins, adjacent mobilization areas, and equipment rooms, for a total width of 102 ft (31.4 m) plus fully enclosed ramp areas at each end of the building Surface panels are used to freeze pavement and soils for the pavement, utility, soil scnsor, and mobility test programs Liquid-to-air heat exchangers are used to test hardware inside enclosures erected in the test basins or on the mobilization area. Currently, coolant is available at -37 F, 0 F, and +100 F (-38 C, 017 8 C, and 37.8 C), allowing test temperatures ranging from -35 F to 90 F (-37 C to 415 C). Lower temperatures can be achieved by using portable units in conjunction with the facility's permanent system.

DEEP FROST EFFECTS ON A LONGITUDINAL EDGE DRAIN.

Allen, W.L., International Cold Regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb. 6-8, 1989. Proceedings Edited by R.L. Michalowski. Cold regions engineering, New York, American Society of Civil Engineers, 1989, p.343-352, 2 refs. 43-2115

FROST ACTION, RUNWAYS, DRAINAGE, FROST PENETRATION, PAVEMENTS, THAW DEPTH, FREEZING INDEXES, GRAIN SIZE, SNOWMELT.

SNOWMELT.

During the summer of 1986, a 2900-ft (883.88-m) long runway, a taxiway and a parking apron were constructed at Newton Field in Jackman, ME. The runway pavement section consists of 2-1/2 in (6.35 cm) of asphalt concrete, 12 in (30.5 cm) of base course, 2 in (5.08 cm) of extracted polystyrene insulation and a 1-in. (2.54 cm) sand leveling course. The structure is sloped to drain to a 5 to 7-1/2 ft (1.52 to 2.29 m) deep longitudinal edge drain on the north side of the runway. Jackman has a design freezing index of approximately 2570 F-days (1428 C-days). The subgrade soil is a sandy, silty, clayey material of significant frost susceptibility. The water table at Newton Field is relatively shallow, increasing potential frost and drainage problems. Temperature sensors were installed during construction and temperatures in the pavement structure were monitored during the winter and spring of 1986-1987, 1987-1988. In the summer of 1987, a were was installed to monitor the flow from the outlet pipe fer about one-flow from the outlet pipe fer about one-flow form the ou ness of the system in a frozen or partially frozen state

MP 2470 UNFROZEN WATER CONTENTS OF SIX AN-TARCTIC SOIL MATERIALS.

Anderson, D.M., et al, International Cold Regions En-Anderson, D.M., et al, International Cold Regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb 6-8, 1989. Proceedings. Edited by R.L. Michalowski Cold regions engineering, New York, American Society of Civil Engineers, 1989, p 353-366,

Ticc. A.R.

43-2116
PERMAFROST TEMPERATURE, UNFROZEN
WATER CONTENT, FROZEN GROUND TEMPERATURE, SOIL WATER, SALINE SOILS,
COLD WEATHER CONSTRUCTION, FROZEN
GROUND STRENGTH, IONS, X RAY DIFFRACTION, TEMPERATURE EFFECTS, PHASE
TRANSFORMATIONS, SPECIFIC HEAT, WEATHERING, GRAIN SIZE, ANTARCTICA-VICTORIA LAND.

Phase composition data are presented for 6 saline antarctic rhase composition data are presented to 8 saint amarctic soils. Unfrozen water contents vs temperature were determined for these soil materials in their naturally occurring state and for the same soil materials after all soluble constituents

were removed by leaching. In their naturally occurring, saine state, these materials retained significant quantities of unfrozen water at very low temperatures (Auth.)

COMPARISON OF INSULATED AND NONIN-SULATED PAVEMENTS.

SULATED PAVEMENTS.
Kestler, M., et al, International Cold Regions Engineering Specialty Conference, 5th, St. Paul, MN, Feb. 6-8, 1989. Proceedings. Edited by R.L. Michalowski. Cold regions engineering. New York, American Society of Civil Engineers, 1989, p.367-378.
Berg, R.L.
43-2117

PAVEMENTS, THERMAL INSULATION, FROST PENETRATION, FROST HEAVE, FROST RE-SISTANCE, FREEZING INDEXES, DAMAGE, COUNTERMEASURES, RUNWAYS, DESIGN, TEMPERATURE EFFECTS, TEMPERATURE DISTRIBUTION DISTRIBUTION.

DISTRIBUTION.

In the 1986 reconstruction of Newton Field, Jackman, Me, a 2-in-thock layer of extruded polystyrene thermal insulation was placed beneath the runway, taxiway and parking apron. Concurrently, and less than 1 mile northwest of the airport, the first 150 ft of Nichols Road was reconstructed to a conventional, noninsulated cross section. The purposes of the ensuing study are (a) to evaluate the effectiveness of the insulation in preventing frost penetration into the subgrade resulting in frost action damage, (b) to compare test results of insulated Newton Field with those of similarly monitored noninsulated Newton Field with those of similarly monitored noninsulated Newton Field with those of similarly monitored noninsulated Newton Read and (c) to reexamine present design precdures for thickness and depth of insulation based upon both the field observations and comparisons to theoretical predictions Monitoring throughout the 1986-1987 and 1987-1988 winters included measurements of air and subsurface temperatures, groundwater levels, pore-water pressures and pavement surface elevations

MP 2472

GLACIGENIC RESEDIMENTATION: CLAS-SIFICATION CONCEPTS AND APPLICATION TO MASS-MOVEMENT PROCESSES AND DEPOSITS.

Lawson, D.E., Genetic classification of glacigenic deposits. Edited by R.P. Goldthwait and C.L. Matsch, Rotterdam, A.A. Balkema, 1989, p.147-169, Refs. p.165-169. 43-2130

GLACIAL DEPOSITS, SEDIMENTATION, MASS MOVEMENTS (GEOLOGY).

ICE COVER DISTRIBUTION IN VERMONT AND NEW HAMPSHIRE ATLANTIC SALMON

REARING STREAMS.
Calkins, D J, et al, Workshop on Hydraulics of River Ice/Ice Jams, 5th, Winnipeg, Manutoba, June 21-24, 1988. Proceedings, [1988], p 85-96, 3 refs Brockett, B.E.

43-2100
RIVER ICE, ICE CONDITIONS, ICEBOUND RIVERS, FREEZEUP, CHANNELS (WATERWAYS), BOTTOM ICE, ENVIRONMENT, BOTTOM TOPOGRAPHY, ICE DAMS, FRAZIL ICE, HEAT FLUX, ICE MELTING, AIR ENTRAINMENT.

FLUX, ICE MELTING, AIR ENTRAINMENT.

One possible cause for winter mortality of salmonids is freezing of the bed material where the fry and parr are residing in a dormant state. Typical habitat reaches in streams of the White Mountains of New Hampshire and the Green Mountains of Vermont were established as study sites. The sites averaged 200 m long, ranged in width from 10 to 30 mi, and represented channel configurations of riffle, run, pool and cascade. The interaction of ice with different channel geomorphic configurations was examined. Winter monitoring techniques included magnetic induction conductivity, high-frequency rader and hand augers to acquire ground truth data. The freeze-up processes were documented with 35-mm photography.

PRELIMINARY RESULTS OF AN EXPERIMENT USING A 16 FT X 50 FT LONG FRAZIL COLLECTOR LINE ARRAY.

Perham, R.E., Workshop on Hydraulics of River Ice-/Ice Jams, 5th, Winnipeg, Manitoba, June 21-24, 1988. Proceedings, (1988), p 139-156, 9 refs. 43-2169

RIVER ICE, ICE FORMATION, RIVER FLOW, ICE COVER THICKNESS, ICE PHYSICS, CLI-MATIC EFFECTS, VELOCITY, EXPERIMENTA-TION, FRAZIL ICE, POROSITY.

TION, FRAZIL ICE, POROSITY.

A line array 16 ft wide x 50 ft long was tested in a small vermont mountain river late in 1980 to determine its ability to form a surface ice cover during the period when the site would normally remain as open water. Though it had little effect on the overall ice cover development on the river, a stable ice cover formed a week or so earlier on the line array. Site characteristics were seen to affect the line array. Water velocities adjacent to the lines were measured and varied from 2.3 to 3.6 ft/s. By Dec 30 solid ice thickness on the array varied from 1.13 to

1.33 ft, which would be typical of lake ice for the same

MP 2475 PRELIMINARY STUDY OF SCOUR UNDER AN ICE JAM.

Wuebben, J.L., Workshop on Hydraulics of River Ice-lice Jams, 5th, Winnipeg, Manttoba, June 21-24, 1988. Proceedings, 1988₁, p.177-192, 15 refs.

ICE SCORING, RIVER ICE, BOTTOM SEDI-MENT, HYDRAULIC STRUCTURES, WATER LEVEL, ICE JAMS, PIPELINES, PIERS, TESTS, ICE BREAKUP, VELOCITY.

ICE BREAKUP, VELOCITY.

While the potential for scouring of a river bed during an ice jam event has often been cited as a cause for concern in association with pipeline crossings, bridge piers and other hydraulic structures, almost nothing is known about the subject Significant changes in the river bed might also influence the formation of the jam itself and the water levels that result. This paper describes preliminary flume experiments to examine the effects of a floating accumulation of ice in a movable bed channel. The experiments consisted of establishing a uniform free-surface open channel flow just below the threshold of bed motion, and then installing artificial ice jams of assumed geometries and monitoring the resulting scour patterns

TRANSVERSE VELOCITIES AND ICE JAM-MING POTENTIAL IN A RIVER BEND. Zufelt, J.E., Workshop on Hydraulies of River Ice/Ice Jams, 5th, Winnipeg, Manitoba, June 21-24, 1988. Proceedings, (1988), p.193-207, 6 refs.

ICE JAMS, RIVER ICE, RIVER FLOW, TOPO-GRAPHIC EFFECTS, STREAM FLOW, VELOCI-

River bends have been reported as major locations for the initiation and development of ice jams. Bends are characterized by nonuniform channel cross sections with velocity fields affected by centrifugal acceleration. The alterations to the streamwise and transverse velocity fields are factors influencing the initiation and development of ice jams in river bends. The streamwise and transverse velocity distributions river bends The streamwise and transverse velocity distribu-tions through a river bend were examined in order to assess ice jamming potential. Tests were conducted under open water, and smooth and rough artificial ice cover condutions. The effects of the above variables on the streamwise and transverse velocity profiles in a river bend are discussed

RIVER ICE AND SALMONIDS.

Walsh, M., et al, Workshon on Hydraulics of River Ice, 4th, Montreal, Quebec, June 19-20, 1986, Montreal, 1986, p.D-4.1-D-4.26, Includes discussion and reply.

Calkins, D.J.

43-2280 RIVER ICE, FRAZIL ICE, ICE GROWTH, ANI-MALS.

Literature describing the winter habitat of Atlantic salmon (Salmo salar) is reviewed Causes of winter mortality of salmonids are proposed. Four factors considered detrimental to overwinter survival include 1) crowding of juveniles mental to overwinter survival include 1) crowding of juveniles into smaller areas due to freeze-up ice cover formation and reduction of available habitat, 2) migration of fish due to overcrowding, 3) solid ice growth into the substrate, thereby freezing the redds and the juvenile fish, and 4) high velocity flows that occur during ice cover breakup and ice jam releases. An analytical treatment of the ice front progressing into the substrate is presented and a realistic example is given to confirm the hypothesis that the freezing of redds is a high potential source for egg and juvenile losses. Frazil ice accumulation under the ice cover on the bed is detrimental to salmonid survival because it accelerates solid ice growth. Increases in overwinter survival have been shown to be Increases in overwinter survival have been shown to be directly linked to the amount of adequate winter shelter includes two key elements: silt-free rubble substrate and adequate flows

MP 2478
RESPONSE OF ADVANCED COMPOSITE
SPACE MATERIALS TO THERMAL CYCLING.
Dutta, P.K., et al, Space '88, Albuquerque, New Mexico, Aug. 29-31, 1988. Proceedings. Enguneering, construction, and operations in space. Edited by S.W. Johnson and J.P. Wetzel, New York, American Society of Civil Engineers, 1988, p.506-517, 10 refs.
Kalafut, J., Farrell, D., Lord, H.W.
43-2277

FREEZE THAW TESTS, MATERIALS

UPDATE ON PORTABLE HOT-WATER SEA ICE

Govoni, J.W., et al, Feb. 1989, 16(2), p.175-178, 2 refs Tucker, W.B. 43-2366

SEA ICE, ICE DRILLS, THICKNESS GAGES, ICE SAMPLING.

MP 2480

MEASUREMENT OF CHARACTERISTIC LENGTH OF FLOATING ICE SHEETS

Sodhi, D.S., Zweite eisbrechtechnische Expedition mit F.S. Polarstern., Schlussbericht, Band I (Second Icebreaking Technology Expedition with R.V. Polarstern., Final report, Vol.I), Hamburg, 1987, n.p. (Ch.7),

SEA ICE, FLOATING ICE, ICE COVER THICK-

Measurement of characteristic length of floating ice sheets was made by landing a helicopter on the ice sheet and measuring the change in slope on the ice surface near the point of loading. The noise from the swells in the water underneath the ice caused considerable difficulties in measuring underneath the ice caused considerable difficulties in measuring the changes in slopes. Only two successful measurements could be made when the ice thicknesses were 0.8 m and 0.63 m. The ratios of characteristic length to ice thickness were about 118 m, and the effective modulus of elasticity was 1.65 GPa and 1.24 GPa

PROCEEDINGS OF THE EIGHTH INTERNA-TIONAL CONFERENCE ON OFFSHORE ME-CHANICS AND ARCTIC ENGINEERING, 1989. VOLUME 4.

International Conference on Offshore Mechanics and International Conference on Offshore Mechanics and Arctic Engineering, 8th, The Hague, Netherlands, Mar. 19-23, 1989, New York, American Society of Mechanical Engineers, 1989, 476p., Refs. passim. For individual papers see 43-2602 through 43-2659. Sinha, N.K., ed, Sodhi, D.S., ed, Chung, J.S., ed.

43-2001 OFFSHORE STRUCTURES, OFFSHORE DRILL-ING, ICE LOADS, ICE MECHANICS, ICEBERGS, ENGINEERING, MEETINGS, ICING, ICE CON-DITIONS, SEA ICE DISTRIBUTION.

MP 2482

UNIAXIAL TENSION/COMPRESSION TESTS ON ICE—PRELIMINARY RESULTS.
Cole, D M, et al, International Conference on Off-

shore Mechanics and Arctic Engineering, 8th, The Hague, Mar. 19-23, 1989. Proceedings. Vol.4. Edited by N.K. Sinha, D.S. Sodhi and J.S. Chung, New ork, American Society of Mechanical Engineers, 1989, p.37-41, 6 refs. Gould, L D.

43-2607

43-2607
ICE STRENGTH, LOADS (FORCES), TENSILE PROPERTIES, COMPRESSIVE PROPERTIES, MEASURING INSTRUMENTS, STRESS STRAIN DIAGRAMS, ICE CRACKS, GRAIN SIZE, MICROSTRUCTURE, TESTS.

CROSTRUCTURE, TESTS.

This paper describes a clamping system that provides a means to alternate freely between tensile and compressive uniaxial loads on an ice specimen. The fixture is hydraulically activated and is used in conjunction with a closed-loop testing system. It is self-aligning, holds the specimen rigidly in place and imparts no detectable bending moment to the specimen when it is activated. The testing methodology centered on this device has proven to be very efficient and reliable. Results of several of the initial experiments employing this device are also presented. These include examples of the effect of loading frequency and grain size on hysteresis, the effect of strain level on the secant modulus for both tensile and compressive loading and an example of tensile failure following compressive loading in a regime characterized by a high degree of microcracking

ON MODELING THE ENERGETICS OF THE RIDGING PROCESS.

Hopkins, M.A., et al, International Conference on Offshore Mechanics and Arctic Engineering, 8th, The Hague, Mar. 19-23, 1989. Proceedings. Vol.4. Edited by N.K. Sinha, D.S. Sodhi and J.S. Chung, New Edited by N.K. Sinna, D.S. Sodhi and J.S. Chung, New York, American Society of Mechanical Engineers, 1989, p.175-178, 8 refs. Hibler, W.D., III. 43-2625

PRESSURE RIDGES, SEA ICE DISTRIBUTION, RHEOLOGY, ICE MODELS, ICE LOADS, ICE COVER THICKNESS, ICE PRESSURE, STATISTI-CAL ANALYSIS.

CAL ANALYSIS.

A discrete element model is developed and used to simulate A discrete element model is developed and used to simulate numerically the pressure ridging process in sea ice. With this model it is possible to keep track explicitly of frictional and collisional energy losses which has not been possible in previous studies. The results show the total energy losses in ridging to be two to three times larger than previously thought. These results are consistent with large-scale ice rheologies based on a statistical treatment of the ridging process. MP 2484

ICE REINFORCED WITH GEOGRID.

Haynes, F.D., et al, International Conference on Offshore Mechanics and Arctic Engineering, 8th, The Hague, Mar. 19-23, 1989. Proceedings. Vol.4. Edited by N.K. Sinha, D.S. Sodhi and J.S. Chung, New York, American Society of Mechanical Engineers, 1989, p.179-185, 21 refs. Martinson, C.R.

43-2626

FLOATING ICE, ICE STRENGTH, BEARING STRENGTH, ICE SHEETS, ICE DEFORMATION, MATERIALS, ICE COVER THICKNESS, TESTS, LOADS (FORCES), ICE CRACKS.

LOADS (FORCES), ICE CRACKS.

Laboratory tests were conducted on floating freshwater ice sheets reinforced with a high-strength polymene mesh (Geogrid). The mesh was frozen into the ice sheets because the tests were conducted on each ice sheet thickness of the ice sheets varied from 3 to 13 cm and the dynamic loads varied from 1 3 to 23 kN. Compansons to tests on ice without the grid were made. For the ice sheets tested, Geogrid reinforcement increased the baringe capacity of thin (49 mm) ice up to 38% and of thicker ice (96 mm) about 10-15%. Failure of the ice with Geogrid reinforcement was very local, whereas failure of the ice without Geognd was catastrophic and over a large area. Displacement of the ice is compared to theory for plates on an elastic foundation. an elastic foundation.

MP 2485

INTERACTION FORCES DURING VERTICAL PENETRATION OF FLOATING ICE SHEETS WITH CYLINDRICAL INDENTORS.

Sodhi, D.S., International Conference on Offshore Mechanics and Arctic Engineering, 8th, The Hague, Mar. 19-23, 1989. Proceedings. Vol.4. Edited by N.K. Sinha, D.S. Sodhi and J.S. Chung, New York, American Society of Mechanical Engineers, 1989, 237, 282, 5 co. p.377-382, 5 refs 43-2648

43-2648
PENETRATION TESTS, ICE LOADS, ICE CUTTING, ICE SOLID INTERFACE, FLOATING ICE, FLEXURAL STRENGTH, TEMPERATURE EFFECTS, ICE SHEETS, EXPERIMENTATION, ICE COVER THICKNESS, BUOYANCY, ICE DEFOR-MATION.

MATION.
Floating model (urea) ice sheets were penetrated vertically up with cylindrical indentors of different shapes (flat, truncated-conical and conical) and diameters (76 mm, 152 mm and 305 mm) and in different ambient temperatures (0, 10, 20 F). Our experimental results show that there is no effect of indentor shape or size on the ice penetration forces. From dimensional analysis, a relationship is obtained for maximum ice penetration force in terms of the specific weight of water, the ice thickness and the upward flexural strength. From the measured deflections of the ice sheet at a few points along a radial line during penetration tests, the buoyancy force is calculated independently of the total measured force, by subtracting the buoyancy force from the total measured force, the inertial force is obtained. Plots of these forces are given for a few tests

INSTRUMENTED VEHICLE FOR THE MEAS-UREMENT OF MOBILITY PARAMETERS. Blaisdell, G.L., International Instrumentation Sym-posium, 35th, Orlando, FL, May 1-4, 1989. Proceed-ings, Research Triangle Park, NC, Instrument Society of America, 1988, p.377-388, 7 refs 43-2667

MOTOR VEHICLES, VEHICLE WHEELS, TIRES, TRACTION, COLD WEATHER TESTS, SNOW.

A 4-wheel drive van was equipped with a stepper motor, instruments and onboard computer data acquisition and control system to measure tire traction on show Forces down to 130 newtons can be measured with an accuracy of 2%

MP 2487 MODEL STUDY OF UPLIFTING ICE FORCES: THE INSTRUMENTATION.

Zabilansky, L.J., international Instrumentation Symposium, 35th, Orlando, FL, May 1-4, 1989. Proceedings, Research Triangle Park, NC, Instrument Society of America, 1988, p.745-748, 2 refs

43-2668 PILE EXTRACTION, PILE LOAD TESTS, ICE LOADS, ICE MODELS.

A test basin 36 m long, 9 m wide and 24 m deep, with a Hewlett-Packard 9845B desktop computer for real-time monitoring and control, was used to model pile extraction from uplifting ice forces

ROOFER: A MANAGEMENT TOOL FOR MAIN-TAINING BUILT-UP ROOFS.

Bailey, D.M., et al, Conference on Roofing Technology, 9th, Gaithersburg, MD, May 4-5, 1989. Proceedings. Putting roofing technology to work, Rosemont, National Roofing Contractors Association, 1989, p.6-10, 5 refs. Brotherson, D.E., Tobiasson, W.

ROOFS, MAINTENANCE, MILITARY FACILI-TIES, WEATHERPROOFING.

ROOFER is a management system to maintain built-up roofs for the U.S. military. The system includes inventory, inspection and condition evaluation. Each roof is evaluated for the condition of its membranes, flashings and insulation. ROOFER is being programmed to use the data for maintenance scheduling on microcomputer

MP 2489

VAPOR RETARDERS FOR MEMBRANE ROOF-ING SYSTEMS.

Tobiasson, W., Conference on Roofing Technology, 9th. Gaithersburg. MD. May 4-5, 1989. Proceedings. 9th, Gaithersburg, MD. May 4-5, 1989. Proceedings. Putting roofing technology to work, Rosemont, IL, National Roofing Contractors Association, 1989, p.31-37, 13 refs. 43-2692

ROOFS, MAINTENANCE, WATERPROOFING, AIR LEAKAGE, VAPOR BARRIERS.

Membrane roofs consisting of piles attached by hot bitumens are subject to condensation damage from air leakage. Warm air can hold more moisture than cold air Vapor retarders are materials which resist leakage of warm high-humidity indoor air into roofs where contact with colder outside temperatures can cool the air and cause condensation Vapor tures can cool the air and cause condensation Vapor retarders should have a perm rating (grains/hr) (sq ft) (inch mercury) of 0.5 or less Some materials with their perm ratings are listed.

MP 2490

SEA ICE RIDGING IN THE ROSS SEA, AN-TARCTICA, AS COMPARED WITH SITES IN THE ARCTIC.

Weeks, W.F., et al, Apr. 15, 1989, 94(C4), p.4984-4988, 20 refs.

Ackley, S.F., Govoni, J.W. 43-2725

SEA ICE, AERIAL SURVEYS, PRESSURE RIDGES, CHUKCHI SEA, BEAUFORT SEA, AN-TARCTICA—ROSS SEA. PRESSURE

TARCTICA—ROSS SEA.

At the end of the 1980 austral winter, surface roughness measurements were made by laser profilometer during a senes of flights over the Ross Sea pack ice. The total track length was 2696 km, and 4365 ridges were counted the frequency distribution of individual ridge heights was found to be well described by a negative exponential distribution. No clear-cut regional variation was noted in ridge heights. The distribution of ridge frequencies per kilometer showed a strong positive skew with a modal value of 188, the most freque ridging occurred off the east coast of Victoria I and Comparisons with similar data sets from the Arctic indicate that large ridges are significantly more likely in the Arctic Ocean than in the Ross Sea. Utilizing a reasonable model for the geometry of ridges, estimates are made of the average thickness of a hypothetical continuous layer composed only of the deformed ice from ridges. The noncoastal Ross Sea value of 0.09 m is less than half of the lowest comparable value from the Arctic. (Auth mod)

MP 2491

SEA-ICE INVESTIGATIONS DURING THE WINTER WEDDELL SEA PROJECT.
Ackley, S.F., et al, 1987, 22(5), p.88-89.

Wadhams, P., Lange, M.A 43-2749

SEA ICE, FRAZIL ICE, ICE COVER THICKNESS, ICE CORES, ANTARCTICA—WEDDELL SEA

Sea ice studies conducted during the Winter Weddell Sea Project are described The field efforts consisted of ice-deformation experiments, ice-thickness measurements by coring and drilling, surface wave investigations, aerial photography and hourly visual observations of surface morphology and ice conditions, radar ice-thickness measurements, microwave emission studies, and joint physical-biological ice-property studies from cores to characterize the sea ice as a habitat Several of the studies showed the relative importance of an ice-advance process controlled by wave and swell action during the freeze-up process. Ice thickness measurements during the freeze-up process, are plotted and discussed

MP 2492

ICE-INDUCED VIBRATIONS OF STRUC-TURES

Sodhi, DS, Fco 1989, Sr 89-5, Working group on ice forces. 4th state-of-the-art report, edited by G.W. Timeo, p.189-221, ADA-207 546, Refs. p.217-221 Also in IAHR Symposium on Ice. 9th, sapporo, Japan, Aug. 23-27, 1988. Proceedings, Vol.2, p 625-657. 43-2818

ICE LOADS, STRUCTURES, VIBRATION, ICE SHEETS, ICE SOLID INTERFACE.

Vertical structures are often placed in ice environments where they are subjected 13 ice action. Under certain conditions, they vibrate as a result of interaction with a moving ice sheet Various theories and concepts have been proposed to explain the ice-induced vibration. A review of the literature on this subject is presented here

MP 2493

FRACTURE OF S2 COLUMNAR FRESHWATER ICE: FLOATING DOUBLE CANTILEVER BEAM TESTS.

Bentley, D.L., et al, IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Pr Vol.1, [1988], p.152-161, Refs. p.160-161. Dempsey, J.P., Sodhi, D.S., Wei, Y. Proceedings,

43-2918

ICE STRENGTH, ICE HARDNESS, ICE CRACKS, CRACKING (FRACTURING), ARTIFICIAL ICE, FLOATING STRUCTURES, ANALYSIS (MATH-EMATICS).

EMATICS).

A series of 30 fracture toughness tests were performed on aboratory-grown S2 columnar freshwater uce at high homologous temperatures (-2 to 0 C)

The floating double cantilever beam specimen used and the monitoring of the crack mouth opening displacement in addition to the applied load provided a means for obtaining an apparent fracture toughness, an effective clastic modulus, a lower-bound estimate of the crack speed, and a side-loaded flexural strength of the ice. An expression for the apparent fracture toughness as a function of the applied load, specimen geometry, and ice thickness was developed using a finite clement program. Total sllowed comparison with previously published values for the toughness of freshwater ice. The small range of scatter in apparent fracture toughness values as well as the ability to measure other mechanical properties of the ice indicates the usefulness of such tests.

MP 2494

STRAIN ENERGY FAILURE CRITERION FOR S2 FRESHWATER ICE IN FLEXURE.

Cole, D.M., IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Proceedings, Vol.1, (1988), p.206-215, 14 refs.

NUCLEATION, ICE RELAXATION, TENSILE PROPERTIES, GRAIN SIZE, MATHEMATICAL MODELS, TEMPERATURE EFFECTS.

MODELS, TEMPERATURE EFFECTS.

This paper describes the development of a model for the flexural strength of S2 freshwater ice in simple bending under isothermal conditions. The model applies to the case of nucleation-controlled failure and addresses temperature and grain size effects. The derivation balances the energy supplied by stress relaxation with the energy required to overcome the barrier to crack nucleation and the energy to form new surface area. The nucleation barrier, which is not yet fully specified, can be determined from experimental results and appears to be independent of temperature for the flexural case under consideration. The physical reasoning behind the model leads to a mathematical form that differs somewhat from the expression generally used to represent similar experimental results. The conceptual basis for the model draws from observations on the flexural tests, from published microscopic observations for ice and from the literature on nucleation theory. The model predictions compare favorably with published experimental results for the flexural strength as a function of temperature in the range of -1 to -19 C and as a function of grain size in the range of 0 0002 to 0 006 m.

MP 2495 RESULTS FROM INDENTATION (ESTS ON FRESHWATER ICE.

Sodhi, D.S., et al, IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988 Proceedings, Vol.1, [1988], p.341-350, 9 refs.

Nakazawa, N.

IMPACT TESTS, TENSILE PROPERTIES, COM-PRESSIVE PROPERTIES, ICE PRESSURE, VELOCITY, EXPERIMENTATION.

VELOCITY, EXPERIMENTATION. Indentation tests were performed by pushing vertical, flat indentors of 50- and 100 r-m widths into freshwater columnar ice of different thicknesses (25-60 mm) at different velocities (1-9 mm/s). Extensive data on forces, displacements and acoustic emissions were recorded, and some of these are presented in this paper. Depending on the velocity of the indentor, ductile or brittle behavior of ice was observed. A few attempts to measure the pressure at the interface during ice crushing indicated a uniform pressure distribution. Later in the program, the interaction forces were measured at the ice-structure interface by supporting indentor plates on three load cells. With this system, the j ints of action of the resultant forces were found to be in the center of the contact area, indicating uniform pressure distribution. MP 2406.

HIGH-FLOW AIR SCREENS REDUCE OR PRE-VENT ICE-RELATED PROBLEMS AT NAVIGA-TION LOCKS.

Rand, J H., IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988 Proceedings, Vol.2, (1988), p.34-43, 4 refs. 3.297

LOCKS (WATERWAYS), ICE CONTROL, BUB-

A variety of techniques have been developed in the past to prevent ice from interfering with navigation lock operations. This article describes the best technique developed that has been effectively demonstrated at several navigation locks in the United States The system consists of an improved bubbler aystem that combines three air manifolds at various locations within the lock to control and move the ice, allowing normal lock operations even in the most severe winter conditions.

MP 2497

DEVELOPMENT OF A RIVER ICE-PROW.

Tatinclaux, J.C., IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Proceedings, Vol.2, 1988, p.44-52, 9 refs. 43-2978

RIVER ICE, ICE NAVIGATION, ICE CONTROL, ICE BREAKING, ICEBREAKERS, SHIPS.

ICE BREAKING, ICEBREAKERS, SHIPS.

This paper describes the second phase in the development of a river ice-prow intended to be attached to a towboat for opening navigation channels or for ice management in the vicinity of the locks and dams on the northern rivers of the United States (Illinois, Ohio, and Upper Mississippinvers). The first prow concept, presented at the 1986 IAHR [cc Symposium in lowa City, proved during model tests to be less maneuverable than desired. Most of the difficulties were attributed to the side ice-cutters and to a poor lengthwise weight distribution. The be "was redesigned and the side cutters were eliminated. Model tests showed greatly improved maneuverability in ice without significant effect on the icebreaking capability of the prow. The results of these tests are presented and discussed.

MP 2498
ICE COVER FORMATION DOWNSTREAM OF A LARGE RESERVOIR WITH VARIABLE RE-

Ashton, G.D., IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Proceedings, Vol.2, Japan, Aug. 23-27, 19 [1988], p.189-198, 3 refs. 43-2992

DAMS, RESERVOIRS, ICE FORMATION, ICE COVER, ICE CONDITIONS.

COVER, ICE CONDITIONS.

On the Missouri River, downstream of Oahe Dam, an ice cover forms, accumulates and retreats in response to varying air temperatures, varying and daily peaking discharges of up to 1400 cu m/s, and varying water temperatures of the release. Extreme accumulations of this ice in some years have caused flooding due to the increased stage associated with the resistance of the ice cover. A simulation of the accumulation and retreat of the ice cover has been constructed, including the variability of the discharge, water temperature, and air temperatures, and compared and calibrated against available data. A discussion of the various approximations used in the simulation is presented together with an assessment of the improvements that occur when various parts of the simulation are treated in more detail, such as using hourly energy budgets rather than daily averages based on a simple bulk heat transfer coefficient

EFFECTS OF AN ICE COVER ON FLOW IN A

MOVABLE BED CHANNEL.
Wuebben, J.L., 1AHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988 Proceedings, Vol.3, 1988, p.137-146, 3 refs.
43-3027

WATER FLOW, CHANNELS (WATERWAYS), SEDIMENT TRANSPORT, ICE COVER EFFECT, ALLUVIUM, FORECASTING.

ALLUVIUM, FORECASTING.

The formation of an ice cover on an alluvial system results in significant changes in the flow regime due to the interaction between the ice cover, fluid flow, fluid properties, sediment and bedforms. For the case of uniform flow in a rigid channel, the addition of an ice cover of uniform thickness and surface roughness would typically result in an increase in water depth and a reduction in water velocity and bed shear. Such a flow can be conceptually split along a hypothetical plane of zero shear located approximately at the point of maximum; velocity in any vertical profile If this concept could be extended to flow over a movable bed, then existing free surface sediment transport theory could be applied to the lower layer by treating it as a distinct "open channel" case. To test the practicability of using this lower layer approach to predict sediment transport and resistance to flow in an ice covered channel, a series of tests were conducted at various discharges in a laboratory flume. The sediment was a uniform, 0.45-mm-diameter quartz sand and bedforms were in the ripple and dune regimes. For each discharge, a run was initiated by establishing uniform flow under a simulated ice cover. Once the lower layer depth and discharge were determined, a corresponding open water flow was established leaving other parameters unchanged. The ice covered and free surface flow were then compared based on sediment discharge, bed form geometry, and energy slope to determine the applicability of the lower layer approach. ometry, and energy slope to determine the applicability the lower layer approach

MP 2500 FORECASTING RIVER WATER TEMPERA-

Daly, S.F., IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988 Proceedings, Vol.3, 1988, p.180-188, 6 refs. 43-3031

FORECASTING, WATER TEMPERATURE, WATERSHEDS, AIR WATER INTERACTIONS, RIVER ICE, MATHEMATICAL MODELS.

The water temperature of a river at any point reflects how the upstream waterahed responds to heat transfer with the environment. The ability to model this response provides a way to forecast future river water temperatures, which could be an important part of an ice forecasting program. This paper presents a model of the watershed response. In the model the overall environmental heat transfer is calculated based on two terms one linearly dependent on the difference between the water and air temperature. The response of the watershed is determined by analyzing the past records of air and water temperature. From these records, monthly of air and water temperature from these records, monthly or seasonal response coefficients for the watershed are determined. Forecasts of future air temperature, along with the known water temperature at the time of the forecast, are used to forecast water temperature. Water temperature the known water temperature at the time of the forecast, are used to forecast water temperature. Water temperature can be forecast for any future data, however, in practice the accuracy is limited by the current limitations of air temperature forecasts. The model is applied to the Ohio River, and results are shown as hindcasts of water temperature based on the actual recorded air temperatures, and hindcasts of "likely ice periods" based on the actual recorded data. The model can be used to forecast likely ice periods in large and small watersheds, is designed to be used with real-time water temperature measurements and is particularly useful for forecasting tributary water temperatures as boundary conditions for more elaborate models. conditions for more elaborate models

MP 2501 LABORATORY STUDY OF TRANSVERSE **VELOCITIES AND ICE JAMMING IN A RIVER** BEND.

poro, Japan, Aug. 23-27, 1988. Proceedings, Vol.3, 1988, p.189-197, 6 refs. Zufelt, J.E., et al, IAHR Symposium on Ice, 9th, Sap-

43-3032

VELOCITY, ICE JAMS, ICE FLOES, RIVER ICE, RIVER FLOW, SIMULATION.

RIVER FLOW, SIMULATION.

The velocity field through a river bend is greatly affected by its channel curvature, primarily by the action of centrifugal acceleration. The streamwise velocity gradient is responsible for a nonuniform distribution of centrifugal forces, which results in a radial circulation. River bends have long been reported as the locations for the initiation and development of ice jams. These radial velocities affect the transport and deposition of bed material and/or ice in the bend, resulting in nonuniform depths and ice thicknesses over a cross section. The streamwise and transverse velocity profiles through a 90 deg bend of a laboratory flume were examined. A variety of discharge, bed roughness, and water surface conditions were tested, including smooth and rough simulated ice covers. The effects of each variable on the velocity field were identified. rough simulated ice covers. The eff on the velocity field were identified

MP 2502 FRACTURE EXPERIMENTS ON FRESHWATER AND UREA MODEL ICE.

Bentley, D.L., et al, Aug. 1988, No.88-7, 152p., Refs. passim. For individual papers see 40-4558, 42-3565, and 43-2918

Dempsey, J.P., Sodhi, D.S.

ICE MODELS, ARTIFICIAL ICE, UREA, ICE STRENGTH, ICE BREAKING, CRACKING (FRACTURING), ICE.

MP 2503 EMERGING METEORITE: CRYSTALLINE STRUCTURE OF THE ENCLOSING ICE. Gow, A.J., et al, 1989, No.28, p.87-91, 6 refs. Cassidy, W.A. 43-3079

ICE CRYSTAL STRUCTURE, GEOCHRONOLO-GY, ANTARCTICA—ALLAN HILLS.

While searching for meteorites in the Allan Hills region during the austral summer of 1982-1983, a small, walnutsized meteorite was discovered with just its tip protruding above the ice surface. The meteorite appeared to be still embedded in the original ice and becoming exposed for the first time at the ablation surface. If this interpretation were proved correct, this would be the first example observed in Allactics of an expression store, a discovery of secret. were proved correct, this would be the first example observed in Antarctica of an energing stone, a discovery of special importance because the terrestrial age of the meteorite would be the same as that of the enclosing ice. This study was undertaken to determine if the crystalline properties of the ice were consistent with the notion that the ice enclosing the meteorite is coeval with the terrestrial age of the meteorite. Following remeasurement and photography the ice block was split apart by wedging and the meteorite removed. The ice was then cut in three mutually perpendicular directions in order to evaluate the three dimensional picture of the crystal/bubble structure of the ice. It is concluded from the analysis that the meteorite was, in fact, just emerging at the ablation surface when it was discovered. (Auth.)

VEHICLES FOR FREIGHT-HAULING AND FOR SCIENCE TRAVERSES IN ANTARCTICA. Mellor, M., Hanover, NH, U.S. Army Cold Regions

Research and Engineering Laboratory, (1988), Var

TRACTORS, TRACKED VEHICLES, LOGISTICS, TRAVERSES, SNOW VEHICLES, CARGO.

Proposals for freight hauling vehicles in Antarctica, submitted by Caterpillar Inc. to CRREL, are presented. Various models of Caterpillar LGP, Challenger, and High Speed Hauler tractors are described

MP 2505 PLANING MACHINES FOR BUILDING RUN-WAYS ON ICE.

Mellor, M., Hanover, NH, U.S Army Cold Regions Research and Engineering Laboratory, [1989], 8p. + attachments.

ICE RUNWAYS, ICE CUTTING, CONSTRUCTION EQUIPMENT, ANTARCTICA—MCMUR-DO STATION.

DO STATION.

An ice runway, 300 ft by 10,000 ft, able to accommodate the C-130 military air transport, is proposed for the Ross lee Shelf near McMurdo Station Caterpillar Inc, was requested to submit proposals for ice planing machines to build the runway. A modified Caterpillar PR-450 pavement build the runway. A modified Caterpillar PR-450 pave profiler and RR-250 road reclaimer look promising

MP 2506 ICE FORMATION DOWNSTREAM OF OAHE

DAM-1987-1988 WINTER.
Ashton, G.D., Hanover, NH, U.S. Army Cold Regions
Research and Engineering Laboratory, 1988, 37p, 1

44-226 DAMS, ICE FORMATION, FLOOD CONTROL. ICE CONTROL, ICE CONDITIONS, RESERVOIRS, UNITED STATES—SOUTH DAKOTA—OAHE DAM.

MP 2507 WINTER WATER QUALITY IN LAKES AND STREAMS.

Calkins, D.J., et al, Hanover, NH, US Army Cold Regions Research and Engineering Laboratory, (1988), 8p, Presented at Corps of Engineers 7th Seminar on Water Quality, Charleston, SC, Feb. 23-25, 1988, 11 refs Ashton, G.D.

WATER CHEMISTRY, LAKE WATER, ICE COVER EFFECT, ICE CONDITIONS, SURFACE

MP 2508 YEAR OF BOWEN RATIOS OVER THE FROZ-EN BEAUFORT SEA.

Andreas, E.L., Sep. 15, 1989, 94(C9), p.12,721-12,-724, 15 refs.

ICE HEAT FLUX, LATENT HEAT, SEA ICE, SEA-SONAL VARIATIONS, AIR TEMPERATURE, ICE AIR INTERFACE, ANALYSIS (MATH-EMATICS).

MP 2509 COMPUTER-GENERATED GRAPHICS RIVER ICE CONDITIONS.

Bilello, M.A., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988 Applied hydrology in the development of northern basins, Copenhagen, 1988, p.211-219, 3 refs.

Gagnon, J.J., Daly, S.F. 44-250

RIVER ICE, ICE CONDITIONS, COMPUTER PROGRAMS.

Timely information on river ice conditions is essential to the shipping industry on ice-prone inland waterways where navigation throughout the winter is required. Included in a river ice management program are daily ice observations on rives in PA and WV. Hand-drawn displays of these ice conditions were made from the alphanimetric coded records, but they excused excitate time to prepare. To excelle but they required excessive time to prepare To expedite the availability of such diagrams, a computer graphics program was developed Intuit computer graphics printed in black and white showed the coverage and extent of river ice. and white showed the coverage and extent of their team of the tree and whether the ice was running or stationary. Further modifications, in which color graphics were used, made it possible to also include ice thickness and other reported twer ice characteristics such as clear or rotting ice.

DEVELOPMENT OF A DYNAMIC ICE BREAK-UP CONTROL METHOD FOR THE CONNECTI-CUT RIVER NEAR WINDSOR, VERMONT.

Ferrick, M.G., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.221-233, 9

emieux, G.E., Weyrick, P.B., Demont, W.

ICE BREAKUP, RIVER ICE, ICE CONTROL, ICE JAMS, FLOODS.

The Cornish-Windsor bridge is the longest covered bridge in the United States and has significant historical value. Dynamic ice breakup of the Connecticut River can threaten the bridge and cause flood damage in Windsor, VT. The authors monitored ice conditions throughout the 1985-86 winter, observed a midwinter dynamic ice breakup, conducted controlled a property of the controlled states and the controlled states. winter, observed a midwinter dynamic ice oreaxup, conducted controlled release tests during both open water and ice cover conditions, and analyzed more than 60 years of temperature and discharge records. River regulation presents alternatives for ice management that would minimi. e water levels during breakup. In this paper the basis of a method is developed to produce a controlled ice breakup at lower stage and discharge than occur during major natural events.

MP 2511 CORRELATION FUNCTION STUDY FOR SEA

Lin, F.C., et al, Nov. 15, 1988, 93(C11), p.14,055-14,063, 50 refs.

Kong, J.A., Shin, R.T., Gow, A.J., Arcone, S.A.

SEA ICE, ARTIFICIAL ICE, DIELECTRIC PROP-ERTIES, ANALYSIS (MATHEMATICS), CORRE-LATION, REMOTE SENSING, REFLECTIVITY, BRINES

MP 2512 WINTER FIELD TESTING OF U.S. NAVY FLEET HOSPITAL.

Sletten, R.S., et al, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, (1988), 10p., Presented at Test Technology Symposium, Johns Hopkins University, Jan 1988. Crory, F.E. 44-269

PORTABLE SHELTERS, MILITARY FACILI-TIES, COLD WEATHER TESTS. The US Navy has designed and initiated procurement of

The US Navy has designed and initiated procurement of more than 20 modular, containerized fleet hospitals ranging in size from 250 to 1000 beds. The hospitals are tenthased but include specially outfitted hard shelters for operating rooms, labs, and other hospital functions. Interconnected tent wings comprise the wards, casually receiving, and some administrative functions. Hospital staff are housed in general purpose tents. Piped water and wastewater systems are provided in the hospital. All wards and outfitted shelters are provided with electrical, heating, and air-conditioning equipment. All hospital components were designed to operate within a temperature range of +125 F to -10 F, but the lower end of this range had not been evaluated under actual winter conditions. At the request of the Navy's Fleet Hospital Program office, representative sections of a fleet hospital were tested at CRREL from Dec. 1986 through May 1987. The hospital was instrumented with approximately 100 thermocouples, and temperatures were recorded every 3 hours throughout the test period. Extensive weather records were collected by an on-site meteorological station. Several subsystem failures were identified and documented, primarily in the heating, electrical, and wastewater facilities. Modifications were made to the plumbing and heating systems in an effort to correct identified failures or to improve the effectiveness of the systems.

MP 2513 EXPERIMENTAL METHODS FOR DECON-TAMINATING SOILS BY FREEZING. Ayorınde, O.A., et al, Hanover, NH, US Army Cold

Regions Research and Engineering Laboratory, [1988], 12p, Presented at Test Technology Symposium, John Hopkins University, Laurel, MD, Jan. 26-28, 1988. 6 refs. Perry, L B., Pidgeon, D., Iskandar, I K. 44-270

ARTIFICIAL FREEZING, WASTE TREATMENT, SOIL FREEZING, SOIL POLLUTION, WASTE DISPOSAL, SOIL WATER MIGRATION.

Laboratory, methods were developed to demonstrate and evaluate the feasibility of using artificial soil freezing as a costeffective technique in general site decontamination. This
effort is part of CRRLL's artificial freezing research program
for hazardous waste management. The study attempted
to quantify parameters which influence contaminant transport in voils during freezing. Among the influence contaminant ransport in voils during freezing. Among the influencing parameters, freezing rate was found to be the most significant. Contaminant movement profiles in soils during freezing were measured Laboratory column studies showed a significant mobility of volatile organics, such as benzene, chloroform and toluene, when Lebanon sity soil contaminated with these organics was frozen from the bottom up. A range of 25-67% reduction in contaminant concentration was measured in

the frozen soil sample when subjected to an average freezing rate of 0.25 cm/day, with the concentration increase found just around the freezing front. However, a corresponding 25-67% increase in concentration ahead of the freezing front was not obtained as expected, due to contaminant losses through volatilization, biodegradation and sorption. A mathematical contamination of the production of the product through volatilization, biodegradation and sorption. A matan-ematical correlation was established between the contaminant relative change in concentration and their octanol-water parti-tion coefficients. The well-correlated relationship strongly suggests the dependence of the freezing-induced mobility of the specific organic contaminant component on its octanol-water value.

PROTOTYPE TESTING FACILITIES FOR FIELD EVALUATION OF CONTAMINANT TRANSPORT IN FREEZING SOILS.

Ayorinde, O.A., et al, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, t1988, 29p., Presented at the International Conference on Physiochemical and Biological Detoxification of Hazardous Wastes, Atlantic City, NJ, May 3-5,

1988. 10 refs.
Perry, L.B., Tantillo, T., Pidgeon, D., Iskandar, I.K.

44-271
ARTIFICIAL FREEZING, WASTE TREATMENT, SOIL FREEZING, SOIL POLLUTION, WASTE DISPOSAL, TEST EQUIPMENT, SOIL TESTS, SOIL WATER MIGRATION.

SOIL WATER MIGRATION.

Recently, artificial freezing has been identified as a potential and plausible technique for treating soil contamination as well as for general site decontamination. As part of the overall CRREL artificial freezing research program for toxic and hazardous waste management and control in cold regions, a large-scale prototype testing facility has been constructed to study and evaluate contaminant movement in soils during freezing. The contaminants proposed to be used for the study include volatile organics, such as chloroform, toluene, and benzene, and non-volatile organics, such as TNT and RDX. Variation in contaminant concentration during freezing would be obtained by soil coring and sampling tubes in different locations. Contaminant concentration would be determined using a gas chromatograph/mass spectrometer and high-precision liquid chromatograph.

MP 2515

USE OF INNOVATIVE FREEZING TECHNIQUE FOR IN-SITU TREATMENT OF CONTAMINATED SOILS.

Ayorinde, O.A., et al, International Conference on New Frontiers for Hazardous Waste Management, 3rd, Pittsburgh, PA, Sep. 10-13, 1989. Proceedings, (1989), p.489-498, 14 refs. Perry, L.B., Iskandar, I.K.

ARTIFICIAL FREEZING, SOIL FREEZING, WASTE TREATMENT, SOIL POLLUTION, WASTE DISPOSAL, SOIL WATER MIGRATION,

WASTE DISPOSAL, SOIL WATER MIGRATION, EXPLOSIVES.

In the past few years, CRREL has been investigating the use of artificial freezing as an innovative technique for soil decontamination. A preliminary laboratory study was conducted specifically to evaluate and analyze the possibility of mobilizing different types of contaminants by freezing in Lebanon silt. Contaminants investigated were explosive residues most extensively found at the U.S. Army ammunition lants as well as volatile organic compounds (VOC3), such as chloroform and toluene. Explosives studied were 2,4,6-trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), octahydro-1,3,5-ternanitro-1,3,5-tertazione (HMX), 2,6-dinitrotoluene (2,6-DNT), ortho-nitrotoluene (O-NT), and meta-nitrotoluene (A-NT) Preliminary data from the laboratory column studies suggested that there was a certain degree of movement of both explosives and VOCs when soil columns of Lebanon silt saturated with these contaminants were frozen unidirectionally from the bottom up. Slopes of the control and frozen soil concentration profiles were statistically analyzed and a comparison between them was made. One freeze cycle at an average freezing rate of 0.5 cm/day was used. Insignificant amounts of movement (<10% change) were observed for 2,0 DNT, O-NT, M-NT, toluene and chloroform For given freezing rate, freeze-thaw cycles, soil and moisture content, it was hypothesized from this and other previous experimental data that the ability to move any contaminant by freezing strongly depends on the type, initial concentration level and the soil/chemical interaction of the contaminant.

MP 2516

MP 2516 VIBRATING WIRE TECHNOLOGY FOR SET-TLED DUST MONITORING.

Dutta, P.K., et al, Battlefield Dust Environment Symposium, 3rd. Proceedings, edited by R.R. Williams and R.E. Davis, [1988], p.71-82, 2 refs. Runstadler, P.W.

44-282 DUST, DETECTION, REMOTE SENSING, MEA-SURING INSTRUMENTS.

A new remote operating sensor for accurate and continuous monitoring of dust settlement rate is described. The system was developed for monitoring settled dust in underground coal mines, but it is conceived that it can also be used

for monitoring dust deposition in many other situations. The design is based upon vibrating wire technology, which makes the device insensitive to lead wire resistance, contact resistance, ground leakage, and humidity, which are common instrument problems in any field environment. The portable readout is microprocessor based, and can read up to 10 remote sensors connected through a switch module. Dust loading on the sensors is read directly in mg/sq cm. In use, the 10 sensors can be placed at various locations, and all can be monitored with their cables terminating at a central station where the switch module is located. The maximum permissible distance of the sensors from the readout is about 1.6 km. The readout unit weights 4 kg and is rugged and splash-proof. Both the sensor and the readout unit were tested for shock and vibration, and both met military standards. The sensors are temperature compensated and can detect changes in dust loading as small as 0.5 mg/sq m. The total range of the sensor is 0 to 500 mg/sq cm. The paper describes the principle by which the sensors operate, the assembly procedures, and the results of sensor calibration, stability and repeatability tests. The details of the readout unit are also described.

HOPKINSON PRESSURE BAR APPARATUS: A TOOL FOR RAPID ASSESSMENT OF MATERI-

AL PROPERTIES AT HIGH STRAIN RATES.
Dutta, P.K., et al, Test Technology Symposium, 1st,
Jan. 25-28, 1988. Proceedings, Vol.2, (1988), p.885-903, 20 refs. Farrell, D., Kalafut, J.

44-283

STRAIN MEASURING INSTRUMENTS, STRAIN TESTS, ICE LOADS, DYNAMIC LOADS, IMPACT TESTS, ICE DEFORMATION.

PACT TESTS, ICE DEFORMATION.

The split Hopkinson bar is an analysis tool that allows material characteristics to be determined under high strain rate loading conditions (50 to 1000 strains per second). In the techniques described, the material under test is cooled with liquid nitrogen flowing through coils surrounding the test specimen. The technique incorporates computer control over the data collection and analysis so the material properties are determined rapidly.

To illustrate the capability of the testing method, a demonstration using ice as a material is included.

MP 2518

INTAKE DESIGN FOR ICE CONDITIONS.

Ashton, G.D., Developments in Hydraulic Engineering, Vol.5. Edited by P. Novak, London, Elsevier Applied Science Publishers, 1988, p.107-138, 44 refs. 44-308

44-308
ICE CONTROL, WATER INTAKES, ICE ACCRETION, FRAZIL ICE, ICE FORMATION, WATER FLOW, STABILIZATION, COUNTERMEASURES, HYDRAULIC STRUCTURES, RIVER ICE, FLUID DYNAMICS, LAKE ICE.

ENGINEERING GEOLOGY STUDIES ON THE NATIONAL PETROLEUM RESERVE IN ALAS-

Kachadoorian, R., et al, Geology and exploration of the National Petroleum Reserve in Alaska, 1974 to 1982. Edited by G. Gryc, Washington, D.C., 1988, p.899-922, 15 refs. Crory, F.E. 44-393

ROADS, WELLS, RESEARCH PROJECTS, RUNWAYS, DRILLING, GRAVEL, SEASONAL FREEZE THAW, SANDS.

WAYS, DRILLING, GRAVEL, SEASONAL FREEZE THAW, SANDS. The U.S. Geological Survey (USGS) has been charged with the responsibility of evaluating the petroleum potential of the National Petroleum Reserve in Alaska (NPRA). This work had already been initiated by the US Navy, from whom the NPRA was transferred to the Department of the Interior. To help fulfill its responsibility, the USGS in Feb 1977 started an engineering geology program to provide the geotechnical support necessary for the exploration program. The USGS requested the U.S. Army Waterways Experiment Station (WES) at Vicksburg, MS, and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) at Hanover, NH, to conduct studies to obtain the physical parameters required to evaluate and solve some of the geotechnical and engineering problems. All of the NPRA is underlain by permafrost, and thus virtually all of the engineering and geotechnical problems encountered during the construction of the well sites and subsequent drilling were associated with permafrost. The widespread occurrence of permafrost containing large amounts of near-surface ground ice in the form of wedges, masses, and intergranular ice required that construction activity not disturb the thermal regime of the ground surface, because such disturbance could lead to thawing of permafrost. Once the permafrost was thawed, ground subsidence, sediment flow, and impassable conditions would result. Construction problems were compounded by the necessity that all construction in the NPRA be done during the winter months to meet the environmental requirements. Therefore, the engineering geology program consistently addressed the impact of the environment on the facilities and the effect of the facilities on the environment

MP 2520

JÖKULHLAUPS FROM STRANDLINE LAKE, ALASKA, WITH SPECIAL ATTENTION TO THE 1982 EVENT.

Sturm, M., et al, June 1989, 88-10, 19p., 14 refs. Benson, C.S.

44-395 FLOODS, GLACIAL LAKES, ICE DAMS, FLOODING, SUBGLACIAL DRAINAGE, GLACIAL HYDROLOGY, UNITED STATES—ALASKA—STRANDLINE LAKE.

CIAL HYDROLOGY, UNITED STATES—ALAS-KA—STRANDLINE LAKE.

Jökulhlaups, or outburst floods, have occurred every 1 to 5 yr from Strandline Lake, one of the largest glacier-dammed lakes in North America. They flood the Beluga River, which was once in an undeveloped region but now is spanned by bridges and power lines leading to Alaska's largest urban area. In 1982, a study of the mechanisms that produce these jökulhlaups was initiated to improve the ability to predict them and thereby to mitigate their damages. Reliable precursors appear to be development of a distinct calving embayment in the lobe of the Triumvirate Glacier, which dams Strandline Lake, and formation of a number of supraglacier pools. Contour maps made from photos taken immediately before and after the jökulhlaup of Sep. 17, 1982 indicate that over 95% of the lake drained, releasing about 700,000,000 cu m of water. The lake is dammed by a glacier lobe that fractures and subsides during a jökulhlaup, which indicates that the release mechanism is hydrostatic lifting of ice off a subglacial spllway; the exposed areas surrounding the glacier margins suggest that the spillway may be controlled by bedrook. Large variations occur in the refilling period of Strandline Lake. Modifications of subglacial drainage into Strandline Lake as a result of jökulhlaups, combined with complex sub- and marginal drainage patterns, appear to exert controls which are not understood but which contribute to the variable filling rates.

MP 2521

COLD-TEMPERATURE CHARACTERIZATION OF POLYMER CONCRETE

Bigl, S.R., Sep. 1986, ESL-TR-86-26, 46p., 4 refs. 44-396

44-396
POLYMERS, CONCRETE PAVEMENTS, CONCRETES, TEMPERATURE EFFECTS, COLD
WEATHER PERFORMANCE, COMPRESSIVE
PROPERTIES, FLEXURAL STRENGTH, CONCRETE AGGREGATES, CONCRETE CURING.

PROPERTIES, FLEXURAL STRENGTH, CONCRETE AGGREGATES, CONCRETE CURING. This report discusses laboratory engineering tests that were performed to determine the properties of polymer concrete under cold conditions. The polymer tested was Percolosed, a three-part polyurethane resin, catalyst amounts were adjusted so that samples set at approximately 30 seconds. The 11 conditions tested involved variations of three factors: (1) ambient temperature (35, 15, 0, or -20 deg F); (2) cure time prior to testing (30 minutes or 24 hours), and (3) moisture content of the aggregate (dry or wet). Flexural strength was determined at all conditions. Tests of compressive strength, chord modulus of elasticity, and Poisson's ratio were performed at each temperature on samples prepared with dry aggregate and cured for 30 minutes. Results of the compressive strength, flexural strength, and modulus of elasticity tests, which all decreased with temperatures from 35 to 0 deg F, but dropped off sharply at the -20 deg F condition. Samples prepared with wet aggregate had much lower flexural strengths than samples prepared with dry aggregate and met the minimum requirements only at the 35 deg F condition. Poisson's ratio, which increased with colder temperatures, remained within the specified range at 35 deg F condition. Poisson's ratio, which increased with colder temperatures, remained within the specified range at 35 deg F and 15 deg F and exceeded the specifications at colder temperatures.

MP 2522

EFFECT OF ICE PRESSURE ON MARGINAL ICE ZONE DYNAMICS.
Flato, G.M., et al, Sep. 1989, 27(5), p.514-521, 9 refs.

Hibler, W.D., III. 44-405 44-403 SEA ICE, ICE PRESSURE, ICE MODELS, CAVI-TATION, WIND FACTORS, ICE EDGE, FLOAT-ING ICE, ICE STRENGTH, DRIFT, ICE ME-CHANICS, COMPRESSIVE PROPERTIES, MASS

TRANSFER.

THICKNESS DISTRIBUTION OF ACCRETED ICE GROWN ON ROTOR BLADES UNDER LABORATORY CONDITIONS.

Itagaki, K., et al, International Conference on Atmospheric Icing of Structures, 4th, Paris, Sep. 5-7, 1988. Proceedings, 1988, p.152-156, 9 refs. Lemieux, G.E.

44-415

ICE ACCRETION, AIRCRAFT ICING, MEAS-UREMENT, TEMPERATURE EFFECTS.

The shape of ice accreted on the leading edge of aircraft wings and other structures varies extensively depending on the growth regime in which accretion takes place. This shape feeds back to control the rate of additional accretion. In order to provide numerical information for further analysis of ice accretion, the thickness distribution of accreted ice grown on cylindrical rotor blades under the laboratory conditions was measured. Measurements were made every 1 cm. in the radial direction and at every 6 deep interval account. cm in the radial direction and at every 6 deg interval are the axis of the cylindrical blades Photographs of

accreted ice were used to identify the growth regime, surface roughness, and the extent of iced area that could not be obtained from thickness measurements by mechanical contact. Extensive liquid migration was observed above -11 C in both radial and tangential directions on the rotor Evidence of liquid water persisted down to -20 C, however

MP 2524

WHAT MAKES THUNDERBOLTS ZIG AND

Liagaki, K., International Aerospace and Ground Conference on Lightning and Static Electricity, Oklahoma City, OK, Apr. 19-22, 1988. Proceedings, 1988, p.22-27, 6 refs.

LIGHTNING, COMPUTERIZED SIMULATION, STATISTICAL ANALYSIS.

STATISTICAL ANALYSIS.

It is well known that lightning bolts trace a zig-zag course between clouds or from cloud to ground. This course is apparently determined during the development of "leader strokes" through which the bolt advances. This paper proposes a model for the development of such a leader stroke. Assumptions used in this model are: 1. A uniform global electric field exists between cloud and ground or cloud and cloud. 2. Electric cells of various strengths and sizes are randomly distributed in the vicinity of the tip of a leader. 3. An electric charge is supplied to the tip of the leader stroke through the previous stroke to increase the electric field around the tip. 4. When the field strength between the advancing tip and one of the cells becomes strong enough, discharge between the tip and the cell takes place, advancing the leader stroke to the cell. Monte Carlo computer simulation of such a model in two and three dimensions has produced patterns to the cell. Monte Carlo computer simulation of such a model in two and three dimensions has produced patterns with a straking resemblance to published photographs of lightning bolts. Statistical analysis of the data generated by the simulation produced by changing various parameters indicated that certain information can be gained by analyzing those photographs For instance, an increase in general electric field strength results in a less tortuous track with longer steps, while a larger cell size distribution results in more ragged tracks

By comparing the statistical analysis of lightning stroke shapes obtained from photographs with observed field conditions causing the strokes, various parameters such as field strength and cell size could be estimated.

MP 2525 GEOTEXTILES AND A NEW WAY TO USE THEM.

Henry, K., Society of Women Engineers. National Convention and Student Conference, Puerto Rico, June 20-26, 1988. Proceedings, [1988], p.214-222, 44-470

SOIL WATER MIGRATION, FROZEN GROUND MECHANICS, FROST HEAVE, FILTERS.

MECHANICS, FROST HEAVE, FILTERS.

This study utilizes soil specimens prepared with geotextiles subjected to unidirectional standard frost heave tests Results indicate that geotextiles can reduce frost heave. Characteristics that influence capillary behavior include pore size distribution and structure of the fabric as well as surface properties of the fibers. Furthermore, fabric thickness appears to influence performance as a capillary barrier. Currently, little is known about fiber surface properties and there are no standard tests to evaluate characteristics such as wetting angle. Test observations indicate the importance of quantifying fabric pore size and the wetting angle of fibers in the fabric so that their influence on capillary behavior can be quantified.

THEORY FOR A TWO-WAVELENGTH MEAS-UREMENT OF THE PATH-AVERAGED TURBU-LENT SURFACE HEAT FLUX.

Andreas, E.L., Lower Tropospheric Profiling: Needs and Technologies, Boulder, CO, May 31-June 3, 1988. Proceedings, [1988], p.219-220, 9 refs.

44-421 FLUX, MEASUREMENT. SURFACE ROUGHNESS, ANALYSIS (MATHEMATICS).

ROUGHNESS, ANALYSIS (MATHEMATICS). Eddy-correlation, inertial-dissipation, flux-gradient, or bulk-aerodynamic methods—the traditional micrometeorological ways of measuring the turbulent surface fluxes of momentum and sensible and latent heat—all yield point estimates of the fluxes. Even over surfaces that are only slightly inhomogeneous, however, such point estimates can be unrepresentative of average surface conditions. Wyngaard and Clifford (1978) and Coulter and Wesely (1980), among others, have therefore suggested that path-averaging electro-optical systems could be used to obtain surface-averaged fluxes, but until now no one has shown how to obtain both sensible and latent heat fluxes from path-averaging instruments without the necessity of also making some point measurements. A two-wavelength, electro-optical technique is described that can yield path-averaged sensible and latent heat fluxes without requiring associated point measurements

MP 2527 INTERFACING GEOGRAPHIC INFURMATION SYSTEM DATA WITH REAL-TIME DROLOGIC FORECASTING MODELS.

Eagle, T.C., et al, National Conference on Hydraulic Eagle, 1.C., et al, National Conference on Agranuse Engineering, New Orleans, LA, Aug. 14-18, 1989. Proceedings. Edited by M.A. Ports. New York, American Society of Civil Engineers, 1989, p.857-861. Merry, C.J., McKim, H.L.

HYDROLOGY, FORECASTING, DATA PROCESSING, MODELS, RIVER BASINS, COMPUTER PROGRAMS

This paper discusses a plan to incorporate remotely sensed spatial data into a real time hydrologic decision support system. Because of the nature of the hydrologic forecasting system, a file server type of interfacing is required. Recommendations for a real time GIS are discussed.

USE OF SPOT HRV DATA IN THE CORPS OF ENGINEERS DREDGING PROGRAM. Merry, C.J., et al, Sep. 1988, 54(9), p.1295-1299, 10

refe McKim, H.L., LaPotin, N.T., Adams, J.R.

44-435
SENSOR MAPPING, SPACEBORNE PHOTOGRAPHY, LAKE WATER, SUSPENDED SEDIMENTS DREDGING, TURBIDITY, PHOTOGRAMMETRY, DATA PROCESSING, ENVRONMENTAL IMPACT.

IS ADVANCED TECHNOLOGY "THE GATE-WAY TO IRRESPONSIBILITY". Zufelt, J.E., Oct. 1989, 115(4), p.434-437.

COMPUTER APPLICATIONS, HUMAN FACTORS, ACCURACY.

ARCTIC RESEARCH OF THE UNITED STATES, VOL.3.

U.S. Interagency Arctic Research Policy Committee, Washington, D.C., Fall 1989, 71p. Brown, J., ed, Bowen, S., ed, Cate, D.W., ed, Valliere,

44-471 RESEARCH PROJECTS, ORGANIZATIONS, MEETINGS, EXPEDITIONS, LEGISLATION.

MEETINGS, EXPEDITIONS, LEGISLATION. This is the first bennial revision to the United States Arctic Research Plan. This revision contains accomplishments and updates to agencies' arctic programs, and reflects current and ongoing U.S activities and national concerns for arctic research it includes recommendations for several new interagency programs and the initial steps for an Arctic Social Science program. Finally, it provides status reports on cross-cutting activities including logistics and data, which support and enhance U.S. capabilities for conducting an integrated national program of arctic research. These revisions have been coordinated with and are responsive to guidance provided by the Arctic Research Commission appointed by President Reagan in Jan. 1985

OCEANIC HEAT FLUX IN THE FRAM STRAIT MEASURED BY A DRIFTING BUOY. Perovich, D.K, et al, Sep 1989, 16(9), p.995-998, 14

Tucker, W.B., Kirschfield, R.A.

44-467

SEA ICE, SEA WATER, HEAT FLUX, REMOTE SENSING, FRAM STRAIT.

SENSING, FRAM STRAIT.

As one component of the Arctic Environmental Drifting Buoy, two thermistor strings were installed through the ice to measure ice temperatures and determine oceanic heat fluxes as the buoy drifted from the arctic basin into the Greenland Sea lee temperature data between Dec 14, 1987 and Jan 2, 1988 were retrieved During this period the AEDB progressed from approximately \$1N 4E to 77N \$W This constituted the most rapid displacement of the entire drift, coinciding with the entity of the floe into the marginal ice zone of Fram Strait Once in the MIZ, water temperatures increased, most notably at a depth of the marginal ice zone of Fram Strait Once in the MIZ, water temperatures increased, most notably at a depth of 16 m, where values changed from -1.8 C to more than 2 C Bottom ablation rates of 34 mm/day were observed between Dec 21 and 28. During this excursion, into warmer water, the occanic heat flux increased by a factor of 18, from 7 W/sq m to 128 W/sq m.

MP 2532 COMMENTS ON "MODELING ADSORP-TION/DESORPTION KINETICS OF PESTI-CIDES IN A SOIL SUSPENSION" BY J.T.I. BOESTEN AND L.J.T. VAN DER PAS. Leggelt, D.C., Sep. 1989, 148(3), p.231.

ADSORPTION, ENVIRONMENTAL IMPACT, SOIL POLLUTION, MODELS

MP 2533 METHOD FOR RATING UNSURFACED ROADS.

Eaton, R.A., et al, Spring/Summer 1989, 21(1-2), 1989, p.30-40, For another version see 42-804. Gerard, S., Dattilo, R.S. 44-609

ROAD MAINTENANCE.

MP 2534

EFFECTS OF FILTERING AND CLASSIFICA-TION ROUTINES ON DIFFERENT RESOLU-TION IMAGERY IN DISTINGUISHING LAND

Merry, C.J., et al, Society for Imaging Science and Technology. Annual Conference, 41st, Arlington, VA, May 22-26, 1988. Advance printing of paper summaries. [1988], p.57-58.

LANDSCAPE TYPES, TERRAIN IDENTIFICA-TION, REMOTE SENSING.

MP 2535

REMOTE SENSING AND WATER RESOURCES. McKim, H.L., et al, ASPRS-ACSM Fall Convention, Reno, NV, Oct. 4-9, 1987. ASPRS technical papers. (1987), p.186-190. Merry, C.J. 44-611

WATER SUPPLY, REMOTE SENSING.

WATER SUPPLY, REMOTE SENSING.
In the past 5 years there has been rapid advancement in the use of remote sensing in the area of water resource management. Satellite image data are now available from operational systems such as the NOAA and SPOT satellites In addition the Landsat series of satellites have taken data over a major portion of the globe. Many procedures and methods have been developed to analyze digital satellite data but the techniques to use them operationally for evaluating water resources on a global scale are in their infancy. A discussion of the methods used by the Corps of Engineers to address water related topics is presented to illustrate how world communities must learn to use remote sensing for collection of data required to manage their water resources.

MP 2536 PERTURBATION SOLUTION OF THE FLOOD PROBLEM. DISCUSSION AND AUTHOR'S REPLY.

Ferrick, M.G., 1988, 26(3), p.346-349, 2 refs. For article by B. Hunt, being discussed, see Ibid, 1987, 25(2). Hunt. R.

FLOOD CONTROL, RIVER FLOW, FLOOD FORECASTING, MATHEMATICAL MODELS.

MP 2537 FRAMEWORK FOR CONTROL OF DYNAMIC ICE BREAKUP BY RIVER REGULATION.

Ferrick, M.G., et al, Regulated rivers, research and management, Vol.3, 1989, p.79-92, 18 refs. For another version see 43-4385. Mulherin, N.D.

44-613

RIVER ICE, ICE BREAKUP, ICE JAMS, RIVER FLOW, ICE CONTROL, FLOOD CONTROL.

RIVER ICE, ICE BREAKUP, ICE JAMS, RIVER FLOW, ICE CONTROL, FLOOD CONTROL.

The entire range of ice breakup behavior, from thermal to dynamic, described and classified, to provide order to this complex process. The theory and model of Ferrick et al. (1986) are refined, building on the concept of an intrinsic relationship between river waves and dynamic ice breakup. A force balance is developed for a common dynamic breakup behavior. Empirical enteria that quantify the resistance to breakup of an ice cover are obtained from a case study and compared with published values. Sensitivity studies of ice breakup with the completed model demonstrate insights that follow from the theory presented, and the intuitive nature of the results. This framework for understanding river ice processes provides the option for ice management by river regulation, and focuses on the potential for control of ice breakup. The concept of controlled breakup involves a release of water from a dam that moves the ice downstream of locations with a high potential for damages during breakup. The abrupt, short-duration characteristics of the controlled release, patterned after those of unregulated river breakup, minimize both the volume of water required to cause breakup and the water levels at breakup. The open water created by the breakup collects heat that increases the rate of melting of the ice. The benefits of succ. ssful regulation include the prevention of flooding, min mum e osion and decreased potential for ice damage to structure, during breakup without adverse affects on the environment.

MP 2538

MP 2538 REMOVAL OF ATMOSPHERIC ICE FROM BROADCAST TOWERS USING LOW-FRE-QUENCY, HIGH-AMPLITUDE VIBRATIONS.

Mulherin, N.D. et al. (1988), 6p., Presented at 4th International Workshop on Atmospheric Icing of Structures, Paris, Sep. 1988. 7 refs Donaldson, R J.F.

TOWERS, ICING, ICE REMOVAL, LOW FRE-QUENCIES, VIBRATION

Laboratory and field experiments showed that structurally safe levels of lcw-frequency, high-amplitude (LFHA) vibrations imparted directly to transmission tower under cold temperatures were ineffective in removing app eciable amounts of atmospheric ice. In general, limited ice removal from the test structures occurred only during resonant-mode frequencies when vibration amplitudes were greatest. More importantly, the same vibrations that were incapable of ice removal were structurally damaging to the 18-m-tall guyed towers. Damage resulted in the form of broken welds and crossbracing and cracked tower legs. Experiments with a surface coating showed that while the bond strength of the ice was reduced, debonding and ice removal was still limited to small areas close to the vibration source. Vibrations preceded by melting at the ice/metal interface and weakening of the ice cover by solar radiation led to rapid and extensive ice removal. The possibility of descing by a combination of ribrations, heat, and/or surface coatings is worthy of additional investigation.

MP 2539

SMART WEAPONS OPERABILITY ENHANCE-MENT.

Link, L.E., Jr, DOD Environmental Technical Exchange Conference on Mesoscale Phenomena, Laurel, MD, Jan. 23-27, 1989. Proceedings. Edited by A.A. Barnes, Jr. 1989, p.165-173.

MILITARY ENGINEERING, MILITARY RE-SEARCH, DETECTION, DATA PROCESSING, ATMOSPHERIC ATTENUATION.

MP 2540

ORTHOGONAL CURVILINEAR COORDINATE GENERATION FOR INTERNAL FLOWS.

Albert, M.R. Numerical grid generation in computa-tional fluid mechanics, edited by S. Sengupta, Pine Ridge Press, 1988, p 425-433, 8 refs.

FLUID DYNAMICS, FLUID MECHANICS, FLUID FLOW, MATHEMATICAL MODELS

FLUID FLOW, MATHEMATICAL MODELS
Generation of boundary-fitted orthogonal coordinates is accomplished by mapping the irregular region in physical space onto a square in the transformed space, where an elliptic equation is solved to find interior physical coordinate locations it is usual practice to employ rules or restrictions on the distortion function governing the coordinate transformation from physical to transformed space. This can allow control of node spacing on the interior of the region, at the expense of arbitrary specification of node locations along the boundaries. In problems involving internal flows, the specification of boundary node locations is important. This paper investigates some implications of a standard rule used for specification of the distortion function, and explores a simple technique of the distortion function, and explores a simple technique that achieves complete boundary correspondence by allowing natural values of the distortion function to exist on the interior. Sample grids are generated to compare the results of the two techniques.

MP 2541 RATING UNSURFACED ROADS. Eaton, R.A., et al, Mar. 1988, 119(3), p.66-69, For another version see 42-804 Gerard, S., Cate, D.W. ROAD MAINTENANCE

MP 2542

UNIQUE NEW COLD WEATHER TESTING FACILITY.

Eaton, R.A., Test Technology Symposium, 1st, Jan. 25-28, 1988. Proceedings Vol.2, [1988], p.745-750, For another version sec 43-2114.

44-62/
LOW TEMPERATURE RESEARCH, COLD
WEATHER TESTS, LABORATORIES, TEST
CHAMBERS, LOW TEMPERATURE TESTS,
BUILDINGS, REFRIGERATION.

BUILDINGS, REFRIGERATION.

The U.S. Army Cold Regions Research and Engineering Laboratory has a new controlled environment test facility, the Frost Effects Research Facility (FERF), now in use. The 29,000 sq. f (2942 sq. m) building comprises a principal test area 182 ft (55 m) long by 4 ft (14 m) wide incorporating 12 test basins, adjacent mobiliration areas and equipment rooms, for a total width of 102 ft (31 m), plus fully enclosed ramp areas at each end of the building. Surface panels are used to freeze pasement and soils for the pasement, utility, soil sensor, and mobility test programs. Liquid-to-air heat exchangers are used to test hardware inside enclosures erected in the test basins or on the mobilization area. Currently, coolant is available at -35 deg. 0 deg and +90 deg F (38, -18 and 38 C), allowing test temperatures ranging from -35 F (-37 C) = +90 F (32 C). Lower temperatures can be achieved by using portable units in conjunction with the facility's permanent system

MP 2543

TECHNIQUES FOR GAS GUN STUDIES OF SHOCK WAVE ATTENUATION IN SNOW. Brown, J.A., et al, Shock waves in condensed matter

1987, edited by S.S. Schmitt and N.C. Holmes, New York, Elsevier, 1988 p.657-660, 8 refs. Gaffney, E.S., Blaisdell, G.L., Johnson, J.B.

44-628

SHOCK WAVES, SNOW COMPRESSION, SNOW MECHANICS, SNOW STRENGTH, SNOW ACOUSTICS.

MP 2544

UNITED STATES ARCTIC RESEARCH PLAN BIENNIAL REVISION: 1990-1991. Brown, J., ed, Fall 1989, Vol.3, 72p.

Bowen, S., ed, Cate, D., ed, Valliere, D., ed. 44-746

POLAR REGIONS, OPGANIZATIONS, LEGIS-LATION, RESEARCH PROJECTS, MEETINGS, COST ANALYSIS

MP 2545

FRACTURE TOUGHNESS OF COLUMNAR FRESHWATER ICE FROM LARGE SCALE DCB

Bentley, D.L., et al, Sep. 1989, 17(1), p.7-20, 35 refs. Dempsey, J.P., Wei, Y., Sodhi, D.S.

ICE STRENGTH, ICE CRACKS, FLEXURAL STRENGTH, TESTS, ICE COVER THICKNESS.

A series of 42 fracture toughness tests was performed on

A series of 42 fracture toughness tests was performed on laboratory-grown S2 columnar freshwater uce at high homologus temperatures (2 to 0 C). The floating double cantilever beam specimen used and the monitoring of the crack mouth opening displacement in addition to the applied load provided a means for obtaining an apparent fracture toughness, an effective elastic modulus, a lower-bound estimate of the crack speed, and a side-loaded flexural strength of the ice. An expression for the apparent fracture soughness as a function of the applied load, specimen geometry, and ice thickness was developed using a finite-element p.o. "am. This allowed comparison with previously published we les for the toughness was developed using a finite-element p.o. "am. This allowed comparison with previously published we les for the toughness of freshwater ice. The small range of scatter in apparent fracture toughness values as well as "be ability to measure other mechanical properties of the ice indicates the usefulness of such tests of such tests

MP 2546

APPROXIMATE SOLUTIONS OF HEAT CON-DUCTION IN SNOW WITH LINEAR VARIA-TION OF THERMAL CONDUCTIVITY. Yen, YC, Sep. 1989, 17(1), p.21- 2, 9 refs

44.Ŕ27

44-827
HEAT FLUX, CONDUCTION, THERMAL CONDUCTIVITY, ANALYSIS (MATHEMATICS), DUCTIVITY, ANALYSIS (M.A. SNOW THERMAL PROPERTIES.

SNOW THERMAL PROPERTIES.

The approximate heat balance integral method (HBIM) is extended to the case of variable properties media such as snow. The case of linear variation of thermal conductivity was investigated. An alternative heat balance integral method (AHBIM) was developed. Both constant surface temperature and surface heat flux were considered. Comparison of temperature distribution from HBIM, AHBIM and the extension of the analytical solution of Jaeger was given for the case of constant surface temperature. In general, for small values of time, results agree quit, well with the analytical solution but as time increases, the difference becomes more pronounced. AHBIM with a quadratiz te, perature profile gave a somewhat better result especially when the value of cta is small. For specific property function of F(cta) = sup cta, clossed form solutions were obtained. The results were conpared. The those from HBIM, AHBIM results were compared on those from HBIM, AHBIM and the analytical method and parend exceptionally well with the analytical especially to safet value, of ter-

MP 2547 PAVEMENT DESIGN FOR SEASO: .. FROST CONDITIONS: CURRENT AND FUTURE METHODS.

Berg, R.L., Hanover, NH, U.S Army Cold Regions Research and Engineering Labo: 'y, Nov. 1988, 120... 8 refs. Presented at the Francisca Lakes Rey, Nov. 1988, gion 4th Annual Airport Engineering/Management Coni rence 44-836

PAVEMENTS, FROST PROTECTION, SEASON-AL FREEZE THAW, FROST HEAVE, FROST AC-TION, FROST RESISTANCE, FROST FORE-CASTING.

MP 2548

USF OF SPOT HRV DATA IN A CORPS DREDG-INC OPERATION IN LAKE ERIE.

Me-ry, C.J., et al. U.S. Army Corps of Engineers Remote Sensing Symposium, 6th, Galveston, TX, Nov 2-4, 1987 Proceedings, (1987), p.49-58, 10 refs

McKim, H.L., LaPotin, N. F., Adams, J.R.

LAKE WATER, DEEDGING, REMOTE SENS-ING. UNITED STA "ES- OHIO- ERIE, LAKE.

The Corps of Engineers coordinated a water quality sampling program with a dredged material disposal operation and a concur n' SPOT overpass on June 4, 1986 The SPOT HRV 20-m multispectral data were classified into five water categories using a maximum: 'ikenhood classifier A post-classification filter was used to smooth the water classification. Due to the limited amount of ground truth data, simple empirical models are presented to illustrate the association between turbidity and spectral class

MP 2549

DEVELOPMENT OF A GEOGRAPHIC INFOR-MATION SYSTEM FOR THE SAYLORVILLE

RIVER BASIN, IOWA.
Merry, C J., et al, U.S. Army Corps of Engineers
Remote Sensing Symposium, 6th, Galveston, TX,
Nov. 2-4, 1937. Proceedings [1987], p.265-269. Nov. 2-4, 1°57. Proceedings [1987], Eagle, T.C. LaPotin, N.T., Gridiner, J.

RIVER B ISINS, REMOTE SENSING, GEOGRA-PHY, FLOOD FORECASTING, UNITED STATES IOWA—SAYLORVILLE RIVER.

—IOWA—SAYLORVILLE RIVER.

CRREL's in...ge processing and Geographic Information System (GIS) efforts with the Rock Island District have concentrated in lowa on the Kanawha and Clarion watersheds in the Saylorville River Basin The Landsat Thematic Mapper (TM) 30-m data and Système Probatoire d'Observation de la Terre (SPOT) high Resolution Visible (HRV) 20-m multispectral Lata were classified into seven land cover classes. Ground truth data were collected after the satellite overflights and are being used to determine the accuracy of the classification scheme These land u.e maps will be placed into a GIS containing soils and elevation data at a 30-m grid cell size classification sceneme I ness iand u.e. maps will be placed into a GIS containing soils and elevation data at a 30-m grid cell size and basin boundary data A p-ocedure is being developed to link the GIS and the Corps hydrologic Engineering Center Data Storage System (DSS) to provide the data base to use with Corps real-time hydrologic forecasting models.

MP 2550

CRREL'S EXPERIENCES OF REMOTE SENS-ING TECHNOLOGY TRANSFER TO THE CORPS USER.

Merry, C.J., U.S. Army Corps of Engineers Remote Sensing Symposium, 6th, Galveston, TX, Nov. 2-4, 1987. Proceedings. (1987), p.271-273. 44-948

REMOTE SENSING, DATA TRANSMISSION.

The tecnnology transfer mechanisms that have worked successfully at CRREL include, working one-on-one with District people, a Remote Sensing Bulletin, telephone consultation, training courses, and moving toward a PC environment. The paper describes in detail these five areas

MP 2551 HYDRAULIC CONDUCTIVITY AND UNFROZ-EN WATER CONTENT OF AIR-FREE FROZEN SHT.

Black, P B, et al, Feb 1990, 26(2), p 323-329, 25 refs. Miller, R.D. 44-2646

FROZEN GROUND, UNFROZEN WATER CONTENT, HYDRAULICS, SOIL WATER.

TENT, HYDRAULICS, SOIL WATER.
Unfrozen water content and hydraulic conductivity data were obtained for an air-free frozen Alaskan silt using a new form of an ice sandwich dilatometer/permeameter that was designed to allow control of effective stress in the granular matrix through appropriate adjustments of pressure in liquid surrounding a specimen confined as in a libarial test apparatus Experimental complications included capt in a w. of conductivity during prolonged periods of equility in (no flow) after each temperature step immediately followed by very slow but continuing decay, as if without limit when a formula of the Brooks and Corey type was fitted to universe water content data hydraulic conductivities inferred from the formula parameter, through the model of Mualkin, provided an acceptaparameter, through the model of Mualcin, provided an accepta-ble description of observed conductivity values, as measured ormediately after the equilibrium period

MP 2552 BUILDINGS AND UTILITIES IN VERY COLD REGIONS: OVERVIEW AND RESEARCH NEEDS.

Tobiasson, W., Fall-Witter 1988, 20(3-4), p 4-11, For another version see 43-864. 44-1011

COLD WEATHER CONSTRUCTION, HUMAN FACTORS ENGINEERING, MILITARY FACILI-TIES, POLAR REGIONS.

MP 2553

COST EFFECTIVENESS OF PROPER PO-THOLE PATCHING.

Eaton, R.A., SAVE International Conference, Torrance, CA, May 23-25, 1988 Proceedings, Society of American Value Engineers, 1988, p 170-174, 7 refs 44-1048

ROAD MAINTENANCE, PAVEMENTS, PAV-ING, ROAD ICING, FREEZE THAW CYCLES, CONSTRUCTION EQUIPMENT.

This paper explains why available portable construction equipment can provide hot asphalt concrete on a year-round basis in cold regions.

It discusses proper materials and methods to be used in correctly repairing potholes or other pavement defects the first time.

FRACTOGRAPHIC ANALYSIS OF GRAPHITE-EPOXY COMPOSITES SUBJECTED TO LOW TEMPERATURE THERMAL CYCLING

Dutta, P.K., et al, International Symposium for Testing and Failure Analysis, Los Angeles CA, Nov. 6-10, 1989. Proceedings, Materials Park, OH, American Society for Metals International, 1989, p.429-435, 7

Taylor, S. 44-1206

MATERIALS, LOW TEMPERATURE TESTS, TENSILE STRENGTH, COLD STRESS, POLYM-ERS. FRACTURING.

ERS, FRACTURING.

Samples of unidirectional graphite-epoxy composites were subjected to 0, 10 and 100 thermal cycles after which tensile stresses, perpendicular to the fiber axes, were applied until the sample failed. The measured tensile strength of these materials was found to decrease with thermal cycling. Sections of the feiled surface were examined with the scanning electron microscope (SEM) and showed that the failure surface of the epoxy matrix becomes progressively smoother as the number of thermal cycles is increased. The appearance of a smoother fracture surface and the concomitant decrease. It transverse tensile strength with increasing number of thermal cycles uggest different failure mechanisms for the cycled and uncycled speciment. It is postulated that for the cycled composites. In uncycled composites the failure path is thought to follow relatively epoxy-rich zones.

MP 2555

MP 2555

TIME CONSTANTS FOR THE EVOLUTION OF SEA SPRAY DROPLETS.
Audreas, E.L., Climate and health implications of bub-

ble-mediated sea-air exchange. Edited by E.C. Vionahan and M.A. Van Patten, Groton, CT, University of Connecticut Sea Grant Program, 1989, p.147-149, Abstract from poster presentation. 44-1221

SEA SPRAY. SEA SPRAY, AIR WATER INTERACTIONS, ANALYSIS (MATHEMATICS).

DEVELOPMENT AND DESIGN OF SLUDGE FREEZING BEDS.

Martel, C.J., Aug. 1989, 115(4), p.799-808, 22 refs. For another version see 43-4597.

44-1799
SLUDGES, WASTE TREATMENT, DESIGN,
STRUCTURES, SEASONAL FREEZE THAW,
COLD WEATHER OPEP ATIONS, MOISTURE
TRANSFER, TEMPERATURE EFFECTS, ANALYSIS (MATHEMATICS).

YSIS (MATHEMATICS).

A new unit operation called a sludge freezing bed i, proposed for dewatering sludges produced by treatment facilities in cold regions. This unit operation uses natural freezentaw to condition the sludge for dewatering. It can dewater all types of aqueous sludges up to a depth of 2.0 m. Basic construction details are identified, and procedures for operating the bed are discussed. Equations for predicting the design depth are presented along with an example of how they can be used. Convection was found to be the controlling heat transfer mechanism during freezing. Solar radiation, ambient air temperature, and the thermal conductivity of the settled sludge layer over the frozen sludge are important parameters controlling the thawing rate. Data from various sludge freezing operations indicate that the design equations are valid.

MP 2557

PASSIVE TRACER GAS MEASUREMENT OF AIR EXCHANGE IN A LARGE MULTI-CELLED BUILDING IN ALASKA.

Flanders, S.N. et al, ASHRAE/DOE/BTECC/CIBSE Conference ton the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, Fl. Dec. 4.7 1989 FL, Dec. 4-7, 1989. Proceedings, Atlanta, GA. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p.433-444, 11 refs

Song, B.H. 44-1358

RESIDENTIAL BUILDINGS, AIR FLOW, MILI-TARY FACILITIES, VENTILATION, AIR POL-LUTION.

LUTION.

A 2963 cu m residence for transient military personnei at Fort Richardson, AK, was subjected to a passive perfluorocarbon tracer gas measurement of air exchange for 3 days. The building was treated as having three separate zones corresponding to the three floors. Each zone received constant tracer gas, emission sources of the same type of gas unique to that zone. The concentrations of each tracer gas were measured throughout the building. As a consequence, it was possible to calculate the average air exchange of each zone with each other zone and the outdoors. The measurement took place during a period when the average emperature of -19 C varied approximately, 5 C up or dee in The first and second floors had air exchange rates of . 21 and 0.22 ach (air changes per hour), respectively, which as the basement had 0.70 ach. The higher exchange rate for the basement was attributed to the configuration of the

main entry doo.s and interior doors, which allowed cold air to descend to the basement, but discouraged mixing on the first flo. The measurement was significant because it represents the upper end of building su. and complexity that lends itself to this measurement technique. Measurement precision was good. The accuracy depended on adequate mixing and on minimum variation of wind and outdoor temperature. Both objectives were met reasonably

MP 2558

VAPOR RETARDERS *** CONTROL SUMMER CONDENSATION.

CONDENSATION.
Tobiasson, W., AS' N. 7 DE/BTECC/CIBSE
Conference on the fine of ormance of the
Exterior Envelopes of the log of the Orlando, FL,
Dec. 4-7, 15-9. Photoschools is last DA, American
Society of Hesitic accignosing Engineers, 190 model of the life.
4-1361 44-1361

BUILDINGS. VAPOR LARRIERS, WALLS, THERMAL INSULAT. , CONDENSATION, COUNTERMEASURES AIR FLOW, INDOOR CLIMATES.

Prior work by the CRR. I. ed that vapor retarders room outside air However, recodeck is solicited on which is solicited to corresponds to the collective expertise of designers and builders Problems associated with summer condensa tion are often related to wetting of exterior cladding and subsequent solar heating, not just simple vapor drive. Nonetheless, in some hot humid areas, vapor retarders may

MP 2559

FIBER COMPOSITE MATERIALS IN AN ARC-TIC ENVIRONMENT.

Dutta, P.K., Structures Co., gress '89, San Francisco, CA, May 1-5, 1989. Proceedings. Structural raterials. Edited by J.F. Orofino, New York, American Society of Civil Engineers, 1989, p 216-225, 5 refs.

44-1412
CONSTRUCTION MATERIALS LOW TEMPER
ATURE TESTS, ELAS-IC PROPERTIES, TENSILE PROPERTIES, TEMPERATURE EFFECTS,
IERMAL STRESSES, COLD WEATHER PERMANCE, COMPOSITION, STRENGTH.

a paper summarizes a study on the behavior of lightweight structural composite materials in cold environments. Results are presented for two composite materials, fiberglassepoxy and griphite-epoxy.

The results show that 'ow whole the composite when the compos results are presented for two composite materials, fiberglass-epoxy and graphite-epoxy. The results show that low-temperatures induce lesidual stresses in composites, which on developing microcracks can change both strength and stiffness properties of the composites

MP 2560

COMMENTS ON "A PHYSICAL ROUND ON THE BOWEN RATIO".

Andreas, E.L., Nov. 1989, 28(11), p.1252-1254, 4 refs.

AIR WATER INTERACTIONS, ICE AIR INTER-FACE, ANALYSIS (MATHEMATICS), HEAT FLUX, ATMOSPHERIC PHYSICS, HEAT TRANS-MOISTURE TRANSFER, BOUNDARY LAYER.

MP 2561

INVESTIGATION INTO THE POST-STABLE BEHAVIOR OF A TUBE ARRAY IN CROSS-

Lever, J.H., et al. Nov. 1989, Vol 111, p.457-465, 21 refs.

Rzentkowski, G.

44-1336 (TUBES), AIR FLOW, STABILITY, ME-CHANIC L PROPERTIES, VIBRATION, ME-CHAN.CAL TESTS, TURBULENT FLOW, VELOCITY MEASUREMENT, DESIGN CRIT-ERIA, WIND TUNNELS, FLUID DYNAMICS.

MP 2562

AIR MOVEMENT IN SNOW DUE TO WIND-PUMPING. Colbeck, S.C. 1989, 35(120), p.209-213, 12 refs

SNOW AIR INTERFACE, SNOW THERMAL PROPERTIES, ANALYSIS (MATHEMATICS), AIR FLOW, ATMOSPHE AIC PRESSURE, WIND FACTORS, SNOW SURFACE

Strong winds can disrupt the thermal regime in seasonal snow because of the variation in surface pressure associated with surface features like dunes and ripples. Topographical features of shorter wavelengths produce stronger surface Pows.

but the flow decays rapidly with depth features produce weaker surface flows but the flow decays more s'owly with depth. The flow may only be strong enough to disrupt the temperature field for features of wavelengths on the scale of meters or tens of meters at wind speeds of 10 m/s or more. Other possible causes of windpumping have been examined but they do not appear to be as significant. Rapid pressure perturbations due to turbulence produce very little displacement of the air because of the high frequency and low amplitude. Barometric pressure changes cause compression and expansion of the air in the pore space, but the rate is too low to have much effect.

! 1P 2563

RIVER-ICE MOUNDS ON ALASKA'S NORTH SLOPE

Arcone, S A, et ai, 1989, 35(120), p.288-290, 5 refs. Delaney, A.J., Calkins, D.

44-1558

RIVER ICE. ICE SURFACE, ICE COVER THICK-NESS, SURFACE ROUGHNESS, UNFROZEN WATER CONTENT, NALEDS, UNITED STATES -ALASKA- .. ORTH SLOPE.

MONITORING PAVEMENT PERFORMANCE IN SEASONAL FROST AREAS.

Berg, R L., Sep. 1989, SR 89-23, Sy. posium on State of the Art of Pavement Response Mointoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1980. Proceedings Edited by V Janoo and R. Eaton, p.10-19, ADA-214 957, 10 refs.

PAVEMENTS, MONITORS, FREEZE THAW CY-CLES, FROST PENETRATION, SOIL WATER, THAW DEPTH, MEASURING INSTRUMENTS, DESIGN THERMOCOUPLES, TEMPERATURE MEASUF EMENT.

As parement de yn and evaluation procedures become increasingly complex, additional instrumentation and more frequent observations may be necessary to provide the control of the control ingly complex, auditional instrumentation and more frequent observations may be necessary to provide the data required to verify and refine these more sophisticated procedures 1.15 additional instrumentation may be increased numbers of previously used devices or more 5-phisticated equipment to measure parameters not monitor d in the past. For example, subsurface temperatures and frost heave have become easured at the pavement surface for years. Within about example, subsurface temperatures and frost heave have became measured at the pavement surface for years. Within about the last 10 years we have also measured in-situ moisture contents versus depth and time, but an inexpensive and universal device for making these measurements is not yet available. In this paper, measurements currently made, measurements we would like to make but have not because the necessary equipment is not available, are discussed

DETERMINATION OF FROST PENETRATION BY SOIL RESISTIVITY MEASUREMENTS.

Atkins, R.T., Sep. 1989, SR 39-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Ausfields, 1st, Hanover, NH, Mar. 6-9, 1989 Proceedings. Edited by V Janoo and R. Eaton, p. 87-100, ADA-214 957.

44-1646 GRADE SOILS, FHERMOCOUPLES, THERMISTORS, ELECTRICAL RESISTIVITY, FROST RI SISTANCE, TEMPERATURE DISTRIBUTION, SEASONAL VARIATIONS, TESTS, MEASURING INSTRUMENTS, SALINITY, SUBSURFACE INVESTIGATIONS, ANTIFREEZES.

INVESTIGATIONS, ANTIPREEZES.

Because of freezing point depression and isothermal springtime condition: frost penetration measurements using temperature-sensing desires can become unremable. In recognition of this problem to frost penetry, acmost shat depend on changes it with the state tested. Tests were conducted on a parking area with an asphaliconcrete surface where salt was periodically applied as part of snow removal operations. For comparison, data were obtained from a resistivity probe, a termocouple probe and a thermstor probe. Results individed that measuring temperature, to determine frost penetration can lead to large errors under resistivity proof, a terrimetropic process and probe Results indicated that measuring temperature to determine frost penetration can lead to large errors under some conditions, for instance when salt has beer applied or when frost is coming out of the ground in spring. The resistivity probe per form d reliably during the entire measurement program—conclusions from this study indicate that resistivity probes have definite advantages that should be considered when future frost penetration measurement programs are designed. grams are designed

SIMPLE AND ECONOMICAL THERMAL CONDUCTIVITY MEASUREMENT SYSTEM.

Atkins, R.T., Sep. 1989, SR 89-23, Symposium on Atkins, R.1., Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Road- and Airfields, 1st, Handler, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoband R. Eeton, p.108-116, ADA-214 957, 3 refs. 44-1648

THERMAL CONDUCTIVITY, THERMISTORS, SOIL PHYSICS, CONSTRUCTION MATERIALS, SLUDGES, ANALYSIS (MATHEMATICS), GRAIN SIZE, TEMPERATURE EFFECTS, TESTS, ACCURACY.

ACCURACY.

Tris report describer a recently patented method for using commercially available thermistors to make in-situ thermal conductivity measurements with commonly available electronic equipment such as digital voltmeters. The emphasis is on the use of a single thermistor to measure the thermal conductivity of soils.

Calibration techniques are explained. Limits on this technique are discussed, including measurement, and temperature stabil. Specific examples of the use of this technique are presided for thermal conductivity measurements of soils, building materials, and the sludges in a sewage treatment plant. Data snalysis, is provided including a statistical approach to finding the thermal conductivity in large volumes of material.

DATA ACQUISITION: FIRST THE FERF THEN THE WURLD.

THE WURLD.
Knuth, K.V., Sep. 1989, SR 89-23, Symposium on
State of the Art of Pavement Response Monitoring
Systems for Roads and Airfields, 1st, Hanover, NH,
Mar. 6-9, 1989. Proceedings. Edited by V. Janoo Mar. 6-9, 1989. Proceedings. Edited by V. J and R. Eaton, p.136-138, ADA-214 957, 4 refs. 44-1651

44-1031
FROST HEAVE, FROST ACTION, LABORATORIES, TEMPERATURE MEASUREME, JT, THERMOCOUPLES, WATER CONTENT, PAVEMENTS, SOIL WATER, MEASURING INSTRUMENTS, ACCURACY, DATA PROCESSING.

MENTS, ACCURACY, DATA PROCESSING.

A review of the measurement systems and the data collection techniques as applied to the laboratory, the Frost I Tects Research Facility and finally the real world will be presented. In the beginning there was the ruler, thermometer, pencil and paper. Then came electricity, motors, etc till now there is the computer, fiber optics, lasers, ultrasound and the satellite. The author presents the current as well as future data collection techniques for temperature, moisture content, pressure, stress, strain and displacement as used in the FERF and in remote sites.

COLD REGIONS WEATHER DATA SYSTEMS. Bates, R.E., et a Sec. 1989, SR 89-23, Symposium on State of the At. of Pavement Response Monitoring Systems for Road and Artfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p. 19-145, ADA-214 957, 13 refs Gerard, S.

METEOROLOGICAL DATA, COLD WEATHER OPERATION, MEASURING INSTRUMENTS, CLIMATIC FACTORS, SNOW SURVEYS, COMPUTER APPLICATIONS, TEMPERATURE DISTRIBUTION, TEMPERATURE EFFECTS, EQUIPMENTS

MENT.

The inorthern temperate climatic zones experience a varying scenario of winter environmental extremes of cold, iong, and precipitation, which severely influence geople, equipment and operations. Even instruments used to measure cold and/or wet adverse environments may be incapable of operation if employed during severe cold weather. It is, important to know the equipment's environmental restrictions and to evaluate the frequency and duration of disabling weather. In some instances, functional impairments persist after the causative meteorological conditions have subsided, e.g. glaze, rime and heavy snow and tee accumulation. For c.er. 25 years, CRREL has studied environmental conditions in winter weather. These efforts have concentrated on providing field-measured meteorological data and historical climato-ogical data, as well as instrumentation support for many ogeci data, as well as instrumentation support for many experiments conducted throughout cold regions of the North-ten Hemisphere These efforts have involved characterizing atmospheric conditions as well as surface conditions. Some of the measurements made are snow temperature profiles, depth of the snow on the ground with varying terrain and vegetation, temperature at the snow/ground interface, nearsurface ground temperature and wind profiles, snow cover properties, solar radiation, visibility and sky conditions

MP 2569

RESILIENT MODULUS DETERMINATION FOR FROST CONDITIONS.

Chamberlain, E.J., et al, Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by Janoo and R. Eaton, p.320-333, ADA 214 957, 5

Cole, D.M., Durell, G F.

44-1668

44-1668
PAVEMENTS, FREEZE THAW CYCLES, LOADS
(FORCES) COMPRESSIVE PROFERTIES,
DEFORMATION, WATER CONTENT, TEMPLAATURE EFFECTS, TESTS, STRESSES, GROVIND
THANKS MEASURING INCENTIMENTS THAWING, MEASURING ANALYSIS (MATHEMATICS). INSTRUMENTS,

ANALYSIS (MATHEMATICS). Resilient moduli for par, ments subject to freezing and thawing ca be obtained from leboratory repeated load triaxial tests. We have found that for the frozen condition, the resilient modulius is very sens — to temperature or unfrozen water content. For the thawed condition, the modulius is primarily dependent upon the water content or mosture stress. The medic'ty is 'so dependent upon the at plied stresses, particularly 'r ic newly thawed condition and the recovery period that 'ollows We empirically relate the moduli to the environmental and stress conditions using a multiple linear regression analysis. Resilient moduli obtained with this procedure typically vary over 3 or 4 orders of magnitude for a complete freeze-thaw cycle. It is difficult to obtain maning? data for the thawed condition where the pore pressure is greater than or equal to zero. The empirical equetions are used in elastic layered models to calculate pavement deflections. pavement deflections

MP 2570

CORRELATION OF FREUNDLICH KD AND N RETENTION PARAMETERS WITH SOILS AND ELEMENTS.

Buchter, B., et al, Nov. 1985, 148(5), p.370-379, 22

Davidoff, B., Amacher, M C., Hinz, C., Iskandar, I.K. Selim, H.M. 44-1732

SOIL CHEMISTRY, SOIL POLLUTION, SOIL COMPOSITION, WATER POLLUTION, IONS, ANALYSIS (MATHEMATICS).

We studied the retention of 15 elements by 11 soils from 10 soil orders to determine the effects of element and soil propertie n the magnitude of the Freundlich parameters Kd and n was related propertic n the magnitude of the Freundlich parameters Kd and The magnitude of Kd and n was related to both and and element properties. Strongly retained elements such as Cu. Hg. Pb. V, and P had the highest Kd values The transition metal cations Co and N is had similar Kd and n values, as did the group IIB elements Zn and Cd. Oxyanion species tended to have lower n values than did cation species. Soil pH and CEC were significantly correlated with log Kd values for cation species High pH and high CEC sulv retained greater quantities of the cation species than did low pH and low CEC soils A significant negative correlation between soil pH and ker Freundlich parameter n was observed for cation species, whereas a significant positive correlation between soil pH and n for Cr(VI) was found Greater quantities of anion species were retained by soils with low amounts of amorphous iron oxides, aluminum oxides, and amorphous material than were retained by soils with low amounts of these minerals Several anion species were not retained by high pH soils Despite the facts that element retention by soils is the result of irrany interacting processes and that neary factors influence retention, significant relationships among retention parameters and soil and element properties exist even among soils with greatly different characterities.

MP 2571

COLD REGIONS ENGINEERING RESEARCH— STRATEGIC PLAN. Carlson, R.F., et al., Dec. 1989, 3(4), p 172-190, 4 refs Zarling, J.P., Link, L.E. 44-1761

RESEARCH PROJECTS, ENGINEERING

RESEARCH PROJECTS, ENGINEERING
The Arctic and cold regions of the United States present
many unique and difficult engineering problems that demand
a coordinated fundamental research program. As a response
to the Arctic Research and Policy Act, the National Science
Board commissioned a study (the Colwell Report) that examined the role of the National Science Foundation (NSF)
in polar tegions. The report's recommendation 14 called
for the conduct of basic engineering research in polar regions
and suggested it be a specifically targeted research component
within the Engineering Directorate of NSF. The report
presents the type of fundamental research programs this
would aid in the solution of long-term cold regions engineering
problems. Over 40 participant's in a 2-1-2-day period
suggested 14 revearch programs within four broad groupings
--offshore technology, watershedy, rivers, and coastal zones,
fac littes infrastructure technology, and transp ritation infrast
ructure technology. tructure technology

MP 2572

UNCONVENTIONAL POWER SOURCES FOR ICE CONTROL AT LOCKS AND DAMS. Nakato, T, et al, Sep. 1989, 3(3), p.107-126, 15 refs. Ettema, R., Ashton, G.D.

44-1771 DAMS, LOCKS (WATERWAYS), ICE CONTROL, ELECTRIC POWER, ICE PREVENTION, ICE RE-MOVAL. ICE GROWTH, ANALYSIS (MATH-EMATICS!

Assessed by a are if e feasibilities of using several unconventional power sources for the control in navigation locks and dams included in this assessment are sensible heat from groundwater, solar power, wind power and portable hydroelectric-power sources. Operation of lock and dam installations is made troublesome and risky by the growth along lock walls and by freezing of gates to the growth along lock walls and by freezing of gates to the covers. Considerable amounts of ower are required for force the control, and therefore, loc inspirators are interested in utilizing economical alternative privar sources other than that generated by commercial power unities. However, the present study concludes that of all unconventional power sources, portable hydroelectric-power is the most viable. Groundwater is at best of marginal viability, and solar and wind power sources are unreliable.

MP 25'

ACOU TIC PUSE PROPAGATION ABOVE GRAS AND AND SNOW: COMPARISON OF THE ETICAL AND EXPERIMENTAL WAVE-

FOR: S. Albert, J.G., et al, Jan. 1990, 87(1), p.93-100, 22 refs. Orcutt, J A.

44-1877
SNOW ACOUSTICS, SOUND TRANSMISSION, SOUND WAVES, ANALYSIS (MATHEMATICS). SOUND WAVES, ANALYSIS (MATHEMATICS).

Theoretical predictions are made of the effect of an absorbing ground surface on acoustic impulsive waveforms propagating in a homogeneous atmosphere for frequencies below 500 Hz The lower frequencies of the pulse are enhanced as the effective flow resistivity of the ground surface decreases and as the propagation distance increases. The pulse waveforms and peak amplitude decay observed for propagation distances of 40 to 27: m over grassiand were satisfactorily matched by calculations using an assumed effective flow resistivity of 200 kN/s/ 0001 m Measurements over snow gave much greater amplitude decay fates, and the waveforms resistivity of 200 kN/s/ 0001 m Measurements over snow gave much greater amplitude dees; rates, and the waveforms were radically changed in appearance, being dominated by the lower frequencies

These waveforms were satisfactorily matched only when a layered ground was incorporated into the calculations; then, ar assumed surface effective flow resistivity of 20 kN/s/ 0001 m gave good agreement with the observed waveforms and peak amplitude decay

MP 2574

CBR OPERATIONS IN COLD WEATHER: A

BIBLIOGRAPHY, VOL1.
Carlon, H.R., et al. Nov. 1989, CRDEC-SP-017, 88p.
Birenzvige, A., D ramo, P.A., Parker, L.V.

MILITARY OPERATION. POLLUTION. MILITARY RESEARCH, COLD WEATHER OPERATION, BIBLIOGRAPHIES.

Complex military operation, can be severely hampered in cold weather. An extensive search of the litereture hybern completed, from which more than 60 reports an *rectrences have been selected for the comprehensive bibliog: that is presented here in two volumes. Volume 1 incl. only unclassified entires for convenient desktop refer. *re, whereas volume 2 includes citations at the restricted, configuration. whereas volume 2 includes citations as the restricted, continued that, and secret levels. Both volumes are cross-indexed by several schemes, including title, subject, author, and year. Abstracts for all references are provided, "there available. This report is intended to provide an up-to-date guide to CBR operations in cold weather and to offer users the most authoritative information available concerning this topic. MP 2575

REFRACTIVE INDEX STRUCTURE PARAMETER FOR A YEAR OVER THE FROZEN BEAU-FORT SEA.

Andreas, E.L., Sep.-Oct. 1989, 24(5), p.667-679, 50 reis.

reis.
44-2091
ICE SURFACE, FLOATING ICE, REFRACTIVITY, LIGHT TRANSMISSION, ATMOSPHERIC
ATTENUATION, ELECTROMA METIC PROPERTIES, SEASONAL VARIATIO S, ICE HEAT
FLUX, STATISTICAL ANALYSIS, WAVE
PROPAGATION, BEAUFORT SEA

MP 2576

RÖOFER: A MANAGEMENT TOOL FOR MAIN-TAINING BUILT-UP ROOFS. Bailey, D M, et al. Oct. 1989, CERL-M-90/02, 9p., ADA-214 032, 5 refs. For another source see 43-2691.

Brotherson, D.E., Tobiasson, W.

44-2109

ROOFS, MAINTENANCE, MILITARY FA ILLI-

This paper describes FOOI I.R. a roofing maint nance management system for built-up roofs being developed by the U.S.

Army Construction Engineering Research Laboratory with the assistance of the U.S. Army Cold Regions Research and Engineering Laboratory and the U.S. Army Engineering and Housing Support Center ROOFER provides building managers with a practical tool for evaluating built-up roofs, determining maintenance priorities, and selecting repair strategies that ensure the maximum return on investment ROFER comprises procedures for dividing the building roof into manageable sections, collecting and managing inventory infor-mation, inspecting and evaluating condition, and managing networks and projects

COMPARISON OF SOIL FREEZING CURVE AND SOIL WATER CURVE DATA FOR WIND-SOR SANDY LOAM.

Black, P.B., et al, Oct. 1989, 25(10), p.2205-2210, 16 refs. For another version see 43-1843.

44-2135

44-2135
SOIL FREEZING, SOIL WATER, LOAMS, UN-FROZEN WATER CONTENT, GROUND ICE, FROZEN GROUND TEMPERATURE, SOIL TEMPERATURE, TEMPERATURE EFFECTS, TEMPERATURE, TEMPERATANALYSIS (MATHEMATICS).

Unifrozen water content as a function of temperature was measured in the laboratory using pulsed nuclear magnetic resonance (PNMR) for a Windsor sandy loam soil. The PNMR data were related to previously measured soil moisture retention data through the modified Clausius-Clapeyron equation, with suitable adjustment for surface tension. The transformed measured unfrozen water content data and the reviously measured soil moisture reference data were tertransformed measured unitozen water content data and the previously measured soil moisture retention data were expressed by a Brooks and Corey type of equation with the required set of regrension parameters determined it was found that a single set of parameters were sufficient to correctly express the behavior of these data when suitable constraints were imposed on the unfrozen water content data. Additional insight into the traditional form of expressions unforcen, water content data is presented in terms. ing unfrozen water content data is presented in terms of air or ice entry pressure.

EVALUATION OF SHEAR STRENGTH OF FRESHWATER ICE ADHERED TO ICEPHOBIC COATINGS.

Mulherin, N.D., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.149-154, 13 refs.

ICE ADHESION, SHEAR STRENGTH, COATINGS, ICE REMOVAL, ICE PREVENTION, SHIP ICING, ICE SOLID INTERFACE, ICE GROWTH, PROTECTIVE COATINGS, TESTS, TEMPERATUL 3 EFFECTS, SEA SPRAY, METEOROLOGI-AL FACTORS

CAL FACTORS.

This paper discusses a study that was undertaken to discriminate between four icephobic coatings for ease of ice removal. The method of discrimination was to compare the shear force required to remove a buildup of freshwater ice from flat plate test surfaces measuring 22 9 x 38 1 cm. Twelve replicates each of the four different coatings and two different control surfaces (a total of 72 samples) were subjected to spray icing in an environmental chamber. The sam, les were iced and shear tested at -10 C. The tests were performed using a constant displacement rate of 0 0381; km/s. This shear rate ensured a brittle failure at the ice/coating interface and produced virtually 100%, ice removal in every This shear rate ensured a brittle failure at the ice/coating interface and produced virtually 100% ice removal in every rest. Results showed that all four of the experimental patings exhibited higher mean shear values than either of the two controls. Although the mean shear values for the various coatings were very similar in absolute magnitude ranging from 71 to 119 kPa, statistical analysis showed that their was a significant difference in coating performance with greater than 56% confidence. The relative standard deviation in shear values ranged from 15 to 29% of the total stre. The distinction is emphasized between decing and anti-ieing surfaces relative to coating performance and anti-ieing surfaces relative to coating performance. and anti-icing surfaces relative to coating performance

DYNAMIC ANALYSIS OF A FLOATING ICE SHEET UNDERGOING VERTICAL INDENTA-

Michibary, W.K., et al. International Conference on Offshore Mechanics and Arctic Engineering, 9th. Houston, TX, Feb. 18-23, 1990. Proceedings Vol. 4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanist Engineers, 1990, p. 195-203, 13 refs. Sodhi, D.S., Lever, J.H. 44-2224 McGlvary, WR, et al. International Conference on

ICE MECHANICS, FLOATING ICE, DYNAMIC PROPERTIES, LOADS (FORCES), ICE DEFORMATION, BEARING STRENGTH, OFF THORE STRUCTURES, VELOCITY, MODELS SHORE DRILLING, ICE ROADS, TESTS

This paper describes a finite-element model of a floating ice sheet subjected to rapid vertical indentation. We modeled the ce sheet using small-ineflection, clastic-plate theory and modeled the fluid using incompressible potential flow.

The objectives were to assess the validity of this coupled model to predict indentor loads and to determine the relative importance of fluid inertia versus ice-sheet inertia. The model's talidity is assessed by comparing its predictions with previously obtained laboratory data. It is found that the model yields reasonably good predictions of indento loads and sheet diffection profiles provided the ice sheet's characteristic length is reduced to account for damage caused by large deflection. The model also clearly demonstrates the predominance of fluid inertia over ice-sheet inertia for the case of rapid vertical indentation. Indeed, it was found that the ice sheet essentially behaves as a massless, clastic plate on a fluid foundation.

MP 2580 WAVE-INDUCEL BERGY BIT MOTION NEAR FLOATING OIL , PODUCTION PLATFORM. Mak, L.M., et al, Interational Conference on Off-shore Mechanics and Arctic Engineering, 9th, Hous-ton, TX, Feb 18-23, 1990 Proceedings. Vol 4 Edited by O.A Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.205-215, 24 refs.

Lever, J.H., Hinchey, M J., Duthinh, D.

44-2225
FLOATING STRUCTURES, ICE MECHANICS, ICE CONDITIONS, WATER WAVES, ICE STRENGTH, IMPACT STRENGTH, OFFSHORE STRUCTURES, ICEBERGS, WAVE PROPAGATION, STATISTICAL ANALYSIS, TESTS,

This paper accribes an experimental study at model scale of waver; unced impacts of bergy bits with a floating oil production 5 aftern in a fee for use on the Grand Banks of Newfoundland, Cir. with a The tests in the 58 m wave tank were can fueted as Memorial University using techniques developed to in earlier pilot study but refined in the present program to a prove data quality. The objective was to collect and a nize a statistically valid set of bergy bit impact velocities and locations, with a view to providing the design information necessary to cer-strengthen the platform It is concluded from the study that (1) open-water iceberg significant velocities can provide conservative estimates of the significant impact velocities, (2) relative motion between the platform and the iceberg tends, on average, to mitigate impacts, (3) the berg rotational kinetic energy at the time of an impact is a small portion of the translational increasing waves, (5) wave diffraction from the structure can reduce impact velocities and change iceberg trajectories, and (6) wave diffraction has more influence on the smaller bergy bit, resulting in fewer impacts. The paper compares the impact results obtained for this floating production pine form with results obtained for this floating production pine form with results obtained previously for a more transparent, a titlora-tion-style semi-submersible. tion-style semi-submersible

MP 2581

CYCLIC LOADING OF SALINE ICE. INITIAL EXPERIMENTAL RESULTS.
Cole, D.M., International Conference on Offshore

Cote, D.M., international Conference on Oilshore Mechanics and Arctic Engineering, 9th, Houston, TX. Feb 18-23, 1990 Proceedings Vol.4 Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p. 265-271, 10 refs.

ICE LOADS, ICE SALINITY, STRESS STRAIN DIAGRAMS, LOADS (FORCES), COMPRESSIVE PROPERTIES, ICE ELASTICITY, TENSILE PROPERTIES, MEASURING INSTRUMENTS. EXPERIMENTATION, ICE CORES, TEMPERA-TURE EFFECTS.

This paper describes the initial experimental results on the cyclic loading of saline ice specimens obtained under fully reversed (tension-compression) uniaxial loading conditions. The apparatus used to grip the 100-m-dia..., seemens is similar to one described in Cole and Gr. 3d (1989) for performing reversed direct stress tests on 50-m-diameter speciperforming reversed direct stress tests on 50-m-diameter specimens. Results were obtained for sinusoidally sarying axia stresses ranging from 0.3 to 0.9 MP and for loading frequencies in the range of 00025 to 10 Hz. The test temperatures were -10 a.1 -20 C. The specimens were saline ice cores taken from an outdoor facility at CRREL. The tee exhibited varying degrees of inelastic behavior under all conditions experienced in these experiments the initial cycle of loading at frequencies in the renge of 0.1 to 10 Hz resulted in closed hysteresis loops, while lower frequencies produced open loops. The net strain at the end of the open hysteresis loops was virtually all recovered within a short time after the end of a single loading cycle for the 100s period was closers. However, for the loading periods of 1000 and 4000s the bulk of the strain required to close the hysteresis loop. Aas generally not recoverable. The the hysteresis loop Aas generally not recoverable. The loading sequences were such that all specimens ultimately failed in tension with the fracture occurring in the deformation. measurement gauge length

MP 2582 DETERMINATION OF THE UNDERSATURA-TION IN THAWED PERMAFROST AT THE BE-GINNING OF FREEZEBACK.

Avorinde, O.A. International Conference on Offshore Ayorinde, O.A., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.317-321, 3 refs. 44-2241

44-2241
PERMAFROST, FREEZE THAW CYCLES, DRILLING, SATURATION, POROSITY, GAS WELLS, OIL WELLS, MATHEMATICAL MODELS, WELL CASINGS, SOIL COMPACTION, UNFROZEN WATER CONTENT.

FROZEN WATER CONTENT.

In permafrost, the initial undisturbed degree of saturation can be significantly reduced when subjected to several cycles of thaw-subsidence and freezeback usually encountered during oil/gas well drilling and production operations. The changes in saturation and the resulting u dersaturation should be considered in the analysis and modelling of permafrost properties. Consideration of the reduction in saturation is lacking in most of the published freezeback and thaw-subsidence models. A mathematical relation is derived to evaluate the undersaturation in the permafrost at the beginning of each freezeback process during several thaw-subsidence-freezeback cycles. The undersaturation is related to the initial unifrozen water content and the permafrost compaction caused by thaw-subsidence. The mathematical analysis shows how the effects of the initial unifozen water content and the by thaw-subsidence. The mathematical analysis shows how the effects of the initial unifozen water content and the permafrost compaction due to subsidence can be taken into account in determining the freezeback pressures. A relationship for the initial gas fraction is also developed which can be incorporated in the freezeback model Furthermore, upper limits are established for the permafrost compaction or thaw consolidation (volumetric strain) for various possible conditions that may be encountered

MP 2583 STABILIZATION OF PERMA-THERMAL. FROST WITH THERMOSYPHONS.

Zarling, JP, et al, International Conference on Off-shore Mechanics and Arctic Engineering, 9th, Hous-ton, TX, Feb. 18-23, 1990 Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p 323-328, 18 refs.

Haynes, F.D., Gagnon, J.J.

PERMAFROST THERMAL PROPERTIES, COOL ING, FOUNDATIONS, SUBGRADES, HEAT TRANSFER, WIND TUNNELS, DESIGN, THER-CONDUCTIVITY, ANALYSIS EMATICS).

Foundation design techniques in cold regions include the Foundation design techniques in cold regions include the use of thermosyphons for subgrade cooling. These passive heat transfer devices have been used under buildings, roads, railroads, pipelines and airfields. Laboratory lests were conducted on a full-size commercial, two-phase thermosyphon in CRREL's atmospheric wind tunnel. The unit was tested at evaporator angles of 9, 7, 3, and 0 degree and condenser angles of 90, 45 and 9 degrees from the horizontal. The condenser section, was subjected to wind speeds range. angues of 90, 40 and 9 degrees from the horizontal. The condenser section was subjected to wind speeds ranging from 0 to 7 m/s. Performance of the thermosyphon as a function of these variables is presented. The component thermal resistances of an in-place thermosyphon were calculated. It was determined that the thermal resistances associated with conduction through the soil and heat transfer from the fins to the air are dominant

MP 2584

PROCEEDINGS. VOL.4.

International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990, New York, American Society of Mechanical Engineers, 1990, 339p, Refs passim. For individual papers see 44-2200 through 44-2244.

Ayorinde, O.A., ed, Sinha, N.K., ed, Sodhi, D.S., ed.

ICE LOADS, OFFSHORE STRUCTURES, ICE MECHANICS, OFFSHORE DRILLING, MEETINGS, ENGINEERING, ICEBERGS, ICING, ICE CONDITIONS, MATHEMATICAL MODELS, SEA ICE, OIL SPILLS, ICE STRENGTH, ICE

PRESSURE.

FINITE ELEMENT SIMULATION OF PLANAR INSTABILITIES DURING SOLIDIFICATION OF AN UNDERCOOLED MELT.

Sullivan, J.M., Jr., et al, Mar. 1987, 69(1), p.81-111, 18 refs.

Lynch, DR, O'Neill, K.

SOLID PHASES, SIMULATION, LIQUID SOLID INTERFACES, CRYSTAL GROWTH, PHYSICAL PROPERTIES, THERMAL PROPERTIES, FREEZ-ANALYSIS (MATHEMATICS), LIQUID COOLING

MP 2586 LIQUID CHROMATOGRAPHIC METHOD FOR DETERMINATION OF EXTRACTABLE NI-TROAROMATIC AND NITRAMINE RESIDUES IN SOIL

Benkins, T.F., et al, 1989, 72(6), p.890-899, 47 refs. Walsh, M.E., Schumacher, P.W., Miyares, P.H., Bauer, C.F., Grant, C.L.

44-2345 SOIL POLLUTION, SOIL COMPOSITION, CHEMICAL ANALYSIS, CHEMICAL PROPERTIES, SOIL SCIENCE, LABORATORY TECH-NIQUES.

MP 2587

IMPACT OF THE WINTER ENVIRONMENT ON INFRARED TARGET SIGNATURES AND EO SENSOR PERFORMANCE.

LU SENSUK PERFORMANCE. Lacombe, J., Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, 1989, n.p., 10 refs. Presented at the 57th Military Operations Re-search Society Symposium, Fort Leavenworth, Kan-sas, 6-8 June 1989. 44-2428

COLD WEATHER PERFORMANCE, COLD WEATHER TESTS, MILITARY OPERATION, IN-FRARED PHOTOGRAPHY, INFRARED RECONNAISSANCE, SNOW COVER EFFECT.

MP 2588 HARBOR DESIGN FOR ICE CONDITIONS.

Wortley, C.A., Apr. 1987, 28(3), p.14-15. 41-3410

PORTS, ICE REMOVAL, SITE SURVEYS, DE-SIGN.

MP 2589

ATMOSPHERIC ICING RATES WITH ELEVA-TION ON NORTHERN NEW ENGLAND MOUNTAINS, U.S.A.

Ryerson, C.C., Feb. 1990, 22(1), p.90-97, 19 refs

44-2664
ICE ACCRETION, ICING RATE, ALTITUDE,
MOUNTAINS, WIND FACTORS, TOPOGRAPHIC EFFECTS, CLOUD COVER, ICE FORMATION, MEASUREMENT, MEASURING INSTRUMENTS, FROST, UNITED STATES—NEW MENTS, FROST, UNITED STATES HAMPSHIRE—MOUNT WASHINGTON.

HAMPSHIRE—MOUNT WASHINGTON.

Atmospheric rime icing, resulting primarily from supercooled cloud droplet impaction on objects at the Earth's surface, was monitored and analyzed as a function of clevation on the west faces of Madonna Peak and Mount Mansfield in the Green Mountains, Vermont, and at the summit of Mount Washington, New Hampshire. Measurements were made of ice accretion rates on passive, manually operated collection baskets and automatic ice detectors. Leing rates pressure accordingly with elevation shows about 800 and 100 an made of ice accretion rates on passive, manually operated collection baskets and automatic ice detectors. Icing rates increase exponentially with elevation above about 800 m, with secondary controls of rate suggested by microtopographic relief exposure. The illustrated dependence of icing rate upon elevation is largely a function of New England wind and cloud regimes and differs from other selected mountainous locations. The relationships presented may help assess the magnitude of frozen moisture inputs to high-elevation mountain executions. mountain ecosystems

MP 2590

AIRBORNE MEASUREMENT OF SEA ICE THICKNESS USING ELECTROMAGNETIC IN-DUCTION DURING LIMEX 89.

Holladay, J.S., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings Vol.4 Edited by O.A. Ayorınde, N.K. Sınha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.309-315, 13 refs.
Rossiter, J.R., Kovacs, A.

44-2240 ICE COVER THICKNESS, SEA ICE, REMOTE SENSING, ELECTROMAGNETIC PROSPECTING, AIRBORNE EQUIPMENT, ICE MECHAN-ICS, OFFSHORE STRUCTURES, AIRBORNE RA-DAR, ICE NAVIGATION, METEOROLOGICAL DATA, ACCURACY.

MP 2591

INTRODUCTION TO DRILLING TECHNOLO-

Mellor, M., International Workshop on Physics and Mechanics of Cometary Materials, Münster, FRG, Oct. 9-11, 1989 Proceedings, European Space Agency, Dec. 1989, p.95-114, ESA SP-302 44-2800

DRILLING, FROZEN GROUND, ICE CORING DRILLS, EXTRATERRESTRIAL ICE, PLANE-TARY ATMOSPHERES

Terrestrial drilling technology is reviewed. The general requirements for a drilling system are given and conventional drilling techniques (rotary drag bit, rotary roller bit, percussive, rotary-percussive) are described. Unconventional techniques for penetrating solids are outlined, including thermal drilling (spalling or melting), projectile penetration, high

pressure liquid jets, explosive jets, erosion by projectile streams, and chemical penetration Special attention is given to drilling in ice and frozen soils, performance data are given, including values for penetration rate and specific energy consumption The principles, theory and equipment relating to each drilling technique are indicated by means of diagrams

FIRST IMPRESSIONS OF THE COMET DRILL-ING PROBLEM.

Mellor, M. International Workshop on Physics and Mechanics of Cometary Materials, Munster, FRG, Oct. 9-11, 1989. Proceedings, European Space Agency, Dec. 1989, p.229-232, ESA SP-302.

44-2011 EXTRATERRESTRIAL ICE, PLANETARY ENVI-RONMENTS, ICE SAMPLING, ICE DENSITY, ICE CORING DRILLS, COSMIC DUST.

ION-PAIRING RP-HPLC METHOD FOR DE-TERMINING TETRAZENE IN WATER AND

Walsh, M E., et al, 1989, 7(3), p.159-179, 18 refs. Jenkins, T.F. 44-2832

44-2832
WATER CHEMISTRY, SOIL CHEMISTRY, CHEMICAL ANALYSIS, EXPLOSIVES, SOIL ANALYSIS, LABORATORY TECHNIQUES, SOIL POLLUTION, CHEMICALS.

POLLUTION, CHEMICALS.

Ion-pairing reversed phase-high performance liquid chromatography methods were developed to determine tetrazene in water and soil. Determinations were achieved using an LC-18 column, a mobile phase of 2/3 //v methanol-water containing 0.01 M 1-decane-sulfonic acid sodium salt, and a UV detector set at 280 nm. The pH of the mobile phase was adjusted to 3 with glacial acetic acid, which was optimal for separation of tetrazene from potential interferences by other explosives. The retention time for tetrazene was 2.8 minutes. A linear model with zero intercept was found to adequately describe the calibration data for concentration ranges of 6.1 to 122 micrograms/L for water samples and 0.204 to 4.08 micrograms/g for soil samples Tetrazene was found to be unstable in an aqueous medium at room temperature. Concentrations decreased by 96-100% over 24 hours. The rate of degradation was reduced significantly when solutions were maintained near 0 deg C.

MP 2594

FREEZING AND THAWING OF SOILS IN CYLINDRICAL COORDINATES.

Lunardını, V.J., International Symposium on Frost in Geotechnical Engineering, Saariselka, Finland, Mar. 13-15, 1989 VTT Symposium 94 Proceedings. Vol 1 Edited by H Rathmayer, Espoo, Finland, Val-tion teknillinen tutkimuskeskus, 1989, p.185-208, 33

43-3098

43-3098 SOIL FREEZING, GROUND THAWING, PIPES (TUBES), HEAT TRANSFER, PHASE TRANS-FORMATIONS, ANALYSIS (MATHEMATICS), POROSITY, TEMPERATURE EFFECTS, HEAT FLUX, THAW DEPTH.

PLUX, I HAW DEPTH.

Freezing and thawing of soil systems are usually formulated and discussed in terms of plane or Cartesian coordinate systems. Thus most freeze/thaw equations are based on the Neumann solution. However, many practical soil phase change problems, such as freezing around butted pipes, deal with cylindrical coordinates. The basic equations, solution methods, and solutions for freezing and thawing in cylindrical coordinates are presented here along with some graphs for resection. practical applications

PHYSICAL CHANGES IN CLAYS DUE TO FROST ACTION AND THEIR EFFECT ON ENGINEERING STRUCTURES.

Chamberlain, E.J., International Symposium on Frost in Geotechnical Engineering, Saariselkä, Finland, Mar 13-15, 1989 VTT Symposium 94 Proceed-ings Vol 2. Edited by H. Rathmayer, Espoo, Finland, Valtion teknillinen tutkimuskeskus, 1989, p.863-893, 49 rcfs

43-3155 GROUND PHYSICS, SOIL FREEZING, SETTLE-MENT (STRUCTURAL), GROUND THAWING, FREEZE THAW CYCLES, FROST HEAVE, AR-TIFICIAL FREEZING, ENGINEERING, FROST RESISTANCE, SOIL STRUCTURE, THAW CON-SOLIDATION.

SOLIDATION.

Freezing and thawing cause changes in the physical and engineering properties of clay soils. The properties of clay soils are particularly susceptible to frost action because the structure and fabric are very sensitive to the stresses that are caused by freezing. This report presents a review of the state of understanding of how changes in the soil fabric and structure occur and how these changes affect the engineering properties of clays and ground freezing projects.

MP 2596

MODELING ICE RESTRAINT FORCES IN AN ICE BOOM.

Perham, R E, IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Proceedings, Vol.3, Japan, Aug. 23-27, 19 [1988], p.198-206, 3 refs. 43-3033

BOOMS, ICE PRESSURE, BUOYANCY, DELS, MATHEMATICAL MODELS, COM-MODELS PUTER PROGRAMS

PUTER PROGRAMS

A model of the ice restraint forces in a floating ice boom having rectangular cross-sectional boom units has been developed. By knowing the boom unit dimensions, buoyancy, and anchor characteristics, one can predict the boom's ability to restrain ice up to certain force levels. In operation, a boom unit tends to be upset by the force coupling that develops between ice forces and structure forces that generally are not collinear, the rectangular unit resists being overturned by virtue of its righting moment that increases with tilt, up to a limit The model is very important now that alternative materials to replace Douglas fir in the boom unit show more economic and technical promise. For the first time an ice boom can be designed and engineered in a fully comprehensive manner. Ice restraint forces and righting moments are given in dimensionless terms, Frand M*, respectively, as Fr*=M*2p/G where p and G relate to the geometry of interaction between the boom unit, the ice and the structure Laboratory tests show that the model yields conservative values of ice restraint capacity, ie minimums for a prototype.

MP 2597

MP 2597

GROUND MOTION INDUCED BY AN ACOUS-TIC PULSE, AND ITS WINTERTIME VARIA-TIONS.

Peck, L., International Symposium on Long Range Sound Propagation and Coupling into the Ground, 3rd, Jackson, MS, Mar. 28-30, 1988 Proceedings, Vol 2, National Center for Physical Acoustics, 1988,

43-3211 SOIL STRUCTURE, FROZEN GROUND PHY-SICS, SEASONAL VARIATIONS, SNOW ACOUSTICS, FREEZE THAW CYCLES

TICS, FREEZE THAW CYCLES
Results are presented from a field program conducted in 1985/86 to investigate the changes in acoustically coupled ground motion due to the presence of snow and/or frozen ground. The acoustic source was blank pistol fire. The addition of a 6-cm-deep layer of snow to bare ground causes a greater reduction in the amplitude of coupled ground motion than does tripling the snow depth from 6 cm to 18 cm. The amplitude of coupled ground motion is 80-90% lower in hard frozen sand (sand frozen when saturated) than it is not try inforcer sand (sand frozen when saturated). than it is in dry unfrozen sand.

COMPARATIVE STUDIES OF THE WINTER CLIMATE AT SELECTED LOCATIONS IN EUROPE AND THE UNITED STATES.

Bates, R.E., et al, Annual EOSAEL/TWI Conference, 9th, Nov 29-Dec 1, 1988 Proceedings, Vol. 1, Mar. 1989, p.283-293, 17 refs.

Bilclio, M.A. 43-3213

CLIMATE, WINTER, CLIMATIC FACTORS, AIR TEMPERATURE, SNOWFALL, SNOW DENSI-TY, SNOW DEPTH, VISIBILITY

TY, SNOW DEPTH, VISIBILITY
Smart weapon systems rely on the capability of electrooptical sensors to locate targets embedded in winter backgrounds Field experiments on the operational effectiveness
of such systems have been conducted at several locations
in the castern United States. Key meteorological parameters
summarized for evaluating these winter experiments are freezing temperatures, frequency of freeze-thaw cycles, snow cover
properties, ceiling height, and visibility. This paper summartizes the climatic parameters for the U.S. locations and
compares them with the same parameters for sites in Europe.
Relationships among the conditions at vites with winters
of varying severity were examined so that a range in regional
variations of the environment could be established

MP 2599

SYNOPTIC METEOROLOGY, CRYSTAL HABIT, AND SNOWFALL RATES IN NORTHEASTERN SNOWSTORMS.

Ryerson, C.C., et al. Annual EOSAEL/TWI Conference, 9th. Nov. 29-Dec. 1, 1988. Proceedings, Vol.2, Mar. 1989, p 335-345, 14 refs.

Bates, R.E.

STORMS, SYNOPTIC METEOROLOGY, CRYSTALS, VISIBILITY, SNOWFALL, STATISTICAL

ANALYSIS
Winter battlefield weather forecasters must predict, in addition to routine weather parameters, F-O extinctions produced by snowfall During the SNOW ONL and ONE-A experiments at Eithan Allen Firing Range, VT, and SNOW TWO and THREL experiments at Camp Grayling, MI, snowfall and weather variables were measured during 38 storms — This paper measures relationships between visibility, crystal habit, snowfall rates, synoptic patterns, and concurrent surface weather conditions during these SNOW experiments — Coastal and take effect local storms, and storms with columnar crystals,

were most often associated with reduced visibility. The relationships, tested statistically, may help forecasters better predict visibility-degrading snowfall conditions from synoptic

MP 2600

FREE AND FORCED CONVECTION HEAT TRANSFER IN WATER OVER A MELTING HORIZONTAL ICE SHEET.

Lunardini, V.J., Offshore and Arctic Engineering Seminar in Korea (post-OMAE), 1986. Proceedings, Korea Institute of Machinery and Metals, 1986, p.42-

43.3218

CONVECTION, HEAT TRANSFER, ICE SHEETS, ICE MELTING, ICE WATER INTERFACE

CONVECTION, HEAT TRANSFER, ICE SHEETS, ICE MELTING, ICE WATER INTERFACE.

Experiments were conducted to study the melting of a horizontal ice sheet with a flow of water above it. The experiments were conducted in a refrigerated flume 35 m long with a cross section of 1.2 x 12 m. Water depth, temperature and velocity were varied as well as the temperature and initial surface profile of the ice sheet. It was found that the heat transfer regimes consisted of forced turbulent flow at high Reynolds numbers with a transition to free convection heat transfer at lower Reynolds numbers. There was no convincing evidence of a forced laminar regime. The data were correlated for each of the regimes with the Reynolds number, or Gr/Re25, used to characterize the different kinds of heat transfer. For very low water velocities over a hortizontal ice sheet, the melting heat flux does not drop below the value for the free convection case as long as the water temperature exceeds 34 C. This is significant since the free convection. At the low velocities the melting flux was not dependent upon the fluid temperature until the water temperature dropped below 3.4 C. The heat transfer was found to significantly exceed that of non-melting systems for the same flow regimes This was attributed to increased free stream trubulence, thermal instability due to the density maximum of water near 4 C, and the turbulent eddies associated with the generation of a wavy ice surface during the melting

MP 2601 SOME PECULIARITIES OF CREEP BEHAVIOR OF FROZEN SILT.

Fish, A.M., International Conference on Offshore Mechanics and Arctic Engineering, 8th, The Hague, Netherlands, Mar. 19-23, 1989. Proceedings. Vol.1, New York, American Society of Mechanical Engineers, 1989, p 721-724, 9 refs.

FROZEN GROUND MECHANICS, FROZEN GROUND STRENGTH, SOIL CREEP, RHEOLO-

GROUND STRENGTH, SOIL CREEP, RHEOLO-GY.

A study has been conducted on creep of frozen Fairbanks silt at a constant temperature of -2 C. The entire creep process (primary, secondary and tertiary) is described by means of two rheological characteristics the time parameter lambda and the viscous failure strain C (the product of the minimum strain rate em and the time of failure tim). A new method is presented for determining these parameters and the time to failure from a single linear plot in which each individual creep curve forms a straight line for both primary and tertiary creep. Secondary creep is considered to be a principal point on this line that predetermines the onset of failure. The two parameters of the straight line (the intersection with the ordinate and the slope) define the magnitudes of the creep parameters. It was found that the shapes of the creep curves, and thus the creep parameters of frozen soil, strongly depend upon sitess. Although theoretically the time parameter lambda can change from 0 to 1, only variations of lambda between 0.6 and 0.8 can be observed in short-term creep tests. It is also shown that parameter C does not retain a constant value. The absolute value of C varies between 3 and 9%, and its variations with sitress correspond to Maxwell's distribution. The sitess dependencies of the creep parameters developed in this paper make it possible to extrapolate the values obtained in short-term tests at high stresses for long-term creep at small sitesses. It is shown that the errors in creep strain calculations may be up to an order of magnitude if stress variations of creep parameters are ignored. are ignored.

MP 2602

LIDAR DETECTION OF LEADS IN ARCTIC SEA ICE.

Schnell, R.C., et al, June 15, 1989, 339(6225), p.530-

Barry, R.G., Miles, M.W., Andreas, E.L. 43-3359

SEA ICE, CLOUDS (METEOROLOGY), ICE OPENINGS, BACKSCATTERING.

OPENINGS, BACKSCATTERING.

Remote sensing using an airborne infrared lidar has shown an unexpected capability to detect open leads (linear openings) in Arctice sea ice and their associated meteorology in winter Here we show that sertical profiles of backscattered radiation demonstrate strong returns from hydrometeor plumes originating from leads having a surface water temperature near 1.8 C. Recently refrozen leads are also distinguishable by the lidar backscatter from adjacent thicker, older sea ice. Wide leads release enough energy to create buoyant plumes which penetrate the Arctic boundary layer inversion, transporting heat and moisture into the troposphere. These results show that the role of the Arctic as a global heat results show that the role of the Arctic as a global heat sink may need to be re-evaluated, and that lead plumes have a significant effect on the radiation budget

MP 2603 ATMOSPHERE SUBGROUP DISCUSSIONS. Andreas, E.L., Apr. 1984, No.84-7, MIZEX bulletin. 3. Modeling the marginal ice zone, p.97-98, ADA-145 43-3360

AIRBORNE EQUIPMENT, MEASURING IN-STRUMENTS, ICE AIR INTERFACE, MEASURE-

MP 2604
TWO-STREAM APPROXIMATION TO RADIA-TIVE TRANSFER IN FALLING SNOW

Koh, G., Smoke/Obscurants Symposium, 12th, Laurel, MD, Apr. 19-21, 1988. Proceedings. Vol.2. Unclassified section. Edited by W.M. Farmer and W. Klimek, July 1988, p.463-470, 7 refs.

BACKSCATTERING, LIGHT TRANSMISSION, SNOW OPTICS, SNOWFALL.

Light transmission measurements through falling snow have produced results that cannot be explained by single scattering arguments. A two-stream approximation to radiative transfer is used to derive an analytical expression that describes ter is used to derive an analytical expression that describes the effects of multiple scattering as a function of the snow optical depth and the snow asymmetry parameter. The simple approximate solution is compared with the experimental results. It is shown that the approximate solution may be as accurate as the exact solution for describing snow transmission measurements within the limits of the experimental uncertainties.

MP 2605 SED TRANSMISSION THROUGH OBSCURANT CLOUDS DURING INCREASED SNOWFALL.

Hewitt, A.D., et al, Smoke/Obscurants Symposium, 12th, Laurel, MD, Apr. 19-21, 1988. Proceedings. Vol.2: Unclassified section. Edited by W.M. Farmer and W. Klimek, July 1988, p.489-496, 11 refs. Hogan, A.W., Koh, G., Lacombe, J., Cragin, J.H.

43-3430

LIGHT TRANSMISSION, SNOWFALL, CLOUD CHAMBERS, SNOW OPTICS, TIME FACTOR.

CHAMBERS, SNOW OPTICS, TIME FACTOR.
Recent experimental and theoretical work has shown that falling snow can remove appreciable amounts of aerosols from obscurant clouds. Field measurements of scavenging efficiencies for brass infrared screener averaged 30% for various snow crystal types. Although increases in transmission and visibility resulting from snow scavenging of particles have been calculated and modeled, quantitative transmission measurements have not previously been conducted. In order to perform such transmission measurements, ad dynamic obscurant cloud chamber was constructed, through which an upward flow of controlled concentrations of brass screener was maintained. The chamber work was opened to permit falling snowflakes to scavenge particles from the upward-moving obscurant cloud. A 633-mm He-Ne laser transmission-through the chamber over a 1-m path leight at two heights. 15 m apart. The difference in transmittance between the two levels is a measure of the amount of obcurant removed. This experimental arrangement is able to measure the rate of scavenging upon electro-optical (E/O) transmission for precipitation rates as light as 0.08 g/sq ms (0.18 mm hrater equivalent). Results venify earlier predictions of reduced effectiveness of infrared screeners during precipitation Field tests conducted during 1987-88 winter snowstorms using brass screener indicate that smoke particle scavenging can cause relative transmission increases of as much as 5-15% for each minute of exposure to snowfall. can cause relative transmission increases of as much as 5-15% for each minute of exposure to snowfall

MP 2607

SNOW-SMOKE INTERACTION.

Hogan, A.W., et al, Smoke/Obscurants Symposium, 12th, Laurel, MD, Apr. 19-21, 1988. Proceedings. Vol.2: Unclassified section. Edited by W.M. Farmer and W. Klimek, July 1988, p.497-506, 6 refs. Hewitt, A.D., Cragin, J.H.

THEORIES, LIGHT TRANSMISSION, SNOW-FALL, SNOW OPTICS, SNOWFLAKES.

FALL, SNOW OF ITCS, SNOWPLAKES.
Falling snow has been observed to collect screener materials with relatively good efficiency. This paper describes a semiempirical theory that predicts the rate at which falling snow diminishes screener concentration. The theory incorporates snowflake size distributions, suspended snow concentration. porates snowlake size distributions, suspended snow concentration, snowfall rate, optical transmission and meteorological parameters from the SNOW experiments. These parameters are used, along with fall velocities from the work of O'Biren, Locatelli and Hobbs, and Mellor, to calculate the volume of air swept by falling snow, as a function of precipitation rate. Calculations are performed using this theory to predict screener scavenging rates, these indicate that very light snow falls are capable of halving smoke concentrations in hundreds of seconds.

IMPACT OF WET SNOW ON VISIBLE, INFRA-RED AND MILLIMETER WAVE ATTENUA-TION.

Bates, R.E., et al, Smoke/Obscurants Symposium, 12th, Laurel, MD, Apr. 19-21, 1988. Proceedings. Vol.2. Unclassified section. Edited by W.M. Farmer and W. Klimek, July 1988, p.523-535, 10 refs. 43.3439

WET SNOW, SNOWFALL, TRANSMISSION, WAVE PROPAGATION, SNOW CRYSTAL STRUCTURE, PRECIPITATION (METEOROLO-

Examination of visible, infrared, and millimeter wave attenuation by falling snow during the coastal snowstorm of Dec 13-14, 1985 at Ft Hollis, ME, (SNOW IV) indicates a peculiarity in transmission that may have resulted from a snow/rain phase change. During this period the type of precipitation changed, while the surface temperatures and the low-level vertical temperature profile fluctuated around O.C. Analyses of the transmission data over a portion of the snowstorm indicate that the infrared and visible attenuations were less than the millimeter-wave attenuation. These results from SNOW IV are compared with those from moderate to heavy wet snowfalls during previous SNOW expe., ments, Previous results indicate that millimeter-wave radiation is normally attenuated less than visible or infrared radiation by moderate to heavy snowfall. Meteorological data and observations of snow crystal habit in similar storms that occurred during all of the SNOW experiments are analyzed to examine transmission Procepitation-phase-change relationon of visible, infrared, and millimeter wave att to examine transmission/precipitation-phase-change relation-

MP 2609 OVERVIEW OF OBSCURATION IN THE COLD ENVIRONMENT.

Berger, R.H., et al, Smoke/Obscurants Symposium, 12th, Laurel, MD, Apr. 19-21, 1988. Proceedings. Vol.2: Unclassified section. Edited by W.M. Farmer and W. Klimek, July 1988, p.537-555, 62 refs. O'Brien, H.

WAVE PROPAGATION, SNOWFALL, SNOW COVER EFFECT, BACKSCATTERING, SNOW

MECHANICS.

"Obscuration in the Cold Environment" was presented at the Smoke/Obscurant Symposium IV in Apr 1980 Since that time, through the cooperation of numerous organizations, most of which are perennial participants in the Smoke/Obscurant Symposia, many of the questions concerning natural winter obscurants and backgrounds have been resolved or at least become better understood. This paper discusses some of the advances in knowledge which have been made possible through the SNOW exercises and the combined SMOKE/SNOW field experiments conducted since 1930. The principal focus of the discussion concerns the transmission. The principal focus of the discussion concerns the transmission of visible, infrared and millimeter-wave radiation through falling snow, and the effects of snow cover as a background obscuring material

MP 2610 METHOD FOR RATING UNSURFACED

ROADS.
Eaton, R.A., et al, International Road Federation (IRF) World Meeting, Seoul, Apr 16-21, 1989 Proceedings, Vol.4, 1989, p.103-106, 2 refs.
Gerard, S., Dattilo, R.S.

ROADS, ROAD MAINTENANCE

ICE STRESS MEASUREMENTS AROUND OFF-SHORE STRUCTURES.

Johnson, J.B., Sea Ice Forces and Mechanics Conference, Anchorage, AK, July 22-23, 1986. Proceedings, (Anchorage, Minerals Management Service, U.S. Dept. of Interior, June 1988, p.55-59.

OFFSHORE STRUCTURES, STRESSES, SEA ICE, MEASUREMENT, ICE MECHANICS, ICE PRES-

MP 2612

CHANGES COMING IN SNOW LOAD DESIGN

CRITERIA.

Tobiasson, W. Feb 1989, 89-06, International Conference on Snow Engineering, 1st, Santa Barbara, CA, July 10-15, 1988 Proceedings, p 413-418, ADA-207 260, 1 ref. 43-3585

SNOW LOADS, BUILDING CODES, ROOFS, STANDARDS, SNOWDRIFTS, DESIGN CRITERIA, SNOW SLIDES, SURFACE PROPERTIES, SNOW DENSITY

Symmosphip of ANSI Standard A58 1 1982, "Minimum Design Loads for Buildings and Other Structures has recently been transferred to the American Society of Civil Engineers ASCL expects to publish a new version of the A58 Standard in 1989. For the past two years the A58 snow loads subcommittee has been active in updating the snow load

design criteria in that Standard. Some revisions have been made to the ground snow load maps in Minnesota and the Dakotas. Sliding snow provisions have been changed and drift load calculations have been expanded to include an appreciation for the length of the upwind roof

MP 2613

ROOF DESIGN IN COLD REGIONS.

Tobiasson, W., Feb. 1989, 89-06, International Conference on Snow Engineering, 1st, Santa Barbara, CA, July 10-15, 1988. Proceedings, p.462-472, ADA-207

43-3590

ROOFS, ENGINEERING, SNOW DEPTH, DRAINAGE, ICING, SNOW SLIDES, VENTILATION, DESIGN, SLOPES, THERMAL INSULATION, MELTWATER.

TION, MELTWATER.

Roofs continue to be a problem in cold regions even though many excellent membrane and water-shedding systems are available. Dead flat roofs of any type are a design mistake In cold regions, membrane roofs should have a slope of 1/4 in./ft and should drain internally It is usually best to slope roofs by inclining the frame rather than using tapered insulation. Most water-shedding roofs drain to cold eaves and are thus subject to ice dam problems. Such problems can be minimized by designing a "cold" ventilated roof, by insulating it well, by minimizing the overhang at the caves, by increasing the roof slope and by providing an unobstructed slippery surface from which snow will slide However, when using slippery-surfaced systems, it is essential to provide a place for the snow to slide where it will not endanger people or damage property.

MP 2614

PERSPECTIVE: GROUND LOADS AND MAP-

Tobiasson, W., Feb. 1989, 89-06, International Conference on Snow Engineering, 1st, Santa Barbara, CA, July 10-15, 1988. Proceedings, p.512-513, ADA-207 260

43-3599

SNOW LOADS, SNOW DEPTH, MEASURE-MENT, MAPPING, MEASURING INSTRU-MENTS, SNOWFALL, METEOROLOGICAL

MP 2615

DEVELOPMENT OF SEA ICE IN THE WED-DELL SEA.

Lange, M.A., et al, 1989, Vol.12, Symposium on Ice Dynamics, Hobart, Australia, Feb. 14-20, 1988, p.92-96, 19 refs

Ackley, S.F., Wadhams, P., Dieckmann, G.S., Eicken,

43-3341

SEA ICE, FRAZIL ICE, ICE FORMATION, ICE GROWTH, ANTARCTICA—WEDDELL SEA.

GROWTH, ANTARCTICA—WEDDELL SEA.
Development and physical properties of sea ice in the central and eastern Weddell Sea are reported. Major elements of the glaciological part of this study include continuous shipborne observations of sea-ice conditions and occasional helicopter reconnaissance flights, extensive measurements of snow and ice thicknesses at daily ice stations, and detailed analyses of sampled ice corest from each ice station. Textural investigations of the sampled ice revealed the dominance of fazil ice in the central Weddell Sea and the occurrence of an additional ice class, called platicle ice, together with the commonly known frazil and congelation ice in the coastal region of the castern Weddell Sea. These results, in combination with the visual ice observations, reveal two major mechanisms for sea-ice generation in the Antarctic, which were not sufficiently well accounted for in previous investigations. In the central Weddell Sea, a cycle of pancake-ice formation and its growth into consolidated floes seems to be the dominant process of the advancing sea-ice edge. In the coastal and its growth into consolidated floes seems to be the dominant process of the advancing sea-ice edge. In the coastal waters, the growing sea-ice cover consists, to a considerable degree, of ice platelets which are formed in the underlying water column in front of the ice-shelf edges. Thus, congelation-ice growth, which is mainly controlled by atmospheric, thermodynamic forcing, seems to be of less importance in the central and southeastern Weddell Sea than, for example, in the Arctic Basin (Auth)

MP 2616

DEWATERABILITY OF FREEZE-THAW CON-

DITIONAL SLUDGES.
Martel, C.J., Feb. 1989, 61(2), p.237-241, 26 refs.

SLUDGES, SEWAGE TREATMENT. FREEZE DRYING, FREEZE THAW TESTS

DRYING, FREEZE THAW TESTS

In this study the limiting depth of freeze thaw conditioned sludges was determined. Column tests were conducted at four depths ranging from 30 to 220 cm. A water treatment sludge, an anaerobically digested wastewater sludge were tested. Results indicated that up to 20 m of each sludge would drain within minutes after freeze-thaw conditioning. After drainage, the average solids content in the water treatment and anaerobically digested wastewater sludges was high enough for mechanical removal. In comparison the uniforen sludges were still draining after 2 weeks. Application of the freeze-thaw conditioning process would best be accomplished in a new unit operation called a sludge freezing bed.

MP 2617

GEOTECHNICAL INVESTIGATION OF SURFI-GEOTECHNICAL INVESTIGATION OF SOME CIAL SOILS TO SUPPORT HARD MOBILE FAUNCHER (HML) STUDIES: FROZEN LAUNCHER (HML) STUDIES: FI STRENGTH CHARACTERIZATION WES/CRREL NHAS TEST SITES IN MON-TANA.

Chamberlain, E.J., et al, Dec. 1988, SL-87-16, var. p., ADB-129 901, 5 refs. Durell, G., Roberts, R.

FROZEN GROUND STRENGTH, FROZEN GROUND COMPRESSION, STRESS STRAIN DIAGRAMS, SOIL SURVEYS.

DIAUKAMS, SOIL SURVEYS.

At the request of the Ballistic Missale Office, the US Army Engineer Waterways Experiment Station conducted surficial soil studies at four locations in the Malmstrom sitting area in Montana. The purpose of this work was to support whicle stability analyses asso-rated with nuclear environment definitions for the Air Force's proposed Hard Mobile Launcher basing mode for a Small Intercontinental Ballistic Missale. This report documents the results of a study conducted basing mode for a Small Intercontinental Ballistic Missile. This report documents the results of a study conducted by personnel of the US Army Cold Regions Research and Engineering Laboratory to characterize the frozen strengths of the soils encountered at four off-road sites. Presented are the results of static laboratory trianial compression tests conducted chiefly on frozen undisturbed samples obtained from the upper 20 inches of each site. Multiple linear regression analyses of these data were conducted to identify relationships between the soil strength at each site and moisture content, density, temperature, and confining pressure.

MP 2618
MUKLUK ICE STRESS MEASUREMENT PRO-

Cox, G.F.N., 1988 MMS 88-0057, Technology assessment and research program for offshore minerals operations; 1988 report. Compiled and edited by J.B. Gregory and C.E. Smith, p.11-15, 8 refs. 43-3643

OFFSHORE STRUCTURES, ICE LOADS, ICE PRESSURE, SEA ICE, ICE SOLID INTERFACE, STRESSES, UNITED STATES—ALASKA—MUK-LUK ISLAND.

MP 2619 MECHANICAL PROPERTIES OF MULTI-YEAR

Richter-Menge, J.A., 1988, MMS 88-0057, Technology assessment and research program for offshore minerals operations, 1988 report. Compiled and edited by J.B. Gregory and C.E. Smith, p.54-61, 14 refs. 43-3646

ICE. ICE MECHANICS, PRESSURE RIDGES.

ELASTIC PROPERTIES OF FRAZIL ICE FROM THE WEDDELL SEA, ANTARCTICA.

Lange, M.A., et al. International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Lulea, Sweden, June 12-16, 1989. Proceedings, POAC 89. Vol. 1. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.208-217, 9 refs. Hellmann, H., Richter-Menge, J.A., Ackley, S.F.

43-3726

SEA ICE, FRAZIL ICE, ICE ELASTICITY, AN-TARCTICA--WEDDELL SEA.

TARCTICA-WEDDELL SEA.
We present data on the elastic properties of antarctic sea ice from the Weddell Sea area. The data have been obtained through measurements of compressional- and shearwave velocities on frazil ice at ultrasonic frequencies (1 MHz). Sample (total) porosities range from 2 to 97- and salimities from 2.3 to 71 ppt. The measured compressional- and shear-wave velocities lie at 36 to 38 km and at 14 to 19 km s, respectively. The thear-wave velocities of the present samples he significantly below those obtained under similar experimental conditions for Arctic frazil ice. The resulting elastic constants range between 5 to 9GPa 7.5 to 10GPA, 1.5 to 32GPa and 0.32 to 0.42 for Young's modulus, bulk mediulus, shear mediulus and Poisson ratio, respectively louised in compression tests on the same samples, are in good agreement with or slightly above the dynamic Young's modulu.

MP 2621 COMPARISON OF THE COMPRESSIVE STRENGTH OF ANTARCTIC FRAZIL ICE AND COLUMNAR SALINE ICE GROWN IN THE LABORATORY.

Richter-Menge, J.A., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.1. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, 2469-278, 14 exp of Technology, 1989, p.269-278, 14 refs.

43-3732

FRAZIL ICE, SEA ICE, ICE PRESSURE, ICE DEFORMATION, ICE STRENGTH, STRAIN TESTS, ANTARCTICA—WEDDELL SEA.

TESTS, ANTARCTICA—WEDDELL SEA.

Unconfined, untaxial compression tests were performed on frazil sea ace samples collected in the Weddell Sea, Antarctica. The tests were done at a constant strain rate of 0001/s and at temperatures of -3, -5 and -10 C. Data from the frazil are tests were compared to results from tests done under the same conditions on transversely isotropic, columnar saline ice. The approximate grain sizes of the frazil and columnar tee were 1 and 10 mm, respectively. The results of this work indicate that the frazil ice generally has a higher strength than columnar ice loaded in the place of the sheet. Tests done by other researchers on freshwater, equiaxed polycrystalline ice have also shown the compressive strength to vary inversely with grain size. Application of this relationship to the sea ice tests at a strain rate of 0001/s cannot be directly extended to explain the variation in compressive strength between the frazil and columnar sea ice. We speculate that this may be due to either (1) the influence that the increased ductility of sea ice has on the relationship between strength and grain size at 0001/s. (2) that another microstructural parameter (e.g. the thickness of the ice between brine inclusions) may be the controlling factor in determining sea ice strength, or (3) that the dominant mechanisms driving deformation vary with each ice type. (Auth.)

MP 2622 MODEL TESTS ON AN ICEBREAKER AT TWO FRICTION FACTORS

Tatinclaux, J.C., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.2. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Tech-nology, 1989, p.774-784, 7 refs. 43-3776

METAL ICE FRICTION, ICE SOLID INTER-FACE, MODELS, ICE STRENGTH, PROPEL-LERS, ICE THICKNESS.

Results of resistance and propulsion tests in level ice of a model of the Canadian R-class icebreaker for two values of the ice-hull fretion factor are presented. The increase in ice resistance due to increased ice friction was significant for thick, weak ice, but negligible in thin and strong ice. for thick, weak ice, but negligible in thin and strong ice.

Also, the increase in the friction factor had no detectable
effect on propeller performance. Ice-propeller interaction
had little effect on the model thrust coefficient, but a strong
one on the torque coefficient and the average thrust deduction
factor. Comparison of the test results with full-scale trial
data showed that ice-propeller interaction was more severe
at model scale than at full scale for ice thickness up to
about 0.7 m. For thicker ice, model and field data were in very good agreement.

MP 2623

AIRBORNE SEA ICE THICKNESS SOUNDING. Kovacs, A., et al. International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleà, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.2. Edited by K.B.E. Axelsson and L.A Fransson, Luleà, Sweden, University of Technology, 1989, p.1042-1052, 2 refs. Holladay, J.S.

43-3801

SEA ICE. ICE THICKNESS. REMOTE SENSING. ELECTROMAGNETIC PROSPECTING.

ELECTROMAGNETIC PROSPECTIONS.
Authorne remote measurement of sea see thickness has been an elusive goal. Many sensing systems have been tried and evaluated, including impulse radar. All these systems were found to have limited capabilities at best. We are now evaluating authorne electromagnetic induction technology, which has long been used for mineral prospecting. now evaluating airborne electromagnetic induction technology, which has long been used for mineral prospecting. Two field studies have been made in the Arctic. One study has been done using a relatively standard 7-m-long, 1/2-m-diameter helicopter-towed antenna, and one using a lighter down-sized antenna only 3 m long and 1/3 m in diameter. The airborne sea ice thickness sounding profiles obtained indicated that the thickness could be estimated but the resolution decreased as the ice became rough. This decrease was associated with the large footprint of the system, which effectively smoothed out the sea ice relief. However, it was found that the average ice thickness estimated by airborne electromagnetic sounding for a given flight track was in reasonable agreement with the average ice thickness determined by direct drill hole measurement. Examples of the ice thickness profiles obtained by airborne sounding and direct drill hole sounding are presented and compared and direct drill hole sounding are presented and compared future development of the airborne system is discussed

MP 2624

SNOW AS A THERMAL BACKGROUND: PRELIMINARY RESULTS FROM THE 1987

Jordan, R., et al, Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987. Proceedings, p.5-24, ADB-133 455, 14 refs.
O'Brien, H., Albert, M.R.
42, 2872

43-3873 SNOW HEAT FLUX, SNOW SURFACE TEMPER-ATURE, SNOW THERMAL PROPERTIES, SNOW AIR INTERFACE, SNOW COMPACTION, SNOW TEMPERATURE, THERMAL EFFECTS.

TEMPERATURE, THERMAL EFFECTS.

An extensive field test was conducted during the winter of 1987 to provide data for the further development and evaluation of CRREL's snow temperature model. The programs ran continuously for two months under a variety of weather conditions. Thermal measurements and infrared imagery were made of natural snow and three sets of tank tracks. General observations from the field test are presented, along with a more detailed discussion of selected data. An improved snow temperature model will be tested against measurements from the field test.

MP 2625

THERMAL MODEL FOR SNOW-COVERED TERRAIN.

Petzko, D.R., et al. Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987. ceedings, p.25-36, ADB-133 455, 16 refs. Rice, J.E., Palmer, R.A.

43-3874

43-3874
SNOW THERMAL PROPERTIES, SNOW SUR-FACE TEMPERATURE, SNOW HEAT FLUX.
SNOW AIR INTERFACE, SNOW COMPACTION,
MODELS, SNOW COVER EFFECT, THERMAL EFFECTS.

EFFECTS.

This paper describes a Snow-Covered Terrain Thermal Model for predicting snow surface temperatures. To characterize snow-covered terrain, the model uses at most two distinct snow layers over a ground layer. The snow layers correspond to combinations of new snow, old snow, or compacted snow Based on a transmission line theory analogy, the model calculates the characteristic impedance of the snow-ground combination. Using this characteristic impedance, the model calculates the thermal response of the combination to time-varying heat input at the snow surface. The model uses standard meteorological observations to calculate the ne-least transferred across the air/snow interface. This paper also presents comparisons of modeled snow surface temperatures. The ALBE WS001 Weapon Systems Performance Tactical Decision Aid being developed by the US Army Atmospheric Sciences Laboratory will incorporate the Snow-Covered Terrain Thermal Model.

MP 2626

MP 2626 ACOUSTICALLY INDUCED GROUND MO-TION IN SAND UNDER WINTER CONDI-

Peck, L., Mar. 1989, SR 89-0?, Snow Symposium, 7th, Harover, NH, Aug. 11-12, 1987 Proceedings, p.37-54, ADB-133 455, 4 refs. 43-3875

SANDS, ACOUSTIC MEASUREMENT, SEIS-MOLOGY, FROZEN GROUND PHYSICS, MILI-TARY OPERATION, COLD WEATHER OPERA-TION, SOIL TEMPERATURE.

TION, SOIL TEMPERATURE.
The variation of acoustically induced ground motion with the freeze/thaw state of the ground was investigated in Feb.Mar. 1986. A test chamber of the CRREL Frost Effects Research Facility containing a sand layer 0.7 m deep was outfitted with a movable roof and one movable wall. With the roof and wall in place, freezing of the sand was accomplished by blowing cold air into the chamber Arrays of thermocouples indicated the depth to which the sand had frozen. Ground motion induced by blank fire from a .22 cabber pistol was monitored with geophoses at depths of 0 to 45 cm in the sand. The results presented are for simulated winter or transitional ground conditions (The sand, either dry gambent mosture content) or saturated, was sufforces, forcer or transitioning through freezing or thawing.) Potential effects of the freeze/thaw state of the ground on the performance of seismic sensor systems are discussed.

MP 2627

OPTICAL TECHNIQUE FOR CHARACTERIZ-

ING PRECIPITATION.
Koh, G., Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987. Proceedings, p.71-76, ADB-133 455, 4 refs. 43-3877

OPTICS, LIGHT TRANSMISSION, PITATION GAGES, SNOWFALL, PRECIPITATION PRECIPITATION GAGES, SNOWFALL,
PRECIPITATION (METEOROLOGY),
METEOROLOGICAL INSTRUMENTS.

A simple optical technique for characterizing precipitation is described. The signals generated by precipitating particles as they interrupt a beam of light are analyzed in the time and frequency domain to obtain information about precipitation.

that may be useful for optical propagation studies. Some preliminary results obtained with the optical device are presented.

MODEL OF SMOKE CONCENTRATION RE-DUCTION DUE TO SCAVENGING BY SNOW. , et al, Mar. 1989, SR 89-07, Snow Symposirutt, D.L., et al, Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH. Aug. 11-12, 1987. Proceedings, p.87-98, ADB-133 455, 11 refs. Cragin, J.H.

43-3879

SNOWFALL, SNOW OPTICS, VISIBILITY, AEROSOLS, SMOKE GENERATORS, SNOW AIR SNOWFAL INTERFACE, MODELS.

INTERFACE, MODELS.

A model is developed to describe the scavenging of smoke particles by snow. The concentration of smoke produced by rapid burst grensdes is approximated by an exponential decay and for this case the reduction in the obscuration time is derived in terms of the snow scavenging efficiency and the smoke decay rate. Measurements of the snow scavenging efficiency are used to predict the reduction in obscuration time in typical winter scenarios. Results show that snow savenging may significantly reduce the effectiveness of grenade screening smokes.

MAP 2629

MP 2629 PARAMETRIC STUDY ON TRANSMISSION THROUGH SMOKE SCREENS PRODUCED IN

PALLING SNOW.
Farmer, W.M., et al, Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987. Proceedings, p.99-111, ADB-133 455, 4 refs.
Gerard, S., Cragin, J.H.

SNOWFALL SNOW OPTICS, VISIBILITY, AEROSOLS, SMOKE GENERATORS, LIGHT TRANSMISSION, SNOW AIR INTERFACE.

TRANSMISSION, SNOW AIR INTERFACE. Preliminary studies have shown that smoke screens produced in falling snow can be reduced in effectiveness through scavenging processes. It is of interest therefore to determine the falling snow conditions under which scavenging processes may significantly sucrease the transmittance through a smoke screen and at the some time provide sufficient visibility for targets to be detected that would not be observed otherwise. The purpose of this paper is to present the results of a parametric study conducted to identify the significance of the various parameters that can affect smoke screen transmittance performance in falling snow. Results show that conditions often exist under which falling snow can play a major role in affecting smoke screen performance and the trangets at which targets can be detected.

MP 2630

MP 2630 MILLIMETER-WAVE PERFORMANCE DUR-

Bates, R.E., et al, Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987. Proceedings, p.113-120, ADB-133 455, 3 refs. Gerard. S.

SNOWFALL, ATMOSPHERIC ATTENUATION, MICROWAVES, SNOW AIR INTERFACE, ELECTROMAGNETIC PROPERTIES, RADIATION ABSORPTION, WET SNOW, PRECIPITATION (METEOROLOGY), TRANSMISSION, PROPA-GATION, RADAR.

GATION, RADAR.

Comparisons of visible, infrared and millimeter wave attenuation by falling snow at SNOW IV, Hollis, Maine, indicate that as the snowstorm of Dec. 13-14, 1985 passed the site a snow crystal phase change (snow to rain) occurred. Mited precipitation types were observed during this period. As the air mass approached the Hollis, Maine, area the near-surface upper air profile and surface temperatures averaged near 0 C. Analyses of the transmission data over a poetion of the snowstorm show less infrared and visible attenuation than millimeter wave attenuation. These results are not consistent with those obtained for previous snow experiment storm analysis. I.e. normally millimeter wave radiation is consistent with those obtained for previous show experiment storm analysis, i.e. normally milimeter wave radiation is attenuated less by moderate to heavy snowfalls than visible and infrared radiation. Data and analyses are presented in this paper, comparing concurrent snow crystal habit and meteorological data (both upper air and surface conditions) with transmission measurements to examine this phase change relationship

MP 2631 RADAR BACKSCATTER COMPARISONS OF A 2-TO 5-GHZ FMCW RADAR AND A 35-GHZ RA-

DAR. Berger, R.H., et al. Mar. 1989, SR 89-07, Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987. Proceedings, p.133-136, ADB-133-455, 4-refs.
Boyne, H.S.

3883

SNOW COVER EFFECT, RADIO ECHO SOUND-INGS, MICROWAVES, BACKSCATTERING, RADAR ECHOES, SNOW COVER STRUCTURE, WET SNOW, SNOW AIR INTERFACE, SNOW SURVEYS.

A series of experiments was performed to determine radar scattering amplitude sariations in dry and wet soom. Two frequency modulated continuous wave (FMCW) radars were used in this investigation. These radars were monited

side by side on a gantry approximately 5 m above the saow field and with a depression angle of 80 degrees. The dimensions of the snow field were 30 x 15 m. The two radar systems could be scanned across the 15-m width of the snow field automatically and moved lengthwise by hand. Backscatter measurements of dry and wet snow were made to determine the variation of radar backscatter cross section as a function of liquid water content. Backscatter measurements were also made after insertion of an aluminum plate into the snow cover at various depths to determine whether there was any variation in the 35-GHz backscatter due to the reduction of volume scattering.

THERMAL CONDUCTIVITY OF SLUDGES. Vesilind, P.A., et al, Feb. 1989, 23(2), p.241-245, 9

Martel, C.I. 43-3984

SLUDGES, FREEZING, WASTE TREATMENT, THERMAL CONDUCTIVITY, FREEZE THAW CYCLES, WATER TREATMENT.

CYCLES, WATER TREATMENT.

The time needed to naturally thew sludge in a freezing bed depends on the thermal conductivity of the settled sludge layer deposted on the thawing sludge. The objective of this research is to measure the thermal conductivity of this layer. Six different sludges are tested, and it is found that thermal conductivity decreases with increasing solute concentration. At normal solids concentrations, the thermal conductivity is found to be about .0005 calories/cm/sec/deg

MP 2633

SNOW HYDROLOGY IN THE UPPER YAMUNA BASIN, INDIA. Malhotra, R.V., et al, 1988, 45th., p.84-93, 7 refs.

McKim, H.L., Rangachari, R.

43-4119 SNOW HYDROLOGY, RIVER BASINS, STREAM FLOW, SNOWMELT, RUNOFF, METEOROLOG-ICAL DATA, WATERSHEDS, MODELS, SNOW SURVEYS, SEASONAL VARIATIONS, MOUN-TAINS, FORECASTING, WATER RESERVES, INDIA—YAMUNA RIVER.

INDIA—YAMUNA RIVER.

Snow accumulation and ablation in the front range of the Himslaynn Mountains accounts for a considerable portion of winter and spring streamflow from the Upper Yamona River Basin. To quantify this contribution, the Central Water Commission (CWC) of India has been collecting hydrometeorological data and conducting snow surveys in the Sundli Nala Watershed, a small tributary of the Paber River that drains into the Upper Yamona River system. Hydrometeorological data from the Sundli Nala watershed, from Dec. to Mar. for the years 1944-1948, were input into the two snowmelt options of the Streamflow Synthesis and Reservoir Regulation (SSARR) model to determine the relationship of snowmelt ranoff to observed discharge. For this period, the observed streamflow data indicated that snowmelt data on contribute significantly to the overall yearly discharge. Losses due to sublimition and evapotranopiration of the remaining available meltwater infiltrates to baseflow. decrease the effect of snowmelt runoff. A large portion of the remaining available meltwater infiltrates to baseflow. This study provides for the first time a better understanding of the snowmelt dynamics in this region of the world. The data base being developed in the Sundli Nala can be used to calibrate the hydrologic forecasting model being developed by the Indian CWC to manage the water resources for the Upper Yamuna River

SNOW-CRYSTAL GROWTH WITH VARYING SURFACE TEMPERATURES AND RADIATION PENETRATION.

Colbeck, S.C., 1989, 35(119), p.23-29, 13 refs. 43-4136

SNOW CRYSTAL GROWTH, SNOW SURFACE TEMPERATURE, SOLAR RADIATION, DEPTH HOAR, RADIATION ABSORPTION, SNOW COVER STRUCTURE

COVER STRUCTURE.

The temperature field is derived for a simusoidally varying surface temperature with varying solar radiation penetration. The growth rates of soon crystals are calculated to explain the rapidly growing layers of faceted crystals (i.e. depth hoar) that form put below the surface at high altitudes and in polar soon. The solutions also show that a layer of wet soon can exist, put below the surface even on days when the surface even on days when the surface temperature remains sub-freezing.

MP 2635

OVERVIEW OF THE PHYSICAL PROPERTIES OF SEA ICE.

Tucker, W.B., June 1988, No.144, Workshop on Ice Properties, St. John's, Newfoundland, June 21-22, 1988. Proceedings, p.71-85 41.4171

SEA ICE ICE PHYSICS.

MP 2636 PROCEEDINGS.

International Symposium on Cold Regions Heat Transfer, Sapporo, Japan, June 28-30, 1989, 1989, 314p., Refs. passim. For selected papers see 43-4194 through 43-4227.

Seki, N., ed, Cheng, K.C., ed, Lunardini, V.J., ed.

Seki, N., ed, Cheng, N., -, -, 43-4193
HEATING, HEAT TRANSFER, COOLING RATE, HEAT TRANSFER COEFFICIENT, FREEZING, ICE HEAT FLUX, ICE FORMATION, ICE WATER INTERFACE, SUPERCOOLING, TEMPRATURE MATHEMATICAL MODELS.

MP 2637

HISTORICAL AND RECENT DEVELOPMENTS THE RESEARCH OF COLD REGIONS HEAT TRANSFER.

Cheng, K.C., et al, International Symposium on Cold Regions Heat Transfer, Sapporo, Japan, June 28-30, 1989. Proceedings. Edited by N. Seki, K.C. Cheng, and V.J. Lunardini, 1989, p.1-25, 451 refs.

en, Y 43.4194

43-4194
ICE FORMATION, HEAT TRANSFER, HISTORY, RESEARCH PROJECTS, SHIP ICING, FRAZIL ICE, SOIL FREEZING, GAS PIPELINES, UNDERGROUND PIPELINES.

DERGROUND PIPELINES.

A brief review of historical and recent developments of ice formation problems in air, water and earth was made covering such subjects as atmospheric and marine icing of structures, permafrost and ground freezing (frost heave), niver and lake ice (frazil ice and supercooling), arctic oil and gas pipelines, and heat transfer with freezing or melting from the unified viewpoint of cold regions heat transfer. An attempt is made to review the varied technical fields involving ice formation phenomena from the common viewpoint of heat transfer to show the scope and subjects of cold regions heat transfer engineering.

MP 2638 OF PURE CONDUCTION WITH REVIEW FREEZING.

Lunardini, V.J., International Symposium on Cold Regions Heat Transfer, Sapporo, Japan, June 28-30, 1989. Proceedings. Edited by N. Seki, K.C. Cheng, and V.J. Lunardini, 1989, p.27-32, Refs. p.30-32. 43-4195

THEORIES, HEAT TRANSFER, THERMA CONDUCTIVITY, FREEZING, CONDUCTION.

CONDUCTIVITY, FREEZING, CONDUCTION.

Freezing of water or melting of ice are phenomena that underlie many immportant scientific and engineering studies of cold regions. Mathematical methods of treating these phase-change heat transfer problems are critical to understauding and dealing with the problems that freeze-thaw causes. This review deals only with systems for which conduction is the basic heat transfer mode or for which the solutions can be obtained in terms of conduction-like problems. While convection is an important heat transfer mode, it can often be neglected without significant error. Exact solutions are noted where available, but since these are quite limited for phase-change problems, references to approximate solutions are listed in some detail. The approximate methods are the perturbation method, which leads to quasi-stationary techniques, and heat balance integral method.

MP 2639

SNOW IV FIELD EXPERIMENT DATA RE-PORT: OVERVIEW. Redfield, R K., May 1989, SR 89-14, p 1-3, ADB-134

43-4297

RESEARCH PROJECTS, COLD WEATHER OPERATION, COLD WEATHER PERFORMANCE.

MP 2640 SYNOPTIC METEOROLOGY DURING THE SNOW IV FIELD EXPERIMENT.

Bilello, M A, et al, May 1989, SR 89-14, p 5-12, ADB-134 724, 2 refs.

Bates, R.E.

43-4298

METEOROLOGICAL CHARTS, SYNOPTIC METEOROLOGY.

MP 2641 SITE-SPECIFIC METEOROLOGY.

Bates, R.E., et al, May 1989, SR 89-14, p.13-15, ADB-

134 724. Harrington, B.

43-4299

43-4279 SITE SURVEYS, METEOROLOGICAL INSTRU-MENTS, METEOROLOGICAL DATA, MEASUR-ING INSTRUMENTS.

MP 2642

SNOW CRYSTAL CHARACTERIZATION. Koh, G., May 1989, SR 89-14, p.17-23, ADB-134 724,

43-4300

CRYSTALS, SNOW CRYSTAL STRUC-TURE.

MP 2643

SNOW CONCENTRATION AND PRECIPITA-TION RATE MEASUREMENTS DURING SNOW IV.

Lacombe, J., May 1989, SR 89-14, p.25-29, ADB-134 724, 2 refs. 43,4301

SNOWFALL, SNOW ACCUMULATION, PRECIPITATION GAGES, MEASURING INSTRUMENTS, AIRBORNE EQUIPMENT.

MP 2644

AIRBORNE PARTICLE MEASUREMENTS. Berger, R.H., May 1989, SR 89-14, p.31, ADB-134 724 43-4302

PARTICLES, PARTICLE SIZE DISTRIBUTION, MEASUREMENT, FOG, AIRBORNE EQUIPMENT.

MP 2645

TEST OF A PROTOTYPE ADVANCED THER-MAL IMAGING SYSTEM.

Munis, R.H., May 1989, SR 89-14, p.81-82, ADB-134 724, 1 ref. 43-4304

INFRARED PHOTOGRAPHY, TESTS, MILITARY OPERATION, VISIBILITY.

MP 2646

SEISMIC/ACOUSTIC EXPERIMENTS SNOW IV.

Peck, L., May 1989, SR 89-14, p.155-157, ADB-134 724, 2 refs. 43-4307

WAVE PROPAGATION, SEISMIC PROSPECT-ING, ACOUSTICS.

MP 2647

HOURLY METEOROLOGICAL DATA FOR SNOW IV.

Bates, R.E., et al, May 1989, SR 89-14, p.159-250, ADB-134 724.

Harrington, B.

METEOROLOGICAL DATA

MP 2648

TWO-WAVELENGTH METHOD OF MEASURING PATH-AVERAGED TURBULENT SURFACE

Andreas, E.L., Apr. 1989, 6(2), p.280-292, 47 refs.

SURFACE ROUGHNESS, HEAT FLUX, SCINTIL-LATION, MEASUREMENT, REFRACTION, CONVECTION.

MP 2649

EXPERIMENTS ON THE HEAT TRANSFER FROM WATER FLOWING THROUGH A CHILLED-BED OPEN CHANNEL. FROM

Richmond, P.W, et al, International Symposium on Cold Regions Heat Transfer, Sapporo, Japan, June 28-30, 1989. Proceedings. Edited by N. Seki, K.C. Cheng, and V.J. Lunardini, 1989, p.51-58, 27 refs. Lunardini, V.J.

HEAT TRANSFER, WATER FLOW, ICE WATER INTERFACE, FLOW RATE, EXPERIMENTATION, ICE MELTING, THERMISTORS, AC-CURÁCY.

CURACY.

Experiments have shown that heat transfer is greater for water flowing over tee than for water flowing over flat plates without ice.

The mechanisms which contribute to this increased heat transfer are not completely understood One possible cause is the density inversion of water at 4 C. In order to investigate this effect on heat transfer, a small open-channel flume was designed so it. Aperiments could be conducted with the flume bed at temperatures slightly above 0 C with no ice present. For fully developed turbulent 3 low (Reynolds numbers greater than 20,000), heat transfer correlations initially showed higher heat transfer rates than those obtained from experiments in flume with large aspect ratios. Velocity profile corrections, to account for the aspect ratio, were applied to the data, which then agreed more closely with the results from wider flumes. The results indicate that the density inversion of water could account for most of the increased turbulent heat transfer rate observed between melting and nonmelting systems. MP 2650

CHANGES COMING IN SNOW LOAD DESIGN CRITERIA.

Tobiasson, W., Corps of Engineers Structural Engineering Conference, St. Louis, Missouri, June 27-July 1, 1988, Vol.2. Washington, D.C., Directorate of Engineering and Construction, 1989, p.918-920. 43-4410

DESIGN CRITERIA, SNOW LOADS, SNOW SLIDES.

The technical basis for the snow load design criteria used by DoD in TM5-809-1 "Load Assumptions for Buildings"

is ANSI Standard A58.1-1982, "Minimum Design Loads for Buildings and Other Structures." Sponsorship of that national standard has recently been transferred to the American Society of Civil Engineers. ASCE expects to publish a new version of A58 in 1988. For the past two years the ASCE snow loads subcommittee has been active in updating the snow load design criteria in that standard. Some revisions have been made to the ground snow load maps in Minnesota and the Dakotas Sliding snow provisions have been changed and drift load calculations have been expanded to include an appreciation for the length of the upwind roof.

ROOF DESIGN IN COLD REGIONS.

Tobiasson, W., Corps of Engineers Structural Fagineering Conference, St. Louis, Missouri, June 2⁷-July 1, 1988, Vol.2. Washington, D.C., Directorate of Engineering and Construction, 1989, p.1029-1037.

ROOFS, DESIGN, CONDENSATION, DRAIN-AGE, SNOW SLIDES.

AGE, SNOW SLIDES.

Roofs continue to be a problem in cold regions even though many excellent membrane and water-shedding systems are available. Compact (tightly built) systems suffer far fewer condensation problems than do framed roofing systems that tend to leak much more air. Air leakage, not vapor diffusion, is the cause of most condensation problems. Dead flat roofs of any type are a design mistake. In cold regions, membrane roofs should have a slope of 1/4 in /ft and should drain internally. It is usually best to slope all roofs by inclining the frame rather than using tapered insulation. Most water-shedding roofs drain to cold eaves and are thus subject to ice dam problems. Such problems can be minimized by designing a "cold" ventilated roof, insulating it well, by minimizing the overhang at the eaves, by increasing the roof slope and by providing an unobstructed slippery surface from which snow will slide However, when using slippery-surface from which snow will slide However, when using slippery-surface from which snow will slide However, when using slippery-surface systems, it is essential to provide a place for the snow to slide where it will not endanger people or damage property.

MP 2652 STRUCTURE AND TEMPERATURE DEPEND-ENCE OF THE FLEXURAL PROPERTIES OF LABORATORY FRESHWATER ICE SHEETS. Gow, A.J., et al, July 1989, 16(3), p.249-270, 13 refs. Ueda, H.T.

43-4446

LAKE ICE, ICE COVER STRENGTH, ICE CRYSTAL STRUCTURE, FLEXURAL STRENGTH, STRAIN TESTS.

STRAIN TESTS.

Small-beam testing was conducted in a test tank on ice corresponding in structure to the two major ice types, S-1 and S-2, encountered in lake ice-sheets Tests of 730 beams in the temperature range -1 to -19 C showed that macrocrystalline (S-1) and columnar (S-2) ice differ appreciably in their flexural characteristics and that these differences are attributable to variations in the size and orientation of the crystals in the ice and the thermal condition of the beams Beams of S-1 ice yielded flexural strengths mid-way between those measured on S-2 ice.

MP 2653

43-4482

ARCTIC RESEARCH IN THE UNITED STATES. VOI 3

U.S. Interagency Arctic Research Policy Committee, Washington, D.C., Spring 1989, 72p.
Brown, J., ed, Bowen, S.L., ed, Cate, D., ed, Valliere, D.R., ed.

INTERNATIONAL COOPERATION, SEARCH PROJECTS, MEETINGS, ETIONS, ORGANIZATIONS. MEETINGS, EXPEDI-

TIONS, ORGANIZATIONS.

This issue contains several invited papers that highlight some U.S accomplishments in Arctic research and point towards future challenges and opportunities To further demonstrate the broad, multidisciplinary nature of arctic research and related activities and their support, numerous reports of past and current national and international conferences, workshops and activities are presented Finally, this issue reflects a new enterprise of joint responsibility for the journal and arctic research between the interagency Committee and the Commission

OBSERVATIONS OF LOW-FREQUENCY ACOUSTIC-TO-SEISMIC COUPLING IN THE OBSERVATIONS SUMMER AND WINTER.

Albert, D.G., et al, July 1989, 86(1), p.352-359, 23 Orcutt, J.A

43-4590

ACOUSTIC MEASUREMENT, SNOW ACOUSTICS, SEISMIC VELOCITY, SOUND TRANSMISSION, EXPERIMENTATION, SEASONAL VARIATIONS, WAVE PROPAGATION.

MP 2655
PASSIVE MICROWAVE IN SITU OBSERVATIONS OF WINTER WEDDEL SEA ICE. Comiso, J.C., et al, Aug. 15, 1989, 94(C8), p.10,891-

10,905, 23 refs. Ackley, S.F.

43-4526

SEA ICE, MICROWAVES, ICE PHYSICS, RADI-OMETRY, ICE COVER, ANTARCTICA—WED-

The microwave radiative characteristics of the Weddell Sca ice were investigated from the R/V Polarstern during winter 1986 through, approximately, 3000 km of ice, from the marginal ice zone to the coastal region and back. Radiometer measurements at 6, 10, 18, 37, and 90 GHz in vertical and horizontal polarizations were complemented by visual and video observations and measurements, at 60 station, and norizontal polarizations were competentice by visual and video observations and measurements, at 60 station, of ice physical characteristics. Two distinct types of ice cover were observed in the marginal ice zone, small paneakes evenly distributed during the southbound leg. Other ice types observed were first-year ice covered by varying thicknesses and states of snow cover, and new and young ice found mainly in leads and polynyas. Analysis of the data shows a large variability in the multispectral microwave emissivities of these ice types, especially at 90 GHz. Overall, however, at 18 GHz and lower frequencies, the emissivities of thick and cold first-year ice are relatively stable with standard deviations of about 0.02. At the marginal ice zone, the emissivity of the ice cover is a lot less predictable and could cause large uncertainties in ice concentration estimates. The use of the 90-GHz channel in combination with a lower-frequency channel shows strong potential for more detailed characterization of the ice cover including the identification of varying snow cover and roughness. (Auth. mod.)

MP 2656

MP 2656

CHEMICAL AND STRUCTURAL PROPERTIES OF SEA ICE IN THE SOUTHERN BEAUFORT

Meese, D.A., Durham, University of New Hampshire, 1988, 294p., University Microfilms order No.-DA8827313, Ph.D. thesis. For abstract see Disserta-tion abstracts international, Sec. B. Apr. 1989, p 4193.

SEA ICE, ICE COMPOSITION, CHEMICAL ANALYSIS, ICE CORES, ICE SALINITY, SEA WATER FREEZING, ICE FORMATION, BEAU-FORT SEA.

MP 2657

THIN ICE GROWTH.

Ashton, G.D., Mar. 1989, 25(3), p.564-566, 6 refs

ICE GROWTH, ICE COVER THICKNESS, STE-FAN PROBLEM, DEGREE DAYS, ICE AIR IN-TERFACE, FREEZING RATE, ICE FORECAST-ING, THERMAL CONDUCTIVITY.

MP 2658

USE AND APPLICATION OF PRESTO IN SNOW-III WEST.

Stallings, E.S., et al, June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol 1, p.11-24, ADB-135 277, 5 refs. Farmer, W.M., Lacombe, J 43-4623

Farmer, W.M., Lacombe, J
43-4623
MILITARY OPERATION, TANKS (COMBAT
VEHICLES), COLD WEATHER OPERATION,
LASERS, SNOWFALL, MILITARY RESEARCH,
MEASURING INSTRUMEN'S, SNOWDRIFTS,
VISIBILITY, STATISTICAL ANALYSIS.
Dunng Dec. 1984, and Jan. 1985. Cold Regions Research
and Engineering Laboratory (CRREL) conducted a field experiment in Grayling, Michigan, to identify and establish
a baseline performance matrix for tank imaging systems,
image intensifiers, and laser rangefinders in a winter environment. The Project/Manager for Smoke/Obscuranti Personnel Response and Evaluation System for Target Obscuratio
(PRESTO) was used as an integral part in this field experiment
to record on site responses of observers to the effects of
falling and blowing snow on the performance of the systems
The PRESTO was also used in additional validation of the
test results. This presentation discusses how the statistics
software was redefined to give probability density histograms
as a function of range, how the system was used for data
verification on site, and how the system was used for results
validation in Snow-III West Examples of data outputs
comparing the results of an imaging system's performance comparing the results of an imaging system's performance during a snow storm will be given and compared to results obtained from military observers viewing video outputs from the same imaging system.

MP 2659

SNOW MASS EXTINCTION COEFFICIENT. SINOW MASS EXTINCTION COEFFICIENT. Koh, G., June 1986, SR 86 15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol.1, p.35-38, ADB-135 277, 6 refs. 43-4625

SNOWFALL, LIGHT TRANSMISSION, LIGHT SCATTERING, ATTENUATION, ANALYSIS (MATHEMATICS), DISTRIBUTION.

The mass extinction coefficient (MEC) of falling snow obtained The mass extinction coefficient (MEC) of falling snow obtained from simultaneous measurements of transmittance (0.55 micrometer wavelength) and of snow mass concentration is presented. Uncertainties in the MEC due to instrument errors are considered, and it is shown that the uncertainty c is reduced when snow mass concentrations range from 0.02 g/cu m. The MEC ranged from 0.016 to 1.0 m/g m/g and the average MEC was 0.027 sq m/g.

MP 2660

THERMAL MEASUREMENTS IN SNOW.

Jordan, R., et al, June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug 13-15, 1985 Proceedings, Vol.1, p.183-193, ADB-135 277, 11 refs. O'Brien, H., Bates, R.E.

43-4634

53-4054 SNOW TEMPERATURE, SURFACE TEMPERATURE, SNOW COMPACTION, HEAT BALANCE, SNOW COVER, SNOW THERMAL PROPERTIES, LATENT HEAT, MATHEMATICAL MODELS, TEMPERATURE VARIATIONS.

TEMPERATURE VARIATIONS.

This paper describes a simplified model for predicting the surface temperature of a snow cover By separate application of the model to natural snow and snow compacted by a moving vehicle, it is possible to determine the term. I contrast between the two surfaces. Inputs to the model utilize routine meteorological observations and certain initial characteristics of the snow cover and underlying ground. Established energy transfer equations are used to describe the last believe in the story cover and uncertainty actived by the heat balance in the snow cover and are solved by the method of finite differences, wherein the snow is divided into layers, and the temperature structure is evolved over time in finite time increments. While the methodology tune in finite time increments. While the methodology of more claborate energy and mass balance models is closely followed, snow cover in the current model is described in only three layers, providing a closed-form mathematical solution that requires little computer time

MP 2661

SPECIRA AND COSPECTRA OF ATMOSPHER-

IC TURBULENCE OVER SNOW.

Andreas, E.L., June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol.1, p.219-233, ADB-135 277, Refs p.231-233 ings, Vol 43-4636

43-4036 LIGHT (VISIBLE RADIATION), SNOW COVER EFFECT, WIND VELOCITY, AIR TEMPERA-TURE, HUMIDITY, TURBULENT FLOW, SPEC-TRA, CLIMATIC FACTORS, TEMPERATURE VARIATIONS, SNOW AIR INTERFACE, ANAL-YSIS (MATHEMATICS), MEASURING INSTRU-

At SNOW-TWO fast responding instruments were used to measure the turbulent fluctuations in the wind speed, temperature, and humidity in the atmospheric surface layer over snow. Two crossed hot-film anemotiteters yielded the turbulent longitudinal (u) and vertical (x) components of the wind vector. A fine-wire platinum resistance thermometer and a Lyman-alpha hygrometer gave the turbulent temperature (t) and humidity (q) fluctuations, respectively Spectra of u and w have inertial subranges that are typical of velocity spectra measured in the atmospheric surface layer. The t and q spectra and the t-q cospectra all have distinct incitual-convective subranges. These are rarely found in simultaneous t and q spectra because the measurements are difficult. Consequently, this seems to be a high quality set of temperature and humidity spectra. Diverse u, w, t, and q spectra and the t-q cospectra collapse into universal forms when nond-circustonalized with appropriate dissipation forms when nond-circustonalized with appropriate dissipation or sets for velocity and the individual scalar and when the turbulence frequency is properly scaled. From the t and spectra and the t-q cospectra the first refractive index spectra for visible and millimeter wavelength light ever measured over snow are computed.

EVALUATING TRAFFICABILITY.

McKim, H.L., June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol.1, p.237-239, ADB-135 277 43-4637

TRAFFICABILITY, SOIL SOIL WATER.

SOIL TRAFFICABILITY, SOIL WATER, METEOROLOGICAL DATA, WATER CONTENT, TESTS, MAPS, MODELS
The US Army Cold Regions Research and Engineering Laboratory (CRREL), with technical assistance from the Dartmouth College Physics Department, has developed a radio-frequency soil moisture sensor that measures the electrical resistance and capacities of a soil sample and converts the readings to volumetric water content. The soild-state sensor is mechanically rigid, small, and lightweight. It can obtain soil moisture and frost data in near real time and can be interfaced with communications systems for remote interrogation. The soil moisture sensor was laboratory tested and its accuracy was calculated at 37. The data also indicated that the vensor readings were independent of soil type and density. The next step for fielding the sensor was to test it under real winter battlefield conditions

MP 2663

UTILIZATION OF UNMANNED AERIAL VEHI-CLES IN THE ALBE THRUST.

Greeley, H.P., et al, June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol 1, p.249-257, ADB-135 277.
Cogan, J., Aitken, G.W., Tate, C.L.

43-4639
MILITARY OPERATION, VEHICLES, AIRCRAFT ICING, VISIBILITY, SNOW COVER EFFECT, CLIMATIC FACTORS, COMPUTER APPLICATIONS, MEASURING INSTRUMENTS,
ICE FORECASTING, METEOROLOGICAL FACTORS, INFRARED SPECTROSCOPY, REFLECTION, REMOTE SENSING.

Unmanned Aerial Vehicles (UAV's) may serve as a mobile platform for a number of sensor systems either already in existence, in the process of being developed and tested or still in the concept stages. These sensors will provide the large amounts of near real time environmental data input required by the ArrLand Buttlefield Environment (ALBE) decision aid programs.

EFFECTS OF WATER AND ICE LAYERS ON THE SCATTERING PROPERTIES OF DIFFUSE REFLECTORS.

Jezek, K.C., et al, June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol.1, p.259-269, ADB-135 277, 6 refs. For another version see 42-1651.

Koh, G. 43-4640

43-4840
MILITARY OPERATION, LASERS, REFLECTION, ICE COVER EFFECT, WATER, BACK-SCATTERING, DETECTION, SURFACE PROPERTIES, MEASURING INSTRUMENTS.

SCATTERING, DETECTION, SURFACE PROPERTIES, MEASURING INSTRUMENTS.

Measurements were made of the angular distribution of power scattered from a diffuse reflector illuminated by a laser beam. Probability density functions of normalized signal strength for near normal scattering were also compiled Experiments were made on dry, wet and uce-covered planar targets. The results show that the diffuse component of scartered power from a wet or ice-covered target is reduced by an amount proportional to the inverse of the square of the index of refraction of the layer—a result consistent with simple theory. Backscattered radiation from a water or ice-covered target se enhanced over that from a dry target in the region about a cone centered on the line normal to the target. The aperture of the cone was greater for the ice-coated target. The difference may be due to small air bubbles in the ice. Because the surfaces of many military targets behave as diffuse reflectors, a simple calculation was made showing the effects of water and ice on laser rangefinder performance. A combination of theoretical and empirical results shows that the return from water and ice-coated targets will be stronger than that from dry targets in the near-zero-degree backscatter direction. As the angle of incidence increases to about 20 deg the coated targets will return almost a factor of two less power than the dry target.

MRD 2665

OBSERVATIONS OF THE BACKSCATTER FROM SNOW AT MILLIMETER WAVE-

Berger, R.H., et al, June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985. Proceedings, Vol 1, p.311-316, ADB-135 277, 5 refs. 43-4644

SNOW PHYSICS, RADAR ECHOES, BACKSCAT-TERING, SNOW COVER STRUCTURE, WAVE PROPAGATION, ICE CRYSTAL STRUCTURE, SNOW TEMPERATURE, UNFROZEN WATER CONTENT, MEASURING INSTRUMENTS, ENVIRONMENTS, METAMORPHISM (SNOW).

An experiment to measure the 35-GHz radar backscatter from a snow cover is described. The radar can scan a large area repeatedly with precise control of the position so that the development of different backscatter features may be observed as a function of the environmental conditions. Some preliminary data are presented

COMMENTS ON THE CHARACTERISTICS OF IN SITU SNOW AT MILLIMETER WAVELENGTHS.

Walsh, J., et al, June 1986, SR 86-15, Snow Symposium, 5th, Hanover, NH, Aug 13-15, 1985 Proceedings, Vol 1, p 317-320, ADB-135 277, 9 refs. Cook, R, Layman, R., Berger, R.H.

43-4645 43-4043 BACKSCATTERING, SNOW PHYSICS, RADAR ECHOES, WAVE PROPAGATION, LIGHT SCAT-TERING. RADIATION ABSORPTION, DESIGN, MEASURING INSTRUMENTS, VISIBILITY.

A summary of the basic characteristics of the backcatter cross-section of snow at mm wavelengths is presented. Theoretical speculations on the origins of the complex signature are discussed and the design of a snow-truth interferometer/scatterometer is summarized.

MP 2667

MP 2007

RADAR BACKSCATTERING FROM ARTIFICIALLY GROWN SEA ICE.

Bredow, J., et al, July 1989, 14(3), p.259-264, 18 refs.
Gogineni, S.P., Gow, A.J., Blanchard, P.F., Moore,

SEA ICE, ARTIFICIAL ICE, BACKSCATTERING, RADAR ECHOES, SURFACE ROUGHNESS, MEASUREMENT, REFLECTIVITY, MI-CROWAVES

MP 2669

ATMOSPHERIC ICING CLIMATOLOGIES OF TWO NEW ENGLAND MOUNTAINS.

Ryerson, C.C., Nov. 1988, 27(11), p.1261-1281, 23

ICING, ICE ACCRETION, ICE DETECTION, ICING RATE, PRECIPITATION (METEOROLOGY), SYNOPTIC METEOROLOGY.

GY), SYNOPTIC METEOROLOGY.

The atmospheric icing climatologies of two New England mountaintops with different elevations are compared. Mount Mansfield in northern Vermont and Mount Washington in New Hampshire. Atmospheric icing, as measured with Rosemount ice detectors, is twice as frequent on Mount Washington with about 12 to 20 times greater intensities and 25 to 50 times more accretion as on Mount Mansfield Most of Mount Mansfield icing events are of low intensity, with periods between icing events averaging 35 to 45 hours on both peaks. Return intervals of ice events by length, intensity, and accretion amount are tabulated. Approximately one-half of all severe icing on the two peaks occurs during and immediately after cold front passages. Icing is most intense when lows are about 450 km to the east and high pressure centers are more than about 450 km distant. Prolonged accretion periods occur when coastal and inland storms merge or follow closely.

MODELING THE TRANSPORT OF CHROMI-UM (VI) IN SOIL COLUMNS.

Selim, H.M., et al, July-Aug. 1989, 53(4), p.996-1004, 37 refs.

Amacher, M.C., Iskandar, I.K.

SOIL PHYSICS, MASS TRANSFER, SOIL CHEMISTRY, MODELS, MINERALS.

MP 2671 U.S. FEDERAL ARCTIC RESEARCH.

Devine, J.S., et al, July 1989, SR 89-21, International arctic research programs, p.65-74, ADA-212 206, Presented at the 7th International Conference and Exhibition on Offshore Mechanics and Arctic Engineering, Houston, TX, Mar. 1988. Link, L.E., Chung, J.S., Wright, E.A.

RESEARCH PROJECTS, ECONOMIC DEVELOP-MENT, UNITED STATES.

MP 2672 SNOW COVER AND GLACIER VARIATIONS. Colbeck, S.C, ed, 1989, No.183, 111p., Proceedings of

an international symposium held during the Third Scientific Assembly of International Association of Hydrological Sciences at Baltimore, MD, May 10-19, 1989 Refs. passim For individual papers see 44-166 through 44-178

44-165 SNOW SNOW COVER, GLACIER OSCILLATION, SNOW SURVEYS, RUNOFF FORECASTING, GLACIER MELTING, WATER BALANCE, GLA-CIER MASS BALANCE, SNOWMELT, MELTWA-

MP 2673 AIRBORNE ELECTROMAGNETIC SENSING OF SEA ICE THICKNESS.

Becker, A., et al. Berkeley, University of California, Mar. 1987, 77p., Final report prepared for U.S. Army Cold Regions Research and Engineering Laboratory under contract No.DACA89-85-K-0008. 12 refs. Liu, G., Morrison, H.F.

44-207 44-207
ICE COVER THICKNESS, RADIO ECHO
SOUNDINGS, AIRBORNE RADAR, SEA ICE,
ICE ELECTRICAL PROPERTIES, ELECTROMAGNETIC PROSPECTING, REMOTE SENSING, MATHEMATICAL MODELS

44-2925

EFFECT OF AEROSOLS ON PH OF SNOW. Kumai, M., 1990, Vol.25, p.17-30, With French sum-mary. 9 refs.

AEROSOLS, SNOW COMPOSITION, CHEMI-CAL PROPERTIES, SNOW IMPURITIES, MELT-WATER, SNOW CHEMISTRY, WIND FACTORS, AIR POLLUTION, HYDROGEN ION CONCEN-TRATION, ELECTRICAL RESISTIVITY, PARTI-CLES, HYDROCARBONS, SCANNING ELEC-TRON MICROSCOPY.

AIR CHANGE MEASUREMENTS OF FIVE ARMY BUILDINGS IN ALASKA.

Flanders, S.N., Air Change Rate and Airtightness in Buildings. Edited by M.H. Sherman, Philadelphia, American Society for Testing and Materials, 1990, p.53-63, TH7005.A37 1989, 6 refs., Paper presented et a symposium held in Atlanta, Georgia, Apr. 16-17, 1989.

44-2944
BUILDINGS, VENTILATION, AIR FLOW, AIR
LEAKAGE, MEASUREMENT, INDOOR CLIMATES, MILITARY FACILITIES, WIND FACTORS, COLD WEATHER TESTS, SAMPLING.

TORS, COLD WEATHER TESTS, SAMPLING.
The air change rates of five buildings (four barracks and one vehicle maintenance garage) were measured, using the tracer gas dilution technique.

The median air change rate for all zones measured was close to 0.5 air change per hour (ACH). The range of air change rates was between 0.05 and 1.75 ACH. Most of this range was attributable to variation in the effective ess of the buildings ventulation systems.

Outdoor temperatures were between -15 and -20 deg C (5 and -4 deg F). The wind was calm for all but one barracks measurement. The maintenance facility, a large single-zone building, permitted good results from the tracer gas technique. The barracks multizone buildings, varied in the ease with which the tracer gas technique could be applied.

The barracks ventilation systems were in operation when air change measurements were made. These systems incorporated air-to-air heat exchangers with intakes and exhausts mounted in rooftop penthouses.

MP 2677
PREDICTING UNFROZEN WATER CONTENT
BEHAVIOR USING FREEZING POINT
DEPRESSION DATA.
Black, P.B., et al, Mar. 1990, SR 90-01, International
Symposium. Frozen Soil Impacts on Agricultural,
Range, and Forest Lands, Spokane, WA, March 21-22,
1990. Proceedings. Edited by K.R. Cooley, p.5460, ADA-219 587, 16 refs.
Tice. A.R.

Tice, A.R. 44-2966

44-2966
UNFROZEN WATER CONTENT, SOIL FREEZING, ANTIFREEZES, NUCLEAR MAGNETIC
RESONANCE, SOIL WATER, SOIL PHYSICS,
TEMPERATURE EFFECTS, MATHEMATICAL
MODELS, CLAYS, SEDIMENTS.
This paper presents a framework by which freezing point
depression data are interpreted to determine the unfrozen
water content behavior of a soil.

The transformed data
are then fitted to a Brooks and Corey type function and
compared to the unfrozen water content behavior determined
by separate warming curve data that were measured by

separate warming curve data that were measured by

EFFECT OF FREEZE-THAW CYCLES ON THE PERMEABILITY AND MACROSTRUCTURE OF

Chamberlain, E, et al, Mar 1990, SR 90-01, International Symposium Frozen Soil Impacts on Agricultur al, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings Edited by K.R. Cooley, p.145-155, ADA-219 687, 6 refs. Iskandar, I.K., Hunsicker, S.E.

44-2977

44-2977
FREEZE THAW CYCLES, SOIL STRUCTURE,
PERMEABILITY, SOIL AGGREGATES, WASTE
TREATMENT, CLAY SOILS, SOIL COMPACTION, MEASURING INSTRUMENTS,
STRESSES, COUNTERMEASURES, RADIOACTIVE WASTES, CONSTRUCTION MATERIALS,
TESTS, GRAIN SIZE, SETTLEMENT (STRUC-TURAL)

Hazardous waste treatment and disposal is one of the major environmenal concerns. In the United States alone, about 50 million tons of hazardous waste is produced each year Clay liners and clay caps are commonly recommended and used for containing and covering hazardous and toxic waste as well as solid municipal waste. The purpose of the liners is to impede the flow of contaminants to ground water and to sorb the chemicals, thus protecting the ground water from contamination. The purpose of the caps is to prevent water infiltration into the contaminated soil and the release of toxic gases. The objective of this study is to investigate the effect of freeze-thaw cycling on the

permeability and structure of compacted clay soils used as caps or barriers for containing hazardous waste materials. MP 2679

FATE AND TRANSPORT OF CONTAMINANTS IN FROZEN SOILS.

Ayorinde, O.A., et al, Mar. 1990, SR 90-01, Interna-Ayonnac, O.A., et al, Mar. 1990, SK 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.202-211, ADA-219 687, 18 refs.

Perry, L.B.

FROZEN GROUND, SOIL POLLUTION, EXPLO-FROZEN GROUND, SOIL POLLUTION, EXPLO-SIVES, MECHANICAL PROPERTIES, WASTE DISPOSAL, SOIL WATER MIGRATION, FREEZE THAW CYCLES, SOIL CHEMISTRY, COUNTERMEASURES, WATER TRANSPORT, MATHEMATICAL MODELS, TESTS.

The objective of this investigation is to evaluate the effect of freezing on the fate and transport of 2,6-DNT, C-NT and M-NT explosive residues in soils This paper describes (a) the development of experimental methods for obtaining reliable data that can be used to model freezing-induced transport of contaminants in soils and (b) the analytical approach used to interpret these data

MP 2680

EFFECT OF NORMAL PRESSURE ON KINETIC FRICTION COEFFICIENT: MYTH OR REAL-

Tatinclaux, J.C., American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.127-134, 8 refs.

ICE FRICTION, ICE PRESSURE, ICE LOADS.

MP 2681

SEASONAL DISTRIBUTION OF LOW FLOW EVENTS IN NEW HAMPSHIRE STREAMS WITH EMPHASIS ON THE WINTER PERIOD. Melloh, R.A., Drought water management, Washington, D.C., Nov. 1-2, 1988. Proceedings. Edited by N.S. Grigg and E.C. Vlachos, Fort Collins, Colorado State University, 1990, p.47-53, 3 refs.

STREAM FLOW, SEASONAL VARIATIONS, WATER LEVEL, WINTER, SURFACE DRAINAGE, HYDROLOGIC CYCLE, CLIMATIC FACTORS, UNITED STATES—NEW HAMPSHIRE.

An analysis of the seasonal distribution of low flow events in various geographic provinces of New Hampshire is presented

The objectives of the analysis are to describe the annual hydrologic cycle and its regional variations and to identify streams or regions where the winter's influence is most severe

MP 2682 MP 2082 USE OF OFF-ROAD VEHICLES AND MITIGA-TION OF EFFECTS IN ALASKA PERMAFROST ENVIRONMENTS: A REVIEW. Slaughter, C.W., et al, Jan.-Feb. 1990, 14(1), p.63-72,

Racine, CH, Walker, D.A, Johnson, LA., Abele, G.

44-3049

ALL TERRAIN VEHICLES, PERMAFROST, EN-VIRONMENTAL IMPACT, COUNTERMEAS-URES, SOIL STRUCTURE, DAMAGE, PROTEC-TION, UNITED STATES—ALASKA.

TION, UNITED STATES—ALASKA.

Use of off-road vehicles in permafrost-affected terrain of Alaska has increased sharply over the past two decades Until the early 1960s, most ORV use was by industry or government, which employed heavy vehicles such as industrial tractors and tracked carriers Smaller, commerc ORVs became available in the 1960s, with the variety and number in use rapidly increasing. Wheeled and tracked ORVs, many used exclusively for recreation or subsistence harvesting by individuals, are now ubiquitious in Alaska. This increased use has led to concern over the cumulative effects of such vehicles on vegetation, soils, and environmental variables including off-site values. Factors affecting impact and subsequent restoration include specific environmental setting, vegetation, presence and tiee content of permafrost, incretopography, vehicle design, weight, and ground pressure, traffic frequency, season of traffic, and individual operator practices Approaches for mitigating adverse effects of ORVs include regulation and zoning, terrain analysis and sensitivity mapping, route selection, surface protection, and operator training MP 2683 MP 2683

UNFROZEN WATER CONTENTS OF UNDISTURBED AND REMOLDED ALASKAN SILT. Tice, A.R., et al, Dec. 1989, 17(2), p 103-111, 13 refs.

Black, P.B., Berg, R.L.

FROZEN GROUND, UNFROZEN WATER CON-TENT, SOIL COMPOSITION, SOIL ANALYSIS, FROZEN GROUND THERMODYNAMICS, NU-CLEAR MAGNETIC RESONANCE, SATURA-TION, TEMPERATURE EFFECTS, SOIL WATER. Unfrozen water content as a function of temperature was measured in the laboratory using pulsed nuclear magnetic

resonance (PNMR) for 16 undisturbed frozen cores acquired from the Northwest Alaska Pipeline Company Chilled Gas Test Facility The cores were then remolded and brought to their original densities and water contents, and unfrozen water content as a function of temperature was again measured over three warming and cooling cycles It was found that differences in unfrozen water contents between the undisturbed warming and cooling curves depended upon relative degree of saturation and its effect on soil structure Only slight changes occurred during the three warming curves of the remolded soil, indicating minor freezing and thawing consequences on the soil structure

MP 2684

DYNAMIC SIMULATIONS OF ICEBERG-SEA-BED INTERACTIONS.
Bass, D.W., et al, Dec. 1989, 17(2), p.137-151, 8 refs

Lever, J.H. 44-3097

44-307/ ICEBERGS, OCEAN BOTTOM, ICE SCORING, COMPUTERIZED SIMULATION, ICE SOLID IN-TERFACE, FLOATING ICE, HYDRODYNAM-ICS, SURFACE STRUCTURE, PHYSICAL PROP-ERTIES, COMPUTER APPLICATIONS, MOD-FIS.

A six degrees of freedom model of iceberg-seabed interaction A six degrees of recording moder of necessators interaction is described. Predictions from the modelling are compared to observations obtained from the DIGS series of experiments on grounding and scouring icebergs on the Labrador Shelf

MP 2685

STRENGTH OF SOILS AND ROCKS AT LOW TEMPERATURES.

Sellmann, P.V., Dec. 1989, 17(2), p.189-190, 7 refs.

FROZEN ROCK STRENGTH, FROZEN GROUND STRENGTH, TEMPERATURE EFFECTS, FROZEN GROUND THERMODYNAMICS, COMPRESSIVE PROPERTIES, TEMPERA-TURE VARIATIONS.

MP 2686

HIGH FREQUENCY ACOUSTICAL PROPER-TIES OF SALINE ICE.

Jezek, K.C., et al, Dec 1989, SR 89-39, Arctic Tech-Jezek, K.C., et al, Dec 1909, Sa 03-37, Figure 20-23, 1989.
Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.9-23, ADB-141 754, 15 refs

Stanton, T.K., Gow, A.J. 44-3135

ICE ACOUSTICS, SEA ICE, ECHO SOUNDING, ICE COVER EFFECT, ICE BOTTOM SURFACE, ATTENUATION, ICE STRUCTURE, ACOUSTIC MEASUREMENT, DENDRITIC ICE, SLUSH, FRAZIL ICE, EXPERIMENTATION, ICE GROWTH, SALT ICE, REFLECTION.

GROWTH, SALT ICE, REFLECTION.

Sonar echo amplitude data have been collected at kilohertz carrier frequencies from the underside of different sea ice types. Histograms of normal incidence echo amplitudes were formed from over 90 samples of each tee type. Experiments were conducted on saline ice grown in an outdoor pond under relatively controlled conditions at CRREL and on the sea ice cover in the Fram Strait. Analysis shows marked variations (about a factor of 5) in the magnitude of the coherent reflection coefficients as congelation ice at the bottom of an ice sheet evolves from a growing dendritic interface to an ablating, thermally altered interface. Larger differences (about a factor of 10) are observed between growing congelation ice and slush ice, used to simulate frazil Transmission measurements through thin ice indicate that important attenuation processes are associated with bassil dendritic structure resulting in a high attenuation regime (5 dB/cm at 200 kHz) in roughly the bottom 10 cm of growing sea ice and low attenuation regime (0 1 dB/cm) growing sea ice and low attenuation regime (0 l dB/cm) consisting of the overlying ice. These results indicate that important variations in acoustic regime exist in areas where different ice types are intermingled

MP 2687 USE OF THE MECHANICAL PROPERTIES OF ICE IN THE DEVELOPMENT OF PREDICTIVE MODELS.

Richter-Menge, J.A., et al, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p 87-99. ADB-141 754, 23 refs

Cole, D.M., Tucker, W B.

ICE MECHANICS, DRIFT, ICE NAVIGATION, MILITARY OPERATION, ICE PHYSICS, ICE CRYSTAL STRUCTURE, GRAIN SIZE, SEA ICE. ICE FORECASTING, MATHEMATICAL MOD-ELS. TESTS.

The approach to developing mechanistically-based predictive models discussed in this paper is by no means trivial deally, a stepwise approach should be taken. This would first involve the determination of the micromechanical processes involved in the deformation of the ice. We would begin by studying these processes in a relatively simple material, freshwater, equiaxed ice, and progress to the most complicated ice type, aligned, columnar sea ice. Once the phenomena

of deformation were well understood over the range of loading and environmental conditions, the attention would focus towards the development of a mathematical, mechanistically-based model of the ice behavior. The model would require input about the loading scenario (e.g. surfacing submanne sail, ship travelling through the ice sheet, convergence of ice sheets), the appropriate environmental conditions, and the corresponding physical properties of the ice. The predictive model would first be verified using scale-model test results and, once the accuracy of the model was proven, application would be extended to field conditions. The capabilities of the model to predict loads in the field would be evaluated by compansion of the predicted to actual stress measurements determined during field experiments. of deformation were well understood over the range of loading

MP 2688

VERTICAL LIFTING AND PENETRATION OF FLOATING ICE SHEETS WITH CYLINDRICAL INDENTORS

Sodhi, D.S., et al, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p 104, ADB-141

McGilvary, W.R., Lever, J.H.

44-3141
FLOATING ICE, ICE MODELS, ICE BREAKUP, PENETRATION, ICE SHEETS, ICE COVER THICKNESS, FLEXURAL STRENGTH, ICE DEFORMATION, TESTS, BUOYANCY.

DEFORMATION, 1ESIS, BUOTANCT.
Floating model ice sheets were lifted vertically and penetrated with cylindrical indentors of different shapes (flat, truncated-conical and conical) and diameters (76 mm, 152 mm and 305 mm) and in different ambient temperatures (0, 10, 20 F). The experimental results show that there is no effect of indentor shape or size on the ice penetration forces. From dimensional analysis, a relationship is obtained for maximum ice penetration force in terms of the specific weight of water, the ice thickness and the upward flexural strength.

MP 2689

ENVIRONMENT OF WINTERTIME LEADS AND POLYNYAS.

Andreas, E.L., Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.273-288, ADB-141 754,

44-3154 POLYNYAS, HEAT TRANSFER, MOISTURE TRANSFER, AIR WATER INTERACTIONS, PACK ICE, CONVECTION, HEAT FLUX, AIR-PLANES, NAVIGATION, TEMPERATURE EF-MOISTURE FECTS, HUMIDITY.

FECTS, HUMIDITY.

Wintertime leads and polynyas are terrific sources of heat and moisture. Described here are some of the environmental effects of these large heat and moisture fluxes. For example, the arr near the water surface is supersaturated, the resulting fog can limit visibility, rime ice forms prolifically on any downwind structure, and for large leads and polynyas, massive plumes of condensate particles can alter the radiation budget of the downwind surface. Convectively driven turbulence fostered by the large fluxes enhances the vertical mixing For large open water areas, the convection may be intense enough to jostle low-flying aircraft.

MP 2691

ICE STRENGTH ESTIMATES FROM SUBMA-RINE TOPSOUNDER DATA.

DiMarco R, et al, Dec 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p 425-426, ADB-141 754

Dugan, J., Martin, W., Tucker, W.B.

44-3160
ICE STRENGTH, ACOUSTIC MEASUREMENT,
SUBMARINES, SOUNDING, UNDERWATER
ACOUSTICS, ICE COVER THICKNESS, EXPERIMENTATION, ACCURACY, FLEXURAL STRENGTH

MP 2692

ANALYSIS OF A SHORT PULSE RADAR SUR-VEY OF REVETMENTS ALONG THE MISSIS-SIPPI RIVER.

Arcone, S A, Oct 1989, CS-26, 20p 44-3199

BOTTOM TOPOGRAPHY, RADAR ECHOES, HYDRALLIC STRUCTURES, RIVERS, SUBSUR-FACE INVESTIGATIONS, BOTTOM SEDI-MENT, SHORE EROSION, WAVE PROPAGA-TION, REFLECTIVITY, REMOTE SENSING.

MP 2693 SEA ICE THICKNESS MEASUREMENT USING A DOWN-SIZED AIRBORNE ELECTROMAGNETIC-SOUNDING SYSTEM.

Kovacs, A., et al, Dec 1989, SR 89-39, Arctic Tech-

nology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.394-424, ADB-141 751, 24 refs.

Holladay, JS. 44-3159

44-3159
ICE COVER THICKNESS, SEA ICE, MEASURING INSTRUMENTS, ELECTROMAGNETIC PROSPECTING, SOUNDING, ICE STRENGTH, PRESSURE RIDGES, SNOW DEPTH, AIRBORNE EQUIPMENT, SEA WATER, ICE FLOES.

Recent developments to improve electromagnetic induction-measurement technology and to down size the related helicopter towerd antenna assembly for use in airborne measurement of sea ice thickness are discussed as are the results from artic tiefs testing. The findings indicate that with further system indicates the testing. The findings indicate that with further system indicates the day of routine sea ice thickness profiling from a sirborne platform is close at hand as the apparent capability to determine the conductivity of the sea ice from which an assessment of sea ice strength may be mace. may be made

IN-SITU SAMPLING AND CHARACTERIZA-TION OF FRAZIL ICE DEPOSITS.

awson, D E., et al, Feb. 1990, 17(3), p 193-205, 27 refe

Brockett, B.E.

44-3294 FRAZIL ICE, RIVER ICE, ICE SAMPLING, ICE COVER, ICE CONDITIONS.

COVER, ICE CONDITIONS.

Three new samplers were developed for detailed analysis of the three-dimensional characteristics of frazil ice deposits beneath an ice cover. These samplers obtain in-situ bulk, hollow cote and flat plate samples of the deposits through 200-mm-diameter access holes. The samples provide information on a deposit's internal structure, stratigraphy and sedimentology, geometry and physical properties, and lateral and vertical variabilities of each. When used as part of a comprehensive field program, the data provide information required for interpreting mechanisms of frazil transport and deposition, and for analyzing the dynamic interaction of frazil deposits with winter river processes

MP 2695

QUASI-STEADY PROBLEMS IN FREEZING SOILS: 1. AN'LYSIS ON THE STEADY GROWTH OF AN ICE LAYER.

Nakano, Y, Feb 1990, 17(3), p.207-226, 30 refs

44-3295

44-3295
SOIL FREEZING, FROST HEAVE, ICE
GROWTH, SOIL WATER MIGRATION, ANALYSIS (MATHEMATICS), GROUND ICE.
The steady growth of a segregated ice layer in freezing
soils is studied mathematically under three distinct and representative hypotheses on the properties of the frozen fringe,
chosen among many such hypotheses reported in the literature.
It was found that the condition of steady growth is determined
by the temperature radient in the unforce next of the It was found that the condition of steady growth is determined by the temperature gradient in the unforcen part of the soil at the 0 (C) isotherm and the temperature gradient in the ice layer at the interface between the ice layer and the frozen fringe in all three hypothetical models studied. The transport equation of water in the frozen fringe was found to be the major factor determining the condition of steady growth. This is the first of a two-part presentation on the subject, the experimental aspects of the study will be presented in a second paper.

PROSPECTS FOR MEASURING PATH-AVERAGED TURBULENT HEAT FLUXES USING SCINTILLATION AT THREE WAVELENGTHS. Andreas, E.L., Symposium on Turbulence and Diffusion, 9th. Roskilde, Denmark, Apr. 30-May 3, 1990. Preprint volume, Boston, American Meteorological Society, (1990), p.74-77, 13 refs. 44-3355

44-3355
HEAT FLUX. ATMOSPHERIC ATTENUATION, SCINTILLATION, TURBULENCE, AIR TEMPERATURE, HUMIDITY, PROPAGATION, ANALYSIS (MATHEMATICS).

CONCURRENT REMOTE SENSING OF ARC-TIC SEA ICE FROM SUBMARINE AND AIR-

Wadhams, P., et al. Studies of sea ice thickness and Characteristics from an arctic submarine cruise.

Phase 3, Cambridge, England, SAIC Polar Oceans Associates, Sep. 4, 1989, 20p., ADA-216 738, Included in Appendix 4. 6 refs.

Comiso, J.C., Cowan, A.M., Crawford, J., Jackson, G., Krabill, W.B., Kutz, R., Sear, C.B., Swift, R.N., Tucker, W.B. 44-3376

SEA ICE, ICE BOTTOM SURFACE, ICE COVER THICKNESS, ICE SURFACE, REMOTE SENSING, SUBGLACIAL OBSERVATIONS, AIR-ING, SUBGLAC BORNE RADAR.

SIGNAL PROCESSING ALGORITHM FOR THE EXTRACTION OF THIN FRESHWATER-ICE THICKNESS FROM SHORT PULSE RADAR DATA.

Rick, L., et al, Jan. 1990, 28(1), p.137-145, 18 refs. Crane, R.K., O'Neill, K. 44-3394

COVER THICKNESS, MEASUREMENT, RADAR ECHOES, MATHEMATICAL MODELS, DATA PROCESSING, SCATTERING, RIVER ICE, LAKE ICE, ACCURACY, LAYERS, SUR-FACE ROUGHNESS, ELECTROMAGNETIC WAVES.

SATELLITE-BORNE REMOTE SENSING AND LARGE-SCALE PROGRAMS FOR THE ARCTIC SEAS IN THE 1990S.

Weeks, W.F., et al, Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985 Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.510-530, 31

Baker, D.J. 44-3433

44-3433 SEA ICE DISTRIBUTION, REMOTE SENSING, SPACEBORNE PHOTOGRAPHY, ICE SURVEYS, MARINE BIOLOGY, ICE CONDITIONS, ICE EDGE, RESEARCH PROJECTS.

The following paper describes several broad scientific and engineering problems related to geophysical aspects of the environment of the arctic seas, the application of satellite-based remote sensing systems in such studies, descriptions of proposed experiments, and finally approaches that could lead to the inclusion of more biological science in these physical science in these physical science in these physical science programs

MP 2701

TRANSPORT OF WATER DUE TO A TEMPERA-TURE GRADIENT IN UNSATURATED FROZEN

Nakano, Y., et al, Apr. 1990, 18(1), p.57-75, 20 refs. Tice, A.R. 44-3540

44-3-40 SOIL FREEZING, WATER TRANSPORT, UN-FROZEN WATER CONTENT, TEMPERATURE GRADIENTS, SOIL TEMPERATURE, SOIL TESTS, CLAYS, ANALYSIS (MATHEMATICS), SEEPAGE.

The net flux of water in a fine-grained soil column is given Under this assumption a new experimental method was intro-duced to determine certain soil properties

DEVELOPMENT OF AN UNDERWATER FRA-ZIL-ICE DETECTOR.

Daly, S.F., et al, Apr 1990, 18(1), p 77-82, 7 refs. Rand, J.H. 44-3541

44-33-1 ICE DETECTION, FRAZIL ICE, UNDERWATER ICE, WATER INTAKES, MEASURING INSTRUMENTS, WATER FLOW, FLOW MEASUREMENT, ELECTRICAL RESISTIVITY, HYDRAULIC STRUCTURES, DESIGN, FLOW RATE, REMOTE SENSING.

REMOTE SENSING.

A new underwater frazil-ice detector developed at USACRREL is described

The detector can operate remotely and in dependently

It can automatically start de-icing procedures and alert operators to the presence of frazil. The detector operates by measuring the flow rate through a small intake screen upon which frazil ice can accumulate screen is, in effect, a miniature trash rack that will freeze up much sooner than the actual trash rack. The detector was tested in the laboratory and in the field with good results, it is economical, and is built largely with off-the-shelf items

FRICTION LOSS THROUGH A UNIFORM SNOW LAYER.

en, Y.C., Apr. 1990, 18(1), p.83-90, 9 refs. 44-3542

44-3542 SNOW PERMEABILITY, AIR FLOW, MASS FLOW, SNOW DENSITY, INTERNAL FRIC-TION, SNOW THERMAL PROPERTIES, VAPOR PRESSURE, AIR SNOW INTERFACE, SNOW STRUCTURE, FLUID FLOW, HEAT LOSS.

An experimental study covering a mass flow rate of air ranging from .00162 to .0675 kg/sq m/m and for snow density varying from 377 to 472 kg/cu m has been conducted Pressure drops of 1 176 to 2811 N/sq m were recorded A plot of friction factor f (sub p) and Re (sub p) (defined analogously as the friction factor f and the classical Reynolds number Re for fluid flow through conduits) showed a good representation of all the experimental data.

MP 2704 SEA ICE THICKNESS VERSUS IMPULSE RADAR TIME-OF-FLIGHT DATA.

Kovacs, A., et al, Apr. 1990, 18(1), p.91-98, 1 ref. Morey, R.M.

SEA ICE, ICE COVER THICKNESS, RADAR ECHOES, SNOW DEPTH, MEASUREMENT, SNOW COVER, ICE ELECTRICAL PROPERTIES, DIELECTRIC PROPERTIES, ELECTROMAGNETIC WAVES, ICE FLOES, REFLECTIVITY.

NETIC WAVES, ICE FLOES, REFLECTIVITY.

Two second-year sea ice floes were probed using "impulse" radar sounding and direct drilling methods The resulting two-way time-of-flight of the impulse radar EM wavelet, traveling from the surface to the ce "bottom" and back to the surface, was compared with snow and ice thickness data obtained from a drill hole From this comparison, simple relationships are presented that provide an estimate of the thickness of sea ice, between about 1 and 8 m thick, with or without a snow cover The data revealed that the apparent delectric constant of the sea ice decreased with increasing ice thickness, from a value of about 7 for ice 1 m thick, to about 3.5 for ice 6 m thick.

MP 2705

DENSITY OF NATURAL ICE ACCRETIONS RELATED TO NONDIMENSIONAL ICING PARAMETERS.

Jones, K.F, Jan 1990, 116B(492), p.477-496, 21 refs. 44-3570

ICF ACCRETION, ICE DENSITY, ICE MODELS, HOARFROST, MATHEMATICAL MODELS, SURFACE TEMPERATURE, WIND VELOCITY. CLOUD DROPLETS.

MP 2706

WATER AND SUSPENDED SOLIDS DIS-CHARGE DURING SNOWMELT IN A DISCON-TINUOUS PERMAFROST BASIN.

Chacho, E.F., Jr., Permafrost Canada: Proceedings of the Fifth Canadian Permafrost Conference, Quebec, Centre d'études nordiques, l'Université Laval, 1989, p.167-173, With French summary. 11 refs. 44-3659

DISCONTINUOUS PERMAFROST, SUSPENDED SEDIMENTS, SNOWMELT, UNITED STATES—ALASKA—FAIRBANKS.

ALASKA—FAIRBANKS.
For the 1985 snowmelt runoff season, discharge, specific conductance and total suspended solids are compared on Glenn Creek, located near Fairbanks, AK, and underlain by permifrost Discharge was measured continuously, and specific conductance and total suspended solids concentration were measured at 2-hour intervals over the entire snowmelt season Specific conductance decreased rapidly following initial streamflow and after 6 days reached a minimum, which held nearly constant for the remainder of the snowmelt runoff season Suspended solids concentration was less than 50 mg/l over the entire rising limb of the seasonal snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and, with the exception of a small snowmelt hydrograph and from less than 50 mg/l to 1337 of the peak flow, a rapid flushing of the channel occurred, with solids concentration rising from less than 50 mg/l to 1337 of the peak flow, a rapid flushing of the channel occurred, with solids concentration rising from less than 50 mg/l to 1337 of the peak discharge and the discharge hydrograph and the peak discharge hydrograph and hy oays, during while time during fluctuations in concentration were well disease, with peak values decreasing daily until on the fife day the peak concentration was under 200 mg i. B, during water temperature data collected in 1983, the durinal fluctuations in solids concentration and water temperature are shown to be consistent.

MP 2707

DOMINION RANGE ICE CORE, QUEEN MAUD MOUNTAINS, ANTARCTICA—GENERAL SITE AND CORE CHARACTERISTICS WITH IM-PLICATIONS.

Mayewski, P.A., et al, 1990, 36(122), p.11-16, 17 refs. Twickler, M.S., Lyons, W.B., Spencer, M.H., Meese, D.A., Gow, A.J., Grootes, P.M., Sowers, T., Watson, M.S., Saltzman, E.

44-3/16
ICE CORES, DRILL CORE ANALYSIS, GLACIER
ICE, ICE COMPOSITION, ICE SAMPLING, ICE
COVER THICKNESS, ISOTOPE ANALYSIS, ICE
CRYSTAL STRUCTURE, CLIMATIC CHANGE,
ICE TEMPERATURE, ANTARCTICA—QUEEN
MALID MOUNTAINS MAUD MOUNTAINS.

MAUD MOUNTAINS.

The Transantarctic Mountains of East Antarctica provide a new mileu for retrieval of ice-core records. Here are reported the initial findings from the first of these records, the Dominion Range are valuable for the recovery of records detailing climate change, volcance activity, and changes in the chemistry of the atmosphere. The unique geographic location of this site and a relatively low accumulation rate combine to provide a relatively long record of change for this potentially sensitive climatic region. As such information concerning the site and general core characteristics are presented, including ice surface, ice thickness, bore-hole temperature, mean annual net accumulation, crystal size, crystal fabric, oxygen-isotope composition, and examples of ice chemistry and isotopic composition of trapped gases. (Auth)

UNUSUAL JÖKULHLAUP INVOLVING PO-THOLES ON BLACK RAPIDS GLACIER, ALAS-KA RANGE, ALASKA, U.S.A. Sturm, M., et al, 1990, 36(122), p.125-126, 3 refs.

Cosgrove, D.M. 44-3731

GLACIER SURFACES, SUBGLACIAL DRAIN-AGE, SURFACE DRAINAGE, WATER FLOW, GLACIAL LAKES, SURFACE STRUCTURE, HY-DRAULIC STRUCTURES, UNITED STATES ALASKA.

MP 2709

WEST ANTARCTICA AND BEYOND.
Grootes, P.M., et al, U.S. National Science Foundation, Icc Core Working Group, Dec. 1989, 32p. Gow, A.J. 44-3738

44-3738
CLIMATIC CHANGES, RESEARCH PROJECTS, ICE CORES, DRILL CORE ANALYSIS, PALEO-CLIMATOLOGY, PALEOECOLOGY, GREENLAND, ANTARCTICA.

The Ice Core Working Group, sponsored by the U.S. National Science Foundation, recommends that the NSF fund ice core research for the 1990s in Greenland and West Antarctica, to study climate changes back to 125,000 years ago. MP 2710

HYDRAULIC MODEL OF OVERLAND FLOW ON GRASS COVERED SLOPES.

Adrian, D.D., et al, International Conference for Cen-tennial of Manning's Formula and Kuichling's Rational Formula, Charlottesville, VA, May 22-26, 1989. Proceedings. Channel flow and catchment runoff. Edited by B.C. Yen, American Society of Civil Engineers, 1989, p.569-578, 14 refs. Martel, C.J.

SLOPES, WATER FLOW, SURFACE DRAINAGE, WATER TREATMENT, GRASSES, WASTE TREATMENT, LAMINAR FLOW, ANALYSIS (MATHEMATICS), SLOPF ORIENTATION, MODELS, FLOW RATE, HYDRAULICS, SURFACE PROPERTIES.

FACE PROPERTIES.

The overland flow system involves applying wastewater to the upper elevation of a carefully prepared grassed slope. The wastewater flows down the surface of the slope through the grass, it is collected at the bottom of the slope and may be discharged to a stream or, perhaps, to a rapid infiltration site. While flowing down the slope, some loss in volume occurs due to evapotranspiration and infiltration, although these losses are usually small due to the short length of slope employed and the impervious nature of soils which favor this method of treatment. The hydraulies of shallow flow down wide grassed channels has received some attention when the flow regime is turbulent. The L.S. Environmental Protection Agency sponsored Storm Management Model uses the Manning equation to describe shallow overland flow, but this approach is suspect when the flow occurs in the laminar regime. Experimental measurements by the Corps of Engineers show that overland flow occurs in the laminar regime with the Reynolds number less than 20 based on grass dameter, taken as 0.001 m. and less than 20 based on grass dameter, taken as 0.001 m. and less than 20 based on grass dameter, taken as 0.001 m flows down the slope of an overland flow system is developed.

PERFORMANCE OF AN OMNI-DIRECTIONAL WHEEL ON SNOW AND ICE.

Blaisdell, G.S., Feb. 1989, 21p. + appends., Prepared for Naval Coastal Systems Center, Panama city, FL. 7 refs.

44-3745
VEHICLE WHEELS, COLD WEATHER PER-FORMANCE, TRACTION, AIRCRAFT LAND-ING AREAS, TIRES, DESIGN, RUBBER ICE FRICTION, VEHICLES.

FRICTION, VEHICLES.

A brief study was performed to investigate the suitability of service vehicles equipped with a unique omni-directional wheel operating aboard aircraft carriers in northern latitudes, where ice and snow on the flight deck is not uncommon flis study addressed the comparative performance of the omni-directional wheel, a bias-ply highway tire as used on current Navy MD-3 aircraft tow vehicles, a typical non-pneumatic forklift truck tire, and an automotive radial-ply all-season tire. The tires were tested for driving traction levels on prepared ice, hard-packed snow, and fresh shallow snow. In general, the omni-directional wheel showed superior performance to the forklift truck tire and the bias-ply highway tire. The radial all-season tire, however, outperforms the omni-directional wheel was found to be well-behaved during traction testing and shows promise for operation on winter surfaces. Recommendations are provided that might further improve omni-directional wheel performance on snow and ice.

MP 2712

MP 2712

NEW APPROACH FOR SIZING RAPID INFIL-TRATION SYSTEMS (DISCUSSION AND CLO-SURE).

Reed, S.C., et al, 1989, 115(4), p.879-882, 3 refs. For article being discussed see 42-2246. Crites, R.W., Zirschky, J, Martel, J.

44-3746

SEEPAGE, SOIL WATER, WATER TREAT-MENT, DESIGN, WASTE TREATMENT, MUNICIPAL ENGINEERING, PERMEABILITY.

MP 2713 ANALYTICAL METHODS FOR DETECTING MILITARY-UNIQUE COMPOUNDS.

Jenkins, T.F., et al, 1989, 7(3), p.13-14. Walsh, M.E.

44-3/4/
ENVIRONMENTAL TESTS, SOIL POLLUTION,
EXPLOSIVES, CHEMICAL ANALYSIS, TEST
EQUIPMENT, MOLECULAR STRUCTURE,
LABORATORY TECHNIQUES, CHEMICAL PROPERTIES.

MP 2714

DEWATERING BY NATURAL SLUDGE FREEZE-THAW.

Martel, C.J., Solid/liquid separation: waste management and productivity enhancement. Edited by H.S. Muralidhara, Columbus, Battelle Press, 1990, p.116-122, 9 refs.

44-3750 44-3750
SLUDGES, WASTE TREATMENT, FREEZE
DRYING, FREEZE THAW TESTS, MOISTURE
TRANSFER, DESIGN, WATER TREATMENT,
DRAINAGE, CAPILLARITY, FREEZING.

DRAINAGE, CAPILLARITY, FREEZING.
Sludges are easily separated into solid and liquid fractions by freezing and thawing. Water and wastewater treatment plants in cold climate areas can take advantage of this process by freezing and thawing sludge during the winter and summer seasons in a new unit operation called a sludge freezing bed. The purpose of this study was to measure the dewaterability of freeze-thaw conditioned sludges and measure how well they drain at various depths. Typical water treatment, anaerobically digested and aerobically digested sludges were tested. The mair conclusion of this study was that up to 2.0 m of these sludges could be applied to a freezing bed.

MP 2715

WHEELED VERSUS TRACKED VEHICLE SNOW MOBILITY TEST PROGRAM.

Green, C.E., et al, International Society for Terrain Vehicle Systems, Joint U.S.A.-Canada meeting, Victoria, British Columbia, Apr., 1989. International Society for Terrain Vehicle Systems, 1989, 19p.

Grimes, K., Blaisdell, G.L. 44-3759

VEHICLE WHEELS, VEHICLES, COLD WEATH-ER PERFORMANCE, SNOW COVER EFFECT, TESTS, TRACKED VEHICLES, TIRES, TRAC-TION, MILITARY RESEARCH, SNOW DENSI-

The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) and the U.S. Army Engineer Waterways Experiment Station conducted snow mobility tests in Houghton, MI, during the period Jan through Mar., 1988 These tests were part of the first phase of a two year snow mobility program Wheeled and tracked vehicles were tested to (1) develop fundamental mobility relations between vehicle characteristics and snow properties, (2) to validate specific

snow relations in CRREL's snow mobility model, and (3) to modify the model as necessary to improve its prediction accuracy and adapt it for use in the NATO Reference Mobility Model, Condensed Army Mobility Model, and the Army Mobility Model.

MP 2716

NONDESTRUCTIVE EVALUATION OF MOISTURE MIGRATION IN INSULATION MATERIAL UNDER PROLONGED EXPOSURE TO WATER.

Ayorinde, O.A., Defense Conference on Nondestructive Testing, 38th, San Antonio, TX, Oct. 31-Nov. 2, 1989. Proceedings, 1989, p.111-121, 3 refs. 44-3760

THERMAL INSULATION, MOISTURE DETEC-THERMAL INSULATION, MOISTURE DETECTION, ABSORPTION, TESTS, MATERIALS, MOISTURE TRANSFER, VAPOR BARRIERS, WATER CONTENT, GAMMA IRRADIATION, MEASURING INSTRUMENTS, TEST EQUIPMENTS, TEST EQUIPMENTS

MENT.

Nondestructive measurement and analysis of moisture absorption and migration in polyurethane insulation material subjected to a prolonged water exposure were performed using a dual-energy gamma-ray device. The parameters influencing moisture absorption by a given type of insulation were found to include (a) the insulation density, (b) the insulation were found to include (a) the insulation density, (b) the insulation thickness, (c) the presence of a vapor barrier or jacket, (d) the type of insulation jacket and (e) the time of exposure to moisture. With time, the variation of any of these factors would cause a change in moisture gradient across the insulation thickness. For this investigation, the effects of the insulation thickness, exposure time to moisture and the presence of a vapor jacket were evaluated and quantified for polyurethane insulation. Also, a preliminary test was performed with a frozen polystyrene breadboard to evaluate the measurement accuracy by the gamma-ray method in determining nondestructively the insulation moisture content and profile. and profile

MP 2717

INFLUENCE OF GROUND WATER MONITOR-ING WELL CASINGS ON METALS AND OR-GANIC COMPOUNDS IN WELL WATER.

Hewitt, A.D., et al, HAZTECH International '89, Fourth Annual Exhibition and Conference, Cincinnati, OH, Sep. 12-14, 1989. Proceedings. Hazardous waste and hazardous materials management, 1989,

9p., 14 refs.
Parker, L.V., Jenkins, T.F., Reynolds, C.M., Lang, K.T., Stutz, M.H.
44-3761

GROUND WATER, ENVIRONMENTAL TESTS, WELL CASINGS, WATER POLLUTION, CHEMICAL ANALYSIS, WELLS, WATER CHEMISTRY, LEACHING, STANDARDS, CORROSION, CORROSION, STEELS.

STEELS.

The purpose of these studies was to compare PVC, PTFE, SS 304 and SS 316 well casings for monitoring metals and organic compounds in well water. Review of the literature revealed that these commonly used well casing materials had not been studied concurrently. These studies used well casings manufactured specifically for ground water monitoring and water obtained from a 76-m-deep domestic well in Weathersfield, VT. No attempt was made to maintain issolved oxygen, carbon dioxide, temperature, pH or redox potential levels representative of ground water, and this undoubtedly had an effect on analyte speciation. Because of these factors, the static laboratory conditions, and exposure of freshly cut surfaces on the well casings, the results will not quantitatively predict what might occur under field conditions. Nevertheless, since spiked analytes varied relative to the control by more than 10% after only 8 hours of exposure, and leaching experiments showed analyte concentiations greater than 5% of the present EPA drinking water quality standards, it is the authors' opinion that there is a basis for concern, especially for shallow wells with a slow recharge.

MP 2718

EVALUATION OF THE CATERPILLAR CHAL-LENGER TRACTOR FOR USE IN ANTARCTICA. Blaisdell, G L., et al, Feb. 1989, 12p. + figs, Prepared for Division of Polar Programs. National Science Foundation. Liston, R.A.

TRACTORS, COLD WEATHER PERFORM-ANCE, MECHANICAL TESTS, TRACKED VEHI-CLES, TRACTION, SNOW COMPACTION, LOG-ISTICS, SURFACE PROPERTIES

ISTICS, SURFACE PROPERTIES

The newly marketed Caterpillar agriculture tractor, called the Challenger 65, was evaluated in snow covered terrain to determine its potential as a prime mover for operations in Antarctica. Three vehicle configurations were tested with the standard belt, with the standard belt carrying studs, and with a specially constructed wide track to improve flotation. Rolling resistance and drawbar pull were measured on ice, hard packed snow and in deep, relatively soft snow General handling and ride were evaluated qualitatively. It was found that the tractor is rugged, well constructed, is easy to operate and has the normal ride quality associated with vehicles having short wheelbases. The results of

the evaluation are very encouraging and led to the conclusionate the machine should receive serious consideration for application in the Antarctic for transport problems that may soon appear that involve the use of sled trains.

NONLINEAR PROBLEMS IN THE STUDY OF WATER MOVEMENT IN FROZEN SOILS.

Nakano, Y., Army Conference on Applied Mathematics and Computing, 6th. Transactions, U.S. Department of Defense, 1989, p.383-393, ARO Report 89-1,

44-3/00 FROZEN GROUND MECHANICS, WATER TRANSPORT, WATER CONTENT, ANALYSIS (MATHEMATICS), UNFROZEN WATER CON-TENT, MASS BALANCE, WATER VAPOR, PHASE TRANSFORMATIONS, TEMPERATURE GRADIENTS.

MP 2720

INFLUENCE OF CASING MATERIALS ON TRACE-LEVEL CHEMICALS IN WELL WATER. Parker, L.V., et al, Spring 1990, 10(2), 11p., 26 refs. Hewitt, A.D., Jenkins, T.F.

WELL CASINGS, GROUND WATER, WATER POLLUTION, SOIL POLLUTION, WATER CHEMISTRY, CHEMICAL ANALYSIS.

Four well casing materials—polyvinyl chloride (PVC), polytet-rafluoroethylene (PTFE), and stainless steel 304 (SS 304) and 316 (SS 316)—were examined to determine their suitability and 310 (35 310)—were examined to determine their suitability for monitoring inorganic and organic constitutions in well water. The inorganic study used a factorial design to test the effect of concentration of mixed ractals (arsenic chromium, lead, and cadmium), pH, and organic carbon The well casings were also tested for sorption/desorption of 10 organic substances

MP 2721

TECHNOLOGY TRANSFER. Eaton, R., May 1990, 57(5), p.25.

ROAD MAINTENANCE, MUNICIPAL ENGINEERING. ROAD

EDUCATION.

MP 2722 REMOTE WATER-TEMPERATURE MEASURE-

MENT. Daly, S., Aug. 24, 1989, No.1110-1-146, 6p. 44-3792

WATER TEMPERATURE, **TEMPERATURE** MEASUREMENT, MEASURING INSTRU-MENTS, DESIGN, TELEMETERING EQUIP-MENT, RIVER FLOW, REMOTE SENSING.

This article provides descriptive information on establishing a remote water-temperature measurement station. The data can be recorded with a data logger on site or transmitted via a data collection platform (DCP) to a Geostationary Operational Environmental Satellite (GOES)

MP 2723

METHODS TO REDUCE ICE ACCUMULATION ON MITER GATE RECESS WALLS. Rand, J H, et al, Aug 24, 1989, No.1110-2-320, 5p. Hanamoto, B.

LOCKS (WATERWAYS), WALLS, ICE PREVEN-TION. ELECTRIC HEATING, WATER FLOW, TESTS, DESIGN, ELECTRIC EQUIPMENT.

This article provides information on methods to reduce or climinate ice accumulation on mitter gate recess walls. With reduced ice accumulation, the miter gates can be completely recessed, thus preventing possible structural damage to the miter gates by lock traffic.

MP 2724

REDUCED WINTER LEAKAGE IN GATES WITH J-SEALS.

Rand, J.H., et al. Aug. 24, 1989, No 1110-2-319, 3p Hanamoto, B.

SPILLWAYS. LEAKAGE, ICE PREVENTION, ELECTRIC HEATING, WATER FLOW, DESIGN, COLD WEATHER OPERATION

This article provides information regarding reduced winter leakage of spillway gate seals, leading to reduced ice interference with gate operation, by means of installing heat tapes in hollow-channe. J-seals on spillway gates

MP 2725

INTERNAL STRUCTURE, COMPOSITION AND PROPERTIES OF BRACKISH ICE FROM THE

BAY OF BOTHNIA.
Weeks, W.F., et al, Feb. 1990, M 90-01, Sea Ice Prop erties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.5-15, ADA-Gow, A.J., Kosloff, P., Digby-Argus, S.A. 44-3809

SEA ICE, ICE PHYSICS, ICE STRUCTURE, ICE COMPOSITION, REMOTE SENSING, RADAR ECHOES, FAST ICE, REMOTE SENSING, PACK ICE, ICE STRENGTH, ICE TEMPERATURE, SNOW ICE INTERFACE, ICE SALINITY, TEMBLE BLOOD FOR THE SALINITY TEMBLE PAGE ICE SALINITY, TEMBLE PAGE ICE SALINITY SILE PROPERTIES, BALTIC SEA-BOTHNIA, BAY.

BAY.
Field observations made during the Mar. 1988 BEPERS (Bothnian Experiment in Preparation for ERS-1) remote sensing experiment allow limited characterizations of the temperature, salinity, structure and physical property profiles of the different types of bracksh ice that forms in the Bay of Bothnia. During the sampling period, undeformed fastice thicknesses varied from 40 to 60 cm in the bay to the east of Umea, Sweden, with somewhat thicker ice occurring in the northermoust, nearly fresh, portions of the bay Ice salinities were generally less than 1 per mill and the ice temperatures were usually higher than -3.5 C. Although most of the ce examined was simple columnar congelation ice, a variety of castis fabrics were observed, including random, vertical and horizontal (random and aligned) onentations. There was no obvious pattern to the geographic arrangement of these fabrics. Brine volume profiles are used to estimate representative corpoperty profiles. Comparisons are made between the properties of ice from the Bay of Bothnia and those of more typical sea ce from the Arctic Ocean at similar ice thicknesses. A variety of structural factors contributing to specific areas of higher radar return in the bay are also discussed.

SNOW COVER EFFECTS ON ANTARCTIC SEA ICE THICKNESS.

Ackley, S.F., et al, Feb. 1990, M 90-01, Sea Ice Proper-Ackiey, S.F., et al, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W F Weeks, p.16-21, ADA-221 723, 12 refs.

Lange, M.A., Wadhams, P. 44-3810

44-3810
SEA ICE DISTRIBUTION, ICE COVER THICKNESS, SNOW COVER EFFECT, PACK ICE, ICE DENSITY, LOADS (FORCES), SNOW DEPTH, SURFACE PROPERTIES, MODELS, ANTARC-TICA-WEDDELL SEA.

SURFACE PROPERTIES, MODELS, ANTARC-TICA—WEDDELL SEA.

In model simulations of seasonal pack ice growth in both polar regions (e.g., Maykut and Untersteiner 1971, Semtner 1976, Hibbler 1979), the snow cover is treated essentially as an insulating layer that inhibits ice growth because of its lower conductivity than pack ice. In the Winter Weddell Sea Project-86, on the cruise of the West German vessel Polarstem, several factors were found that negate this behavior predicted by the mooels. Relatively thin sea ice (40-60 cm) forms initially in Antiarctica during the ice edge advance. Surface roughness features act as snow fences and, under the action of relatively high winds (40 knots in frequent storms), the snow cover is shifted around over periods of hours to a few days. Wind-blown snowdrifts build to 1 m or greater thicknesses in a few injurs. Snow of this depth can easily depress the existing ice cover surface below sea level, and flooding of the snow cover followed by sub-freezing temperatures leads to a superimposed snowice layer on the top surface. The remaining snow cover is redistributed in the next storm within a few days to continue the process. Two sets of measurements showed the general nature of this process. The first, a series of 4000 ice thickness measurements, showed about 17% of the holes drilled had the ice surface at or below sea level at the time of the measurement, sometimes accompanied by slush pools on the surface. Sea ice cores analyzed for oxygen isotopes independently confirmed that the top 10-20 cm of the intact cores was derived from seawater-flooded snow in secveral cases. It was estimated that the snow cover increases mean sca ice thickness in Antarctica by 20-30% (10-20 cm) over model predictions by this flooding-infiltration-refreezing ice growth mechanism (Auth.)

MP 2727

QUANTIFICATION OF SEA-ICE TEXTURES THROUGH AUTOMATED DIGITAL IMAGE ANALYSIS.

Eicken, H., et al, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1998. Edited by S.F. Ackley and W.F. Weeks, p.28-32, ADA-221 723, 3 refs.

Lange, M.A., Ackley, S.F. 44.3812

SEA ICE, ICE PHYSICS, ICE CRYSTAL STRUCTURE, ICE FORMATION, METEOROLOGICAL FACTORS, OCEANOGRAPHY, GRAIN SIZE, PHOTOGRAPHY, COMPUTER APPLICATIONS,

FACTORS, OCEANOGRAPHY, GRAIN SIZE, PHOTOGRAPHY, COMPUTER APPLICATIONS, ANTARCTICA—WEDDELL SEA.

The physical and biological properties of sea ice are governed to a large extent by us texture. The texture of a sea-ice cover, on the other hand, is controlled by the meteorological and oceanographic conditions under which growth took place. Textural analysis can thus provide insight into the formation and development of sea ice, and at the same time it represents the central link between the evolution and the properties of an ice cover. Studies of sea-ice thin sections taken from the Weddell Sea have generally relied on subjective, qualitative evaluations of texture. Aside from c-axis distributions determined with a Rigaby stage, textural characteristics such as grain size or shape are usually not evaluated because the procedure is time-consuming (as is determination of c-axis distribution) or even impossible. The complex texture of sea ice—with intertwining grains of diverse shapes, numerous inclusions of brine and gases between and within grains, and sub-grain boundaries—often delies common notions of "grains," "grain size," etc. The introduction of automatic exture analysis might be helpful in overcoming the difficulties outlined above the method allows quantification of textures, permitting direct comparison between large numbers of samples, which is difficult or impossible to achieve through qualitative examination. Automatic texture analysis also overcomes personal bias inherent in conventional methods by collecting and considering all the information (i.e., all gray values) available for one thin section. (Auth.) MP 2728

CHEMICAL AND STRICTIDAL PROBERTIES

MP 2728 CHEMICAL AND STRUCTURAL PROPERTIES OF SEA ICE IN THE SOUTHERN BEAUFORT

Messe, D.A., Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.32-35, ADA-221 723, 11 refs. 44-3813

SEA ICE, ICE STRUCTURE, ICE COMPOSITION, ICE CORES, CHEMICAL ANALYSIS, ICE SALINITY, SEA WATER.

SALINITY, SEA WATER.

Detailed chemical and structural profiles were determined for 10 first-year and 10 multiyear ice cores collected in the southern Beaufort Sea during Apr. and May 1986 and 1987. Concentrations of Cl. Br and SO4 were determined with a Dionex ion chromatograph using standard techniques An eluent of 1.125 mM sodium bicarbonate and 35 mM of sodium carbonate was used Concentrations of Na, Ca, K and Mg were determined by atomic absorption spectro-photometry using standard techniques (Perkin-Elmer 1976) Nutrient analyses (PO4, SiO4, NO3, NO2 and NH4) were conducted following the techniques of Glibert and Lode (1977) on the 1986 samples and those of Whitledge et al (1981) on the 1986 samples and those of Whitledge et al (1981) on the 1987 samples. Chiorophyll a analyses were conducted using the techniques of Strickland and Parsons (1972). Detailed descriptions of the analysis and blank studies can be found in Meese (1988) The objectives of the study included determination of what, if any, chemical and/or physical trends exist in sea ice in the southern Beaufort Sea and to determine the extent of chemical fractionation See and to determine the extent of chemical fractionation

MP 2729

THEORETICAL ESTIMATES OF LIGHT RE-

THEORETICAL ESTIMATES OF LIGHT RE-FLECTION AND TRANSMISSION BY SPA-TIALLY INHOMOGENEOUS AND TEMPO-RALLY VARYING ICE COVERS.
Perovich, D.K., Feb. 1990, M 90-01, Sea Ice Proper-ties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edit-ed by S.F. Ackley and W.F. Weeks, p 45-49, ADA-221 723, 11 refs. 44-3816

44-3816 44-3816
ICE SPECTROSCOPY, ICE OPTICS, LIGHT
TRANSMISSION, REFLECTION, WAVE PROPAGATION, ABSORPTION, ICE THERMAL PROPERTIES, REMOTE SENSING, GEOPHYSICAL
SURVEYS, THERMODYNAMICS, ICE COMPOSITION, ICE COVER THICKNESS, MODELS,
SNOW DEBTH SNOW DEPTH.

SNOW DEPTH.

The reflection, absorption, and transmission of light at visible and near-infrared wavelengths is important for a number of geophysical problems. Light reflection is an important to ice thermodynamics, and transmission strongly influences biological activity in and under the ice. The focus on this paper is on the spectral (wavelength region 400-1000 nm) reflection and transmission of light by spatially inhomo-

geneous sea ice covers investigated using a two-stream, multilayer radiative transfer model

The model is computationally simple and utilizes available experimental data on the optical properties of sea ice. The ice cover is characterized as a layered medium composed of selections from nine distinct snow and ice types. Two cases are presented illustrating values of spectral albedo, transmittate, and transmitted PAR (photosynthetically active radiation) for a uniform ice cover as it melts and for a spatially inhomogeneous ice cover. The importance of ice thickness and surface conditions on the spectral reflected and transmitted radiation fields is demonstrated.

ACOUSTICAL AND MORPHOLOGICAL PROP-ERTIES OF UNDEFORMED SEA ICE: LABORA-TORY AND FIELD RESULTS.

Jezek, K.C., et al, Feb. 1990, M 90-01, Sea Ice Proper-

ties and Processes; Proceedings of the W F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p 67-75, ADA-221 723, 9 refs.

Stanton, T.K., Gow, A.J, Lange, M.A.

44-3821

SEA ICE, ICE ACOUSTICS, ICE STRUCTURE, ICE GROWTH, REFLECTION, ICE SALINITY, ICE CRYSTAL STRUCTURE, LAKE ICE.

ICE CRYSTAL STRUCTURE, LAKE ICE.

Sonar echo amplitude data have been collected at carrier rrequencies of 188 and 120 kHz from the underside of different sea ice types. Histograms of normal incidence echo amplitudes were formed from over 90 samples of each ice type Experiments were conducted on saline ice grown in an outdoor pond under relatively controlled conditions at CRREL and on the sea ice cover in the Fram Strait. Analysis shows marked variations (about a factor of 5) in the magnitude of the coherent reflection coefficients as congelation ice at the bottom of an ice sheet evolves from a growing dendritic interface to an ablating, thermally altered interface Larger differences (about a factor of 10) are observed between growing congelation ice and slush ice, used to simulate frazil These results indicate that important variations in acoustic regime exist in areas where different ice types are intermingled

COMPARISON OF THE COMPRESSIVE STRENGTH OF ANTARCTIC FRAZIL ICE AND LABORATORY-GROWN COLUMNAR ICE. Richter-Menge, J.A., et al, Feb. 1990, M 90-01, Sea

Lee Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.79-84, ADA-221 723, 14 refs. Ackley, S.F., Lange, M.A. 44-3823

44-3823 FRAZIL ICE, ICE STRENGTH, COMPRESSIVE PROPERTIES, SEA ICE, STRAIN TESTS, ICE CRYSTAL STRUCTURE, GRAIN SIZE, TESTS, ICE MICROSTRUCTURE, STRESSES, ANTARC-TICA—WEDDELL SEA.

ICE MICROSTRUCTURE, STRESSES, ANTARC-TICA—WEDDELL SEA.

Unconfined, uniaxial compression tests were performed on frazil sea ice samples collected in the Weddell Sea. The tests were done at a constant strain rate of 1/100 1/s and at temperatures of -3, -5 and -10 C. Data from the frazil ice tests were compared to results from tests done under the same conditions on transversely isotropic, columnar saline ice. The approximate grain sizes of the frazil and columnar ice were 1 and 10 mm, respectively. The results of this work indicate that the frazil ice generally has a higher strength than columnar ice loaded in the plane of the sheet. Tests done by other researchers on freshwater, equiaxed polycrystalline ice have also shown the compressive strength to vary inversely with grain size. Application of this relationship to the sea ice tested indicates that the results from these freshwater ice tests at a strain rate of 1/100 1/s cannot be directly extended to explain the variation in compressive strength between the frazil and columnar sea ice. It is speculated that this may be due to 1) the influence that the increased ductility of sea ice has on the relationship between strength and grain size at 1/100 1/s, 2) that another microstructural parameter (e.g., the thickness of the ice between brine inclusions) may be the con rolling factor in determining sea ice strength, or 3) that the dominant mechanisms driving deformation vary with each ice type (Auth)

MP 2732

SEAICE: A HABITAT FOR THE FORAMINIFER

NEOGLOBOQUADRINA PACHYDERMA?.
Dieckmann, G. et al, Feb. 1990, M 90-01, Sea Ice
Properties and Processes, Proceedings of the W.F.
Weeks Sea Ice Symposium, San Francisco, CA, Dec.
1988. Edited by S.F. Ackley and W.F. Weeks, p 8692, ADA-221 723, 22 refs

Spindler, M. Lange, MA. Ackley, S.F., Eicken, H. 44-3824

SEA ICE, MARINE BIOLOGY, MICROBIOLO-GY, ICE GROWTH, FCOLOGY, BIOMASS, BAC-TERIA, ICE COMPOSITION, SEA WATER, PACK ICE, ICE COVER THICKNESS, ICE CORES, AN-TARCTICA: WEDDELL SEA

A report is given on a large-scale survey of the Weddell Sea pack ice and water column carried out during the Winter

Weddell Sca Project 1986 (WW2P '86) from midwinter to austral spring It was concluded that the incorporation of Neogloboquadrina pachyderma into sea ice is related to ice formation processes, and that their incorporation into the ice is not necessarily accidental but may indicate an overwintering strategy. These observations can have implications for the use of N. pachyderma as a marker for water masses, since forammilers growing in the ice may have a different isotopic configuration from those living in seawater only. (Auth mod.)

MP 2733

LIDAR DETECTION OF LEADS IN ARCTIC SEA

Schnell, R.C., et al, Feb. 1990, M 90-01, Sea Ice Prop Scanieri, R.C., et al, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.119-123, ADA-221 723, 19 refs.

Barry, R.G., Miles, M.W., Andreas, E.L., Radke, L.F., Brock, C.A., McCormick, M.P., Moore, J.L.

SEA ICE, STREAMS, REMOTE SENSING, ICE STRUCTURE, MARINE METEOROLOGY, RADIATION BALANCE, LIDAR, MODELS, HEAT TRANSFER, MOISTURE TRANSFER, SEASONAL VARIATIONS, BACKSCATTERING, DETECTION

DETECTION.

Remote sensing using an airborne infrared lidar has shown an unexpected capability to detect open leads (linear openings) in arctic sea ice and their associated meteorology in winter It is shown that vertical profiles of backscattered radiation demonstrate strong returns from hydrometeor plumes originating from leads having a surface water temperature near -1.8 C. Recently refrozen leads are also distinguishable by the lidar backscatter from adjacent shicker, older sea ice. Wide leads release enough energy to create buoyant plumes which tenetrate the arctic boundary layer inversion, transporting heat and moisture into the troposphere. These results show that the role of the Arctic as a global heat sink may need to be re-evaluated, and that lead plumes have a significant effect on the radiation budget.

MP 2734 WIND-GENERATED POLYNYAS OFF THE COASTS OF THE BERING SEA ISLANDS.

Kozo, T.L., et al, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W.F. Weeks, p.126-132, ADA-221 723, 15 refs.

Farmer, L.D., Welsh, J.P.

44.3835

POLYNYAS, WIND FACTORS, SEA ICE, ICE MECHANICS, LATENT HEAT, CLIMATIC FAC-TORS, DISTRIBUTION, DRIFT, BERING SEA.

TORS, DISTRIBUTION, DRIFT, BERING SEA. The relationship of winds derived from mesoscale meteorological networks to polynya sizes and onentations was investigated Defense Meteorological Satellite Program imagery was merged with atmospheric pressure network data from the Bering Sea for Mar. 1988 During the month, wind systems drove sea ice southward, creating and maintaining polynyas south of St. Lawrence, St Matthew, and Nunivak Islands. Existing land stations, the deployment of a moored pressure buoy south of the ice edge, and a rew automated weather station on St. Matthew Island have allowed the "creation" of meso-networks that surround these lee-shore polynyas This analysis (rather than synoptic) has shown that polynya lengths and orientations can be simply related to the mesonet computed geostrophic winds. The typical time lag between the onset of a geostrophic wind and the appearance of "windsock" type tracking of the polynyas is 24 hours MP 2735

MP 2735 RECENT MEASUREMENTS OF SEA ICE TOPOGRAPHY IN THE EASTERN ARCTIC. Krabill, W.B., et al. Feb. 1990, M 90-01, Sea Ice Prop-

erties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.132-136, ADA-221 723, 8 refs. Swift, R.N., Tucker, W B.

44-3836

SEA ICE, TOPOGRAPHY, ICE SURFACE, REMOTE SENSING, LIDAR, SURFACE ROUGH-NESS, PRESSURE RIDGES, PHOTOGRAPHY.

NESS, PRESSURE RIDGES, PHOTOGRAPHY. During a multinational remote sensing experiment in May 1987, the NASA Airborne Oceanographic Lidar (AOL) was used to collect profiles of the sea ace surface topography in the eastern Arctic. A Global Positioning System (GPS) receiver was used to provide aircraft positioning to an accuracy of about 50 m. The AOL is a pulsed laser that provides a profile free of phase shift discontinuities common to continuous wave lasers. Similar to other laser data, however, the aircraft altitude variation requires removal from the profile prior to calculation of the ice surface roughness statistics As with previous data, there remains an uncertainty as to the freeboard level of the ice after the aircraft motion has been removed, thus small-scale roughness statistics are considered unreliable. However, statistics of pressure ridges can be generated with confidence. The statistical results of ndges from this data set consisting mainly of ridge height and frequency distributions, compare well with previous results obtained from this area of the Arctic. Consistent with

previous findings, the AOL data indicate that while the regional mean ridge heights from the area north of Greenland are similar to those reported for other parts o' are Arctic, the average kilometer contains substantially more ridges than have been observed in other Arctic locations.

ANTARCTIC ICE SHEET BRIGHTNE TEM-PERATURE VARIATIONS.

Jezek, K.C., et al, Feb. 1990, M 90-01, Sea Ice Proper-

ties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W.F. Weeks, p.217-223, ADA-221 723, 11 refs. Cavalieri, D.J., Hogan, A.W.

44-38-4 ICE SHEETS, GEOPHYSICAL SURVEYS, MI-CROWAVES, RADIOMETRY, REMOTE SENS-ING, ICE TEMPERATURE, ICE SURFACE, BRIGHTNESS, POLARIZATION (WAVES), ICE ELECTRICAL PROPERTIES, AIR TEMPERA-

ELECTRICAL PROPERTIES, AIR TEMPERA-TURE.

In this paper the possibility of extracting geophysical information about the great ice sheets from passive microwave data is explored. This work was stimulated by calculations done by Zwally (1977) who showed that typical snow grain sizes at the surface of the ice sheet measurably influence the microwave emissivity of the near surface. This result led to speculation that ice-sheet-wide accumulation rates could be estimated by using empirical relations between grain size and accumulation rate, but little quantitative progress has been made towards that goal using single channel radiometer data alone. Data from the Scanning Multichannel Microwave Radiometer are now in a convenient format for analysis, prompting us to perform a qualitative analysis of the 18- and 37-GHz vertically and horizon-tally polarized data, in the context of Zwally's earlier work. An additional premise of the investigation is that this analysis can be simplified by hypothesizing that large-scale glaciologic regimes trive characteristic surfaces controlled by local environmental conditions. In turn, characteristic surface properties contribute to unique microwave signatures. To test whether a segmentation of the SMMR data set into particular glacial regimes could be used to identify differences between the physical properties of each regime, mean monthly brightness temperatures were examined at 18- and 37-GHz for both horizontal and vertical polarizations over frive areas. Measurable differences were found between brightness temperature trends for the different areas that were attributed, in part, to fluctuations in the large-scale surface temperature field of the ice sheet. (Auth.)

AIRBORNE SEA ICE THICKNESS SOUNDING. Kovacs, A., et al, Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea lee Symposium, San Francisco, CA, Dec. 1988. Edit-ed by S.F. Ackley and W.F. Weeks, p.225-229, ADA-221 723, 7 refs.

Holladay, J.S.

44-3855

44-3533
ICE COVER THICKNESS, SEA ICE, AIRBORNE EQUIPMENT, ELECTROMAGNETIC PROSPECTING, SOUNDING, REMOTE SENSING, RADAR ECHOES, BOREHOLES, SNOW DEPTH, ICE FLOES, PRESSURE RIDGES.

Results from the use of airborne electromagnetic induction technology for profiling sea ice thickness are presented. The technology for profiling sea ice thickness are presented. The airborne sea ice thickness soundings indicated that the thickness could be estimated but the resolution decreased as the ice became rough. However, it was found that the average ice thickness estimated by airborne electromagnetic sounding for a given flight track was in reasonable agreement with the average ice thickness determined by direct drill hole measurement. Examples of the ice thickness profiles obtained by airborne sounding and direct drill hole sounding are presented and compared. Future development of the airborne system is discussed. orne system is discussed

MP 2738

CAVITATING FLUID SEA ICE MODEL.
Flato, G.M., et al., Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA. Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.239-242, ADA-221 723, 3 refs.
Hibler, W.D., III.

44-3858

ICE MODELS, SEA ICE, CAVITATION, OCEANS, CLIMATIC CHANGES, ICE COVER EFFECT. RHEOLOGY, SEA WATER, ICE COVER THICKNESS, FLUID DYNAMICS, ICE MECHANICS.

The motivation for the present work is the development The motivation for the present work is the development of a sea ice theology parameterization that retains most of the essential physics of large-scale drift, yet is conceptually simple and computationally fast enough to be useful for long-term climate studies. The approach is to reformulate the velocity correction method of Nikiforov et al. (1967) and Parkinson and Washington (1979) and obtain the so-called cavitating fluid theology. The ristinale is that packing can be viewed as a two-phase medium (in two dimensions), one phase being ice and the other open water. The open

water phase is considered to have no strength and so convergence will reduce the area of open water. The ice phase has some strength and so convergence is restricted if no open water is present.

Divergence, on the other hand, is unhindered and causes open water to be created. In the model discussed here, the ice pack is assumed to have no shear strength which, aithough counternituitive, has certain advantages first, the model is much simpler; and second no shear strength which, aithough counternituitive, has certain advantages first, the model is much simpler, and second, a more robust (and realistic) circulation of the ice is maintained for wind fields averaged over periods of days or weeks By incorporating the cavitating fluid rheology into a complete dynamic-thermodynamic sea ice model and performing several three year simulations of the arctic sea ice cover, the effect of various parameters and time step lengths can be evaluated. Comparison with the more complete viscous-plastic model of Hibler (1979), which includes shear strength, yields insight into the effects of this simplified parameterization.

MP 2730

MP 2739

MP 2739
ON MODELING THE BAROCLINIC ADJUST-MENT OF THE ARCTIC OCEAN.
Hibler, W.D., III, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, Saa Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.247-250, ADA-221 723, 3 refs.

OCEAN CURRENTS, ICE MECHANICS, DRIFT, BOTTOM TOPOGRAPHY, MATHEMATICAL MODELS, WIND FACTORS, SALINITY, WATER TEMPERATURE, PRESSURE.

MP 2740

OCEANIC HEAT FLUX IN THE FRAM STRAIT MEASURED BY A DRIFTING BUOY.

Perovich, D.K., et al, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.291-296, ADA-221 723, 14 refs.

Tucker, W.B., Krishfield, R.A 44-3867

44-380/
ICE TEMPERATURE, SEA ICE DISTRIBUTION,
HEAT FLUX, ICE MELTING, SEA WATER,
DRIFT STATIONS, ICE EDGE, ICE COVER EFFECT, ICE COVER THICKNESS, HEAT TRANSFER, THERMISTORS, WATER TEMPERATURE,
I ATENT HEAT LATENT HEAT.

Two thermistor strings were installed through the ice to measure ice temperatures and determine oceanic heat fluxes Two thermistor strings were installed through the ice to measure ice temperatures and determine oceanic heat fluxes as the Arctic Environmental Drifting Buoy drifted from the Arctic Basin into the Greenland Sea. Ice temperature data between Dec 14, 1987 and Jan 2, 1988 were retrieved. During this period the AEDB progressed from approximately 81N 4'E to 77N 5'W This constituted the most rapid displacement of the entire drift, coinciding with the entry of the floc into the marginal ice zone of Fram Strait Once in the MIZ, water temperatures increased, most notably at a depth of 16 m, where values changed from -1.8 C to more than 2 C. Bottom ablation rates of 34 mm/day were observed between 21 and 28 Dec. During this securion into warmer water, the oceanic heat flux increased by a factor of 18, from 7W/sq m to 128W/sq m MP 2741 MP 2741

RADAR BACKSCATTER MEASUREMENTS OVER SALINE ICE.

Gogineni, S., et al, Apr 1990, 11(4), p.603-615, 16

Moore, R K, Wang, Q., Gow, A.J., Onstott, R.G

ARTIFICIAL ICE, SEA ICE, MEASUREMENT, RADAR ECHOES, BACKSCATTERING, ICE SURFACE, ANTENNAS, ICE GROWTH, SNOW COVER EFFECT, SURFACE EFFECT, WAVE PROPAGATION.

During the 1984 and 1985 winter seasons, radar backscatter During the 1984 and 1985 winter seasons, radar backscatter measurements were performed on artificial sea ice at the US. Army Cold Regions Research and Engineering Laboratory (CRREL) at Harder, NH. Radar data were collected at selected frequencies in the 4-17 GHz region for incidence angles from 0 to 60 deg with like and cross polarizations. These measurements were performed on smooth, rough, bare and snow-covered saline ice and open water. Backscattering from ice increased with its thickness until the ice was about 1 cm thick and then decreased gradually with further growth Rough ice and snow-covered ice gave similar returns at 13 6 GHz, but the scattering coefficients of snow-covered ice were lower than that of rough ice at 9 6 GHz. Depolatized scattering from smooth, thin ice and water were much lower than from rough ice and snow-covered ice.

MP 2742

MP 2742

ANTIFREEZE ADMIXTURES FOR COLD WEATHER CONCRETING. PRELIMINARY TEST RESULTS.

Korhonen, C.J., et al. 1990, 8p., 10 refs Presented at the American Concrete Institute Spring Convention. Toronto, Canada, Mar. 18-23, 1990. Cortez, E.R

CONCRETE ADMIXTURES, WINTER CON-CRETING, ANTIFREEZES, CONCRETE FREEZ-ING, CONCRETE STRENGTH.

Winter concreting practices in the United States are geared toward assuring that fresh concrete never freezes Foreign literature points out that chemical admixtures can be used interature points out that chemical admixtures can be used to depress the freezing point of water while permitting the cement to hydrate. information about various chemical admixtures, based on an extensive literature survey and the results from an ongoing laboratory test program, is presented. At 20,-5 and -10C, an aqueous solution of sodium nitrite/calcium nitrite and a solution of sodium nitrite/potassium carbonate performed well in strength tests

SALTING-OUT SOLVENT EXTRACTION FOR PRECONCENTRATION OF NEUTRAL ORGANIC SOLUTES FROM WATER.

Leggett, D.C., et al, July 1, 1990, 62(13), p 1355-1356, 9 refs.

Jenkins, T.F., Miyares, P.H.

44-3922

WATER CHEMISTRY, LABORATORY TECH-NIQUES, CHEMICAL ANALYSIS, CHEMICAL COMPOSITION, SOLUBILITY, CHEMISTRY

It appears there has been very little exploitation of salting out with water-miscible solvents for extraction of organic solutes from water Although this technique is known to many chemists, we found no specific literature references to many chemists, we found no specific literature references to salting-out of organic compounds as a prelude to their determination in water, save one recent abstract. This technique has, however, been used for a number of years for extraction of metal-chelates into organic solvents prior to atomic absorption, high-performance liquid chromatography, polarographic, or colorimetric analysis. So, although we freely acknowle'; e that the technique itself is not new, we do feel that its potential "polications in organic trace analysis of water have not been properly appreciated or utilized. We describe here just one of many possible examples, which has found considerable utility in our laboratory.

MP 2744

FIELD ASSESSMENT OF FISHERIES HABITAT-ENHANCEMENT STRUCTURES IN BINGO BROOK, VERMONT, AFTER THE SPRING 1989 ICE RUN.

Calkins, D.J., et al, International Association of Hydrological Sciences Congress, 23th, Ottawa, Ontario, Aug. 22, 1989. Proceedings, [1989], 12p., 4 refs Gatto, L.W., Brockett, B.E.

HYDRAULIC STRUCTURES, STREAM FLOW, ICE BREAKUP, ICE COVER EFFECT, STABILITY, ICE CONDITIONS, ECOSYSTEMS, ROCKS. TY, ICE CONDITIONS, ECOSYSTEMS, ROCKS. Fishenes habitat-enhancement structures, such as flow deflectors, check dams, large boulders placed in-stream an I woody-materials structures that diversify stream habitats, have not been evaluated to see if they can withstand river rice forces during ice runs and ice jams. This paper assesses the first winter performance of such structures placed in Bingo Brook, a small stream in the Green Mountain National Forest, Vermont. Photographs, field observations and ice thickness measurements were taken throughout the winter. The primary objective was to observe 1988-89 rec conditions and ice cover breakup at the structures to determine their survivability during an ice run and jam, and to identify improvements in their design for projects being constructed in the summer and fall of 1989

SKI FRICTION AND THERMAL RESPONSE. Warren, G.C., et al, International Snow Science Workshop, Whistler, British Columbia, 1989, [1989, p.223-225, 2 refs.

Colbeck, S.C. 44-3924

SKIS, WOOD ICE FRICTION, TEMPERATURE MEASUREMENT, MELTWATER, SLIDING, THERMAL PROPERTIES.

SIMULATION OF DISTRICT HEATING SYS-TEMS FOR PIPING DESIGN.
Phetteplace, G., International Symposium on District

Heat Simulation, Reykjavik, Iceland, Apr. 13-16, 1989, (1989), 27p, 12 refs.

HEATING, COST ANALYSIS, HEAT PIPES, DE-SIGN CRITERIA, SIMULATION, ANALYSIS (MATHEMATICS), HEAT LOSS, PIPES (TUBES). This paper describes the initial development of a non-proprie-tary comprehensive design model for sizing distribution piping tary comprehensive design model for sizing distribution piping. This model considers all major costs incurred in the construction and operation of a distribution system over its useful lifetime. The effect, of annual variations in load are considered where they will have an impact on the operational costs. Realistic methods for meeting variations in load, such as combined temperature and flow modulation, can be used. Results from a sample calculation are compared to results of a enteria-based design. The enteria-based design is shown to have a life cycle cost which exceeds that of the optimal design by 16. In addition, the capital costs of the enteria based design are shown to be 30 seriales. greater.

MP 2747

OPTIMAL SIZING OF DISTRICT HEATING

Phetteplace, G., American Society of Heating, Refrigerating and Air-Conditioning Engineers Winter Meeting, Chicago, IL, Jan. 1989, American Society of Heating, Refrigerating and Air-Conditioning, 25p., 11 refs. 44-3926

HEATING, HEAT PIPES, COST ANALYSIS, DE-SIGN CRITERIA, ANALYSIS (MATHEMATICS), HEAT LOSS, MODELS, PIPES (TUBES)

HEAT LOSS, MODELS, PIPES (TUBES)

Existing design methods for district heating systems rely largely on criteria known only to result in functional designs which may be far from optimal a rational design method which achieves a design yielding the lowest life cycle cost for the assumptions made. All major costs are considered, and the formulation provides great flexibility for including factors such as escalation of energy costs in establishing the operating costs for the system, any type of annual load profile and operational strategy may be considered. The method developed is used to obtain an optimal design of a typical district heating main. This design is compared to a design resulting from the application of well established criteria. The criteria stated of the criteria for the criteria fo the approximation of well established currents. The extensions that design is shown to have a life cycle cost which exceeds that of the optimal design by 16%. The capital costs are 30% greater for the criteria-based design

MP 2748

REGIONAL CLIMATIC TRENDS IN NORTH-ERN NEW ENGLAND.

Haugen, R.K., et al, 1988, Vol.18, p.64-71, 8 refs. Fulk, M.A. 44-3927

AIR TEMPERATURE, STATISTICAL ANALYSIS, METEOROLOGICAL DATA, CLIMATIC CHANGES, TEMPERATURE VARIATIONS, PERIODIC VARIATIONS, CLIMATOLOGY, PRECIPITATION (METEOROLOJY).

The unusually dry and warm summer of 1988 has heightened interest in the subject of climing change. Six inland stations in Maine, New Hampshire, and Vermor with temperstations in Maine, New Hampshire, and vermor after end precipitation records of nearly 100 years, are analyzed. The database is the NOAA-Oak Ridge National Laboratory US Historical Climatology Network Seasonal and annual air temperature and precipitation patterns are compared among the six stations exhibit a gradual warming over their periods of record, but no regional precipitation trends can be identified

MP 2749

THAWING SOIL STRENGTH MEASURE-MENTS FOR PREDICTING VEHICLE PER-FORMANCE.

Shoop, S.A., International Society of Terrain Vehicle Systems, North American Meeting, Victoria, British Columbia, Apr., 1989 Proceedings, (1989), 18p., 7 rcfs.

SOIL TESTS, VEHICLES, PERFORMANCE, SOIL STRENGTH, TRACTION, GROUND THAWING, SHEAR PROPERTIES, SOIL WATER, ACCURA-

The CRREL Instrumented Vehicle (CIV), and shear annulus direct shear and triaxial compression test devices w to measure the strength of thawed and thawing soil. to measure the strength of thawed and thawing soil. These strength values can be used in simple traction models to predict the tractive performance of vehicles. Strength was evaluated in terms of the parameters c and phi based on the Mohr Coulomb failure critetion. It is proposed here that an instrumented vehicle is best suited for terrain characterithat an instrumented whicle is best suited for terrain characterization for mobility studies because the conditions created by a tire slipping on a soil surface are exactly duplicated. The c and phi values from the shear annulus were found to overpredict traction because of the low normal stress applied by the annulus and the curved nature of the failure envelope. Of all the tests, the direct whear test yields the highest phi value. This was most likely because the test was run at a slow deformation rate, under drained conditions. The triavall test results were the most similar to those from the vehicle. All test methods show phi increasing with soil moisture up to the plastic limit of the soil and then decreasing. Phi as neasured with the vehicle was also found to be strongly influenced by the thaw depth.

MP 2750

SEA ICE IN THE POLAR REGIONS. Gow, A.J., et al, Polar oceanography Part A: physical science Edited by W.O. Smith, Jr., San Diego, Academic Press, 1990, p.47-122, Refs. p.117-122 Tucker, W.B

44.3976

SEA ICE DISTRIBUTION. ICE COVER THICK-NESS, SEA WATER FREEZING, ICE STRUCTURE, DRIFT, ICE CRYSTAL GROWTH, ICE SALINITY, MATHEMATICAL MODELS

The following is death with in this chapter large scale aspects of floating ice covers, from thermodynamic and dynamic behavior to specific ice features small scale properties, beginning with the freezing characteristics of sea water and progressing to the crystainne structure and salinity characteristics of sea ice. Specific features of the large- and small-

scale properties of the Arctic and antarctic sea ice are compared

MP 2751

COMPARATIVE MODEL TESTS IN ICE OF A CANADIAN COAST GUARD R-CLASS ICE-BREAKI'R.

Tatinclaux, J C, et al, Society of Naval Architects and Marine Engineers, 1989, p.1/1-1/18, 8 refs, For presentation at the Annual Meeting of the Society of Naval Architects and Marine Engineers, New York,

N.Y., Nov. 15-18, 1989. Alekseyev, IU.N., Enkvist, E., Kıtagawa, H., Narita, S., Schwarz, J., Takekuma, K., Williams, F.M.

44.3984 ICEBREAKERS, MODELS, MECHANICAL TESTS, METAL ICE FRICTION, PERFORM-ANCE, PROPELLERS, ICE MECHANICS, COR-

RELATION, ACCURACY.

MP 2752

DETECTION OF COARSE SEDIMENT MOVE MENT USING RADIO TRANSMITTERS.

Chacho, E.F., Jr., et al, 23rd Congress of the Interna-Chacho, E.F., Jr., et al, 23rd Congress of the Interna-tional Association for Hydraulic Research, Ottawa, Canada, Aug. 21-25, 1989. Proceedings, [1989], p.367-373(B), 7 refs. Burrows, R.L., Emmett, W.W.

44-3985

RIVER FLOW, SEDIMENT TRANSPORT, TELEMETERING EQUIPMENT, ROCKS, DETECTION, RADIO WAVES, GLACIAL RIVERS. MP 2753

SNOW-SURFACE TEMPERATURE ANALYSIS. Bates, R E., et al, 1989, 46th, p.109-116, 4 refs Gerard. S.

44-4003

SNOW SURFACE TEMPERATURE, SNOW AIR INTERFACE, TEMPERATURE MEASUREMENT, MEASURING INSTRUMENTS, CORRE-LATION, TEMPERATURE VARIATIONS, ACCURACY.

This paper gives a detailed analysis of near snow-surface temperature measurements gathered at the US Army Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, NH, and at a National Guard facility located at Hollis, ME. These data provided simultaneous hourly or half-hourly surface temperatures for intercomparison of the instrumentation noted above during three winters of field experiments.

MP 2754

VECTOR ANALYSIS OF ICE PETROGRAPHIC DATA.

Ferrick, M.G., et al, 1989, 46th, p 129-141, 13 refs. Claffey, K.J., Richter-Menge, J.A. 44-4006

ICE CRYSTAL STRUCTURE, ORIENTATION, ANALYSIS (MATHEMATICS), ICE CRYSTAL OPTICS.

OPTICS.
In this paper a quantitative analysis of uniaxial crystal orientation data is developed. Though the method is general, we focus on the application of the analysis to ice fabrics. The crystal orientation data are represented as points on the surface of a unit sphere. An orthogonal least-squares error measure is used to develop equations that define the closest plane and line through the data while retaining all coordinate directions as independent variables. For comparison, a parallel develope, ent is presented of the standard dependent variable least-squares determination of the best plane. The orthogonal error measure quantifies the good-ness-of-fit to the data of all approximate representations. Finally, a technique is developed to generalize from the standard Schmidt net presentation of data in the xy-plane to a presentation in any of the three planes defined by the Cattesian coordinate system. MP 2755

DOES SNOW HAVE ION CHROMATOGRAPH-

IC PROPERTIES. Hewitt, A.D., et al. 1989, 46th, p.165-171, 9 refs Cragin, J.H., Colbeck, S.C.

SNOW COMPOSITION, CHEMICAL PROPERTIES, ION DIFFUSION, SNOW CRYSTALS, MELTWATER, ADSORPTION, ICE WATER INTERFACE, CHEMICAL ANALYSIS

In this study we investigate whether or not grains of metamorphosed snow (ice crystais) can act as a chromatographic column selectively adorbing and retaining inorganic ions. The chromatographic process has been proposed as a potential mechanism to explain the preferential elution of inorganic ions observed in water from melting snowpacks. Experiments were conducted using a 18 cm diameter by 30 cm long. Pyrex glass column filled with frozen droplets and natural snow grains. Denonized water and solutions containing known dilute concentrations of sulfate, nitrate and chloride were then slowly allowed to flow down through the column and the cluant was collected in 1 ml, abspaces. An experiment specifically designed to detect chromatographic effects showed all three species appeared at the bottom of the column simultaneously, indicating that we surfaces exhibit no preferential affinity for these anions. In this study we investigate whether or not grains of metamorMP 2756

APPLICATION OF AEROSOL PHYSICS TO SNOW RESEARCH.

Hogan, A.W., 1989, 46th, p.201-207, 6 refs.

SNOW: LAKES, SNOW CRYSTAL STRUCTURE, SNOWFLAKES, SNOW CRYSTAL STRUCTURE, SNOWFALL, STATISTICAL ANALYSIS, AEROSOLS, SNOW OPTICE, PRECIPITATION (METEOROLOGY), PARTICLES, VISIBIL'TY, CLASSIFICATIONS.

CLASSIFICATIONS.

Operational winter meteorology deals with problems that depend on the area, volume or number of snowflakes in the air. The irregular shape of typical aggregated snowflakes requires special techniques for calculation of area, volume or number from mass precipitation data. Atmospheric aerosols, paint pigments, and other fine particles have very irregular shapes but are several orders of magnitude smaller than snowflakes. The statistical techniques developed these fine particles can be applied to snowflakes to estimate the visibility, rate of surface coverage and other area- or volume-dependent operational parameters. It appears that these techniques can be broadly applied to generalization of the physical properties of airborne snow

CHEMICAL MIGRATION IN SNOWPACK. Murphey, B.B., et al, 1989, 46th, p.282-286, 8 rets. Wolfe, D., Hogan, A.W.

44-4028

SNOW COVEP, SNOW COMPOSITION, CHEMI-CAL PROPERTIES, SNOW IMPURITIES, GRATION, SAMPLING, PRECIPITA (METEOROLOGY), POLLUTION. PRECIPITATION

(METEOROLOGY), POLLUTION.

It is inviting to use snowpack sampling as a technique to collect precipitation specinens, and to evaluate chemical precipitation theories or source-receptor pollution transport models with the results of spreimen analysis. Such snowpack sampling would allow a posteriori collection of representative samples for analysis, rether than requiring multi-point multi-time collections by several observers, through a long precipitation period. An experiment has been initiated to investigate chemical behavior in snowpack.

MP 2758

LIDAR-DERIVED PARTICLE CONCENTRA-TIONS IN PLUMES FROM ARCTIC LEADS. Andreas, E.L., et al, 1990, Vol.14. Symposium on Ice

and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.9-12, 24 refs.
Miles, M.W., Barry, R.G., Schnell, R.C.

44-4151

ICE OPENINGS, CLOUD DROPLETS, AIR WATER INTERACTIONS, LIDAR, AEROSOLS, POLYNYAS, ANALYSIS (MATHEMATICS), HU-MIDITY.

With an airborne lidar, massive plumes of condensate particles rising from wintertime leads in the Arctic Ocean have been observed. Some of these plumes reached an altitude of 4 km; some extended over 200 km down-wind from their surface source. Here we invert the lidar equation and 4 km; some extended over 200 km upwirms to surface source. Here we invert the lidar equation and use lidar backscatter data to infer particle concentrations within two such plumes. Assuming that the plumes consist of supercooled water droplets of radius 5 micron, typical concentrations of 300,000-600,000 droplets/cu m just above the leads is estimated Concentrations within the plumes can still be as high as 10,000 droplets/cu m at an altitude of 3 km and 200 km down-wind from some leads. Had it been assumed that the plume particles are ice spheres of radius 40 microns, concentrations would be just 100 times leas than these.

MP 2759

TREATMENT OF SHORTWAVE RADIATION AND OPEN WATER IN LARGE-SCALE MOD-ELS OF SEA-ICE DECAY

Perovich, D.K., et al. 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p.242-246, 12 refs.

Maykut, G.A. 44-4202

SEA ICE DISTRIBUTION, ICE MELTING, SOLAR RADIATION, MATHEMATICAL MODELS, ICE WATER INTERFACE, ICE COVER THICKNESS, ICE AIR INTERFACE, ICE MOD-ELS. ICE EDGE.

Sea ice covering the polar oceans is only a thin veneer whose areal extent can undergo large and rapid variations in response to relatively small changes in thermal forcing Positive feedback between variations in ice extent and global abodo has the potential to amplify small changes in climate Particularly difficult to model is the summer decay and retreat of the ice pack which is strongly influenced by shortwave radiation entering the upper ocean through leads. Most models assume that all of this energy is expended in lateral melting affine edges. In reality, only a portion of shortwave radiation contributes directly to lateral melting, with the temainder going to bottom ablation and warming of the water. This partitioning of shortwave radiation affects not only the magnitude, but also the character of the jacdicted rice decay, reducing the change in see concentration and enhancing the thinning of the ice and the storage of heat in the water. In this paper an analytical model is presented which includes many of these processes and is stable regardless of time step, making it suitable for use in climate simulations Sea ice covering the polar oceans is only a thin vencer

MP 2760

PRIMARY EFFLUENT AS A HEAT SOURCE FOR HEAT PUMPS.

Phetteplace, G.E., et al, 1989, 5(6), p.12-17, 4 refs or another version see 43-2160.

Heda, H.T.

HEAT TRANSFER, HEAT SOURCES, SEWAGE REATMENT, HEAT RECOVERY, WATER TREATMENT, WASTE TREATMENT.

TREATMENT, WASTE TREATMENT.

Water-source heat pumps have beer, installed in two waste treatment buildings at Ft Greely, AK. These heat pumps use primary effluent as a source of heat. Intermediate loops circulating an ethylene glycol/water mixture are used to transfer heat from the effluent heat exchangers to the heat pump evaporators. In one case, heat exchange is accomplished via an embossed panel heat exchanger immersed directly in the effluent. In the other case, the effluent heat exchanger is a plate-and-frame unit

THEORETICAL ESTIMATES OF LIGHT RE-FLECTION AND TRANSMISSION BY SPA-TIALLY COMPLEX AND TEMPORALLY VARY-

ING SEA ICE COVERS.
Perovich, D.K., June 15, 1990, 95(C6), p.9557-9567, 25 refs. For another version see 44-3816. 44.4764

44-4264 SEA ICE, ICE COVER, ICE OPTICS, LIGHT TRANSMISSION, ICE MODELS, MATHEMATI-CAL MODELS, REFLECTION, ICE SURFACE, ICE COVER THICKNESS.

ICE COVER THICKNESS.

The focus of this paper is on the reflection and transmission of light by spatially inhomogeneous and temporally varying sea are covers. This is investigated using a two-stream, multilayer radiative transfer model in the wavelength region from 400 to 1000 nm. The model is computationally simple and utilizes the available experimental data on the optical properties of sea are. The ice cover is characterized as a layered medium composed of selections from nine distinct anow and ice types. Three case studies are presented illustrating values of spectral albedo, transmittance, and transmitted photosynthetically active radiation (PAR) for (1) a spatially inhomogeneous are cover, (2) a uniform ice cover as it undergoes a melt cycle, and (3) a temporally changing spatially variable ice cover. Results indicate that small-scale horizontal variations in snow depth and ice thickness. spanishly variation the cover Results indicate that small-scale horizontal variations in snow depth and ice thickness can cause I th transmission to change over 3 orders of magnitude. Disc atic changes in light reflection and transmagnitude.

mission at predicted in the early part of the melt season as the ice over evolves from an opaque, snow-covered medium to translucent oare or ponded ice

COMPARATIVE MODEL TESTS IN ICE OF A CANADIAN COAST GUARD R-CLASS ICE-

Latinclaux, J.C., et al. 1989 (Pub. 1990), Vol.97, p.31-52. Includes discussion and authors' reply. 12 refs.

For another version see 44-3984. Alekseev, IU.N., Enkvist, E, Kitagawa, H., Narita, S., Schwarz, J., Takekuma, K., Williams, F.M.

ICEBREAKERS. METAL ICE FRICTION, IC NAVIGATION, ANALYSIS (MATHEMATICS).

This paper presents the results of resistance and propulsion tests in level ice of a 120 scale model of the Canadian This paper presents the results of resistance and propulsion tests in level ice of a 120 scale model of the Canadian Coast Guard R-class recbreaker at two rec-hull finetion coefficients, performed at several ice testing facilities in various countries under the aegus of the Committee on Performance of Ships in Ice-covered Waters of the International Towing Tank Conference (ITTC). There is good agreement overall among the test results obtained at the various facilities. The differences that do remain should be attributed to differences in experimental techniques and types of model ice used at the participating laborateries. An increase in hull roughness led to an increase in ince resistance as expected, but had no effect on the propeller characteristics. While the thrust coefficient in ice was nearly the same as in clear water, the torque coefficient and thrust deduction factor were much greater in level ice than in clear water and nearly constant. Full-scale ship performance predicted from the resistance test results of the rougher model and the propulsion characteristics in clear water was in good agreement overall with available field trial data. Predicted performance using the ice resistance of the rougher model and the model propeller characteristics in ice was usually below that observed at full scale. This would indicate that ice-propeller interaction is egessive during model propulsion tests, or that the effect of ice entrainment on propeller performance is greater at model scale than at full scale. Ice-propeller interaction remains a domain where further research is needed

MP 2763

INTERNAL STRUCTURE, COMPOSITION AND PROPERTIES OF BRACKISH ICE FROM THE BAY OF BOTHNIA DURING THE BEPERS-88 EXPERIMENT.

Weeks, W.F., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, .0th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1318-1333, 21 refs.

A.J., Kosloff, P., Digby-Argus, S.A.

SEA ICE, SALT ICE, ICE SALINITY, ICE SUR-VEYS, REMOTE SENSING, ICE TEMPERA-TURE, ICE STRUCTURE, BOTHNIA, BAY.

TURE, ICE STRUCTURE, BOTHNIA, BAY.
Field observations made during the May 1988 BEPERS (Bothmian Experiment in Preparation for the ERS-1 satellite) remote sensing experiment allow limited characterizations of the temperature, salinity, structure and physical property profiles of the bracksh ice that forms in the Bay of Bothnia. During the sampling period, undeformed fast ice thicknesses varied from 40 to 60 cm in the Bay to the east of Umea, Sweden, with somewhat thicker ice occurring in the northernmost, nearly fresh, portions of the Bay. Ice salinities were generally less than 1 per mill and the ice temperatures were usually warmer than -3 5 C. Although most of the ice examined was simple congelation ice, a variety of c-axis fabrics were observed including random, vertical and horizontal (random and aligned) orientations. There was no obvious pattern to the geographic arrangement of these fabrics. Brine volume profiles are used to estimate representative ice property profiles. Comparisons are made between the properties of ice from the Bay of Bothnia and those of more typical sea ice from the Bay of Bothnia and those of more typical sea ice from the Arctic Ocean at similar ice thicknesses. A variety of structural factors contributing to specific areas of high radar return in the bay are also discussed. also discussed

ICE FORCE MEASUREMENTS ON A BRIDGE PIER IN A SMALL RIVER.

PIEM IN A SMALL RIVER.
Sodhi, D.S., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.Å. Fransson, Luleå, Sweden, University of Technology, 1989, p.1419-1427, 9 refs. Gagnon. J.G.

Gagnon, J.G. *44*...439

BRIDGES, PIERS, ICE LOADS, RIVER ICE.

BRIDGES, PIERS, ICE LOADS, RIVER ICE.

Three V-shaped panels were installed on a bridge pier in a small river in Vermont, USA:

Each panel was supported on four instrusionated pins such that the ice force on each face of the 1-shaped panel was measured by three load cells. During the ice run in Mar. 1988, the ice forces were measured into recorded. Typical records and histograms of the measured ice forces are presented.

MP 2765

ARCTIC ! ESEARCH OF THE UNITED STATES, VOL.4.

U.S. Interagency Arctic Research Policy Committee, Washington, D.C., Spring 1990, 120p. Brown, J., ed. Bowen, S., ed.

44-4466

RESEARCH PROJECTS, OCEANS, OCEANOG-RAPHY, ENVIRONMENTAL PROTECTION, ECOLOGY, CLIMATOLOGY, MEETINGS, NATURAL RESOURCES, ATMOSPHERIC COM-POSITION.

The Irad atticle in this issue reflects the importance of the Artic Ocean and its marginal seas to US national interests the iding the fisheries industry, the oil and gas industries, defense, and the study of global climate change processes. This is followed by a brief description of research projects of the specific federal agencies involved in the Artic Oceans. Research. Program.

MP 2766

RADAR SURVEYING OF THE BOTTOM SUR-

FACE OF ICE COVERS.
Arcone, S.A., et al, Apr. 1990, 16(1), p.30-39, With French summary. 29 refs.

Calkins, D.J.

A4.4468
RIVER ICE, RADAR ECHOES, ICE BOTTOM SURFACE, ICE COVER THICKNESS, ICE CONDITIONS, SUBGLACIAL OBSERVATIONS, ICE SOLID INTERFACE, SCATTERING

Asmet, H.W.C. Management of power plant waste heat in cold regions	Acharya, H.K. Surface-wave dispersion in Byrd Land, Antarctica [1972,	Mechanisms for ice bonding in wet snow accretions on power lines (1983, p 25-30) MP 1633
(1975, p.22-24) MP 942 Thermal energy and the environment (1975, 3p. + 2p. figs.)	p.955-959j MP 992 Ackermann, N.L.	Field measurements of combined icing and wind loads on wires [1983, p.205-215] MP 1637
MP 1480	Mechanics of ice jam formation in rivers (1983, 14p) CR \$3-31	Simple boom assembly for the shipboard deployment of air- sea interaction instruments [1983, 14p.] SR 83-28
Protected membrane roofs in cold regions (1976, 27p.) CR 76-02	Ackleson, S.G.	Effect of X-ray irradiation on internal friction and dielectric
Utility distribution systems in Iceland [1976, 63p] SR 76-05	Comparison of SPOT simulator data with Landsat MSS im- agery for delineating water masses in Delaware Bay, Broad-	Physical mechanism for establishing algal populations in frazil
Long distance heat transmission with steam and hot water [1976, 39p.] MP 938	klit River, and adjacent wetlands [1985, p.1123-1129] MP 1909	ice (1983, p.363-365) MP 1717 Surface roughness of Ross Sea pack ice (1983, p.123-124)
Utility distribution systems in Sweden, Finland, Norway and England (1976, 121p) SR 76-16	Ackley, S.F. Meso-scale strain measurements on the Beaufourt sea pack	MP 1764 Elemental compositions and concentrations of micros-
Ice engineering complex adopts heat pump energy system 1977, p.25-261 MP 893	ice (AIDJEX 1971) ₁ 1974, p.119-138 ₁ MP 1035 Snow and ice ₁ 1975, p 435-441, 475-487 ₁ MP 844	pherules in snow and pack ice from the Weddell Sea [1983, p.128-131] MP 1777
Utility distribution practices in northern Europe (1977, p.70- 95 ₁ MP 928	Height variation along sea ice pressure ridges and the proba- bility of finding "holes" for vehicle crossings (1975, p.191-	Relative abundance of diatoms in Weddell Sea pack ice [1983, p 181-182] MP 1786
Ice engineering facility heated with a central heat pump sys- tem (1977, 4p.) MP 939	199] MP \$48 Thickness and roughness variations of arctic multiyear sea ice	Atmospheric boundary-layer modification, drag coefficient, and surface heat flux in the antarctic marginal ice zone
Observation and analysis of protected membrane roofing sys-	(1976, 25p.) CR 76-18	(1984, p 649-661) MP 1667
tems (1977, 40p.) CR 77-11 Mid-winter installation of protected membrane roofs in Alas-	Antarctic sea ice dynamics and its possible climatic effects [1976, p.53-76] MP 1378	Antarctic sea ice microwave signatures and their correlation with in situ ice observations [1984, p 662-672] MP 1668
ka (1977, 5p) CR 77-21 Heat transmission with steam and hot water (1978, p.17-23)	Misgivings on isostatic imbalance as a mechanism for sea ice cracking [1976, p.85-94] MP 1379	West antarctic sea ice [1984, p.88-95] MP 1818
MP 1956 Abele, G.	Review of Ice Physics by P.V. Hobbs (1977, p.341-342) MP 937	Morphology and ecology of diatoms in sea ice from the Weddell Sea (1984, 41p.) CR 84-85
Portable instrument for determining snow c tracteristics related to trafficability (1972, p.193-204) MP 886	De-icing of radomes and lock walls using pneumatic devices [1977, p.467-478] MP 1064	Sea ice structure and biological activity in the antarctic marginal ice zone [1984, p.2087-2095] MP 1701
Some effects of air cushion vehicle operations on deep snow [1972, p.214-24] MP 887	Laboratory experiments on lock wall deicing using pneumatic devices (1977, p.53-68) MP 974	Variation of the drag coefficient across the Antarctic marginal
Methods of measuring the strength of natural and processed	Sea ice studies in the Weddell Sea region aboard USCGC Burton Island [1977, p.172-173] MP 1014	ice zone (1984, p.63-71) MP 1784 Sea ice data buoys in the Weddell Sea (1984, 18p.) CR 84-11
Effects of hovercraft, wheeled and tracked vehicle traffic on	Comparison between derived internal dielectric properties and radio-echo sounding records of the ice sheet at Cape	Simple boom assembly for the shipboard deployment of air-
tundra (1976, p.186-215) MP 1123 Compressibility characteristics of compacted snow (1976,	Folger, Antarctica (1978, 12p.) CR 78-04	sea interaction instruments (1984, p.227-237) MP 1752
47p. ₂ CR 76-21 Arctic transportation: operational and environmental evalua-	Primary productivity in sea ice of the Weddell region (1978, 17p) CR 78-19	Combined icing and wind loads on a simulated power line test span [1984, p.173-182] MP 2114
tion of an air cushion vehicle in Northern Alaska (1976, 7p.) MP 894	Sea ice and ice algae relationships in the Weddell Sea (1978, p.70-71) MP 1203	Ice nucleation activity of antarctic marine microorganisms [1985, p.126-128] MP 2217
Hovercraft ground contact directional control devices (1976, p.51-59) MP 875	Measurement of mesoscale deformation of Beaufort sea ice (AIDJEX-1971) (1978, p.148-172) MP 1179	Sea ice microbial communities in Antarctica (1986, p.243-
Air cushion vehicle ground contact directional control devices [1976, 15p.] CR 76-45	Numerical simulation of atmospheric ice accretion [1979, p.44-52] MP 1235	Conductor twisting resistance effects on ice build-up and ice
Arctic transportation: operational and environmental evalua- tion of an air cushion vehicle in northern Alaska (1977,	Laboratory experiments on icing of rotating blades (1979, p.85-92) MP 1236	shedding (1986, 8p. + figs.) MP 2108 Communication tower icing in the New England region
p.176-182; MP 985 Runway site survey, Pensacola Mountains, Antarctica	Computer modeling of atmospheric ice accretion (1979, 36p.) CR 79-04	[1986, 7p] MP 2169 Sea spray icing: a review of current models [1986, p.239-
(1977, 45p.) SR 77-14	Standing crop of algae in the sea ice of the Weddeli Sea region [1979, p 269-281] MP 1242	262; MP 2163 Icing and wind loading on a simulated power line 1986.
Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska (1977, 32p.) SR 77-31	Ice sheet internal radio-echo reflections and associated physi-	p.23-27 ₁ MP 2200
Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska (1978, 63p.) SR 78-16	cal property changes with depth [1979, p.5675-5680] MP 1319	Growth, structure, and properties of sea ice (1986, p.9-164) MP 2209
Effects of winter military operations on cold regions terrain [1978, 34p.] SR 78-17	Drifting buoy measurements on Weddell Sea pack ice (1979, p.106-108) MP 1339	Sea-ice investigations during the Winter Weddell Sea Project [1987, p 88-89] MP 2491
Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p)	Mass-belance aspects of Weddell Sea pack-ice (1979, p.391- 405) MP 1286	Computer modeling of atmospheric ice accretion and aerodynamic loading of transmission lines (1987, p.103-109)
SR 79-29 Effect of water content on the compressibility of snow-water	Modeling of anisotropic electromagnetic reflection from sea ice (1980, p.247-294) MP 1325	MP 2279 Physical and structural characteristics of Weddell Sea pack
mixtures (1979, 26p.) CR 79-02 Infiltration characteristics of soils at Apple Valley, Minn;	Modeling of anisotropic electromagnetic reflection from sea- ice (1980, 15p) CR 80-23	ice (1987, 70p.) CR 87-14 Ice thickness distribution across the Atlantic sector of the
Clarence Cannon Dam, Mo; and Deer Creek Lake, Ohio, land treatment sites (1980, 41p.) SR 80-36	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea [1980, p 84-96] MP 1431	Antarctic Ocean in midwinter (1987, p.14,535-14,552) MP 2314
Hydraulic characteristics of the Deer Creek Lake land treat- ment site during wastewater application (1981, 37p.)	Review of sea-ice weather relationships in the Southern Hem- isphere [1981, p.127-159] MP 1426	Sca-ice pressure ridge microbial communities (1988, p.172- 174) MP 2450
CR 81-07 Ecological impact of wheeled, tracked, and air cushion vehi-	Sea-ice atmosphere interactions in the Weddell Sea using drifting buoys (1981, p.177-191) MP 1427	Development of sea ice in the Weddell Sea (1989, p.92-96) MP 2615
cle traffic on tundra (1981, p 11-37) MP 1463 Analysis of infiltration results at a proposed North Carolina	Modeling of anisotropic electromagnetic reflections from sea ice [1981, p 8107-8116] MP 1469	Sea ice ridging in the Ross Sea, Antarctica, as compared with
wastewater treatment site (1984, 24p.) SR 84-11 Long-term effects of off-road vehicle traffic on tundra terrain	Physical and structural characteristics of sea ice in McMurdo	sites in the Arctic (1989, p.4984-4988) MP 2498 Elastic properties of frazil ice from the Weddell Sea, Antare-
(1984, p.283-294) MP 1820	Sound (1981, p.94-95) MP 1542 Growth, structure, and properties of sea ice (1982, 130p.)	tica (1989, p.208-217) MP 2628 Companson of the compressive strength of antarctic frazil ice
Cold factor (1985, p.480-481; MP 2024 Effect of cold weather on productivity (1986, p.61-66)	M \$2.01 On the differences in ablation seasons of arctic and antarctic	and columnar saline ice grown in the laboratory (1989, p 269-278) MP 2621
MF 2152 Effects of cold environment on rapid runway repairs (1986.	sea ice (1982, p.440-447) MP 1517 Physical and structural characteristics of antarctic sea ice	Passive microwave in situ observations of winter Weddell Sea ice (1989, p.10,891-10,905) MP 2655
p.1-9; MP 2169 Arctic mobility problems (1987, p 267-269; MP 2421	(1982, p.113-117) MP 1548 On modeling the Weddell Sea pack ice (1982, p.125-130)	Sea Ice Properties and Processes; Proceedings of the W.F.
Use of off-road vehicles and mitigation of effects in Alaska permafrost environments: a review [1990, p.63-72]	MP 1549 On the differences in ablation seasons of Arctic and Antarctic	Snow cover effects on antarctic sea ice thickness (1990, p. 16-
MP 2682 Abernathy, A.R.	sea ice (1982, 9p.) CR 82-33 Observations of pack ice properties in the Weddell Sea	21 ₁ MP 2726 Quantification of sea-tee textures through automated digital
Overland flow wastewater treatment at Easley, S.C. (1985.	(1982, p 105-106) MP 1608	image analysis (1990, p 28-32) MP 2727 Comparison of the compressive strength of antarctic frazil ice
Of: Overland flow wastewater treatment at Easley, S.C.	Physical, chemical and biological properties of winter sea ice in the Weddell Sea (1922, p.107-109) MP 1609	and laboratory-grown columnar ice (1990, p.79-84) MT 2731
[1986, p.1078-1079] MP 2300 Aceredo, W.	Reports of the U.SU.S.S.R. Weddell Polynya Expedition. October-November 1981, Volume 3, Sea ice observations	Sea ice: a habitat for the foraminifer Neogloboquacina pa- chyderms? [1590, p.86-92] MP 2732
Landsat-assisted environmental mapping in the Arctic Na- tional Wildlife Refuge, Alaska (1982, 59p. + 2 maps)	[1983, 6p. + 59p] SR R3-2 Numerical simulation of the Weddell Sca pack ice [1983].	Adams, J.R.
CR #2-37 Vegetation and a Landset-derived land cover map of the Bee-	p.2873-2887; MP 1592 Recent advances in understanding the structure, properties.	Use of SPOT HRV data in a Corps dredging operation in Lake Ene (1987, p.49-58) MP 2548
chey Point quadrangle, Arctic Coastal Plain, Alaska (1987, 63p.) CR 87-85	and behavior of sea ice in the coastal zones of the polar oceans [1983, p.25-41] MP 1604	Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528

Adams, W.P. Techniques for measurement of snow and ice on freshwater	Orthogonal curvilinear coordinate generation for internal flows [1988, p.425-433] MP 2540	Determination of unfrozen water in frozen soil by pulsed nuclear magnetic resonance (1978, p 149-155)
[1986, p.174-222] MP 2000 Adley, M.D.	Snow as a thermal background: preliminary results from the 1987 field test (1989, p.5-24; MP 2624	MP 1097 Water vapor adsorption by sodium montmonilonite at -5C
Experimental determination of buckling loads of cracked ice	Alekseev, IU.N.	[1978, p 638-644] MP 981
sheets (1984, p.183-186) MP 1687 Buckling analysis of cracked, floating ice sheets (1984,	Comparative model tests in ice of a Canadian Coast Guard R- class icebreaker [1990, p.31-52] MP 2762	Phase composition measurements on soils at very high water contents by pulsed nuclear magnetic resonance technique
28p. ₂ SR 84-23 Calibrating HEC-2 in a shallow, ice-covered river (1986, 25	Alekseyev, IU.N. Comparative model tests in ice of a Canadian Coast Guard R-	[1978, p.11-14] MP 1210 Viking GCMS analysis of water in the Martian regolith
refs.; SR 86-34	class icebreaker (1989, p 1/1-1/18) MP 2751	(1978, p 55-61) MP 1195
Adrian, D.D. Rational design of overland flow systems [1980, p.114-121]	Alexander, M. Preliminary investigations of the kinetics of nitrogen transfor-	Analysis of water in the Martian regolith (1979, p.33-38) MP 1409
MP 1400 Hydraulic model of overland flow on grass covered slopes	mation and nitrosamine formation in land treatment of was- tewater (1979, 59p) SR 79-04	Low temperature phase changes in montmonllonite and non- tronite at high water contents and high salt contents (1980,
[1989, p.569-578] MP 2710	Alexander, V.	p 139-144) MP 1330 Unfrozen water contents of submarine permafrost determined
Aithen, G.W. Beseplate design and performance: mortar stability report	Ice engineering facility (1983, 12p. + fig) MP 2088 Alger, G.R.	by nuclear magnetic resonance [1980, p.400-412] MP 1412
(1977, 28p ₁ CR 77-22 Terminal ballistics in cold regions materials (1978, 6p ₁	Ice and navigation related sedimentation (1978, p.393-403)	Thawing of frozen clays (1985, p.1-9) MP 1923
MP 1182	MP 1133	Unfrozen water contents of six antarctic soil materials (1989, p 353-366) MP 2470
Impact fuse performance in snow (Initial evaluation of a new test technique) [1980, p.31-45] MP 1347	Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40	Anderson, E.A.
Dynamic testing of free field stress gages in frozen soil (1980, 26p.) SR 80-30	Increasing the effectiveness of soil compaction at below-freez-	Permeability of a melting snow cover (1982, p 904-908) MP 1565
SNOW-ONE-A; Data report [1982, 641p.] SR \$2-08	ing temperatures (1978, 58p) SR 78-25 Allen, W.L.	Anderson, S. Wildlife habitat mapping in Lac qui Parle, Minnesota (1984,
Optical engineering for cold environments (1983, 225p) MP 1646	Response of pavement to freeze-thaw cycles. Lebanon, New Hampshire, Regional Airport (1989, 31p) SR 89-02	p.205-208 ₁ MP 2065
Utilization of the snow field test series results for development of a snow obscuration primer (1983, p.209-217)	Deep frost effects on a longitudinal edge drain (1989, p.343-	Andreas, E.L. Turbulent heat flux from Arctic leads [1979, p.57-91]
MP 1692	357; MP 2469 Alley, R.B.	MP 1340 Estimation of heat and mass fluxes over Arctic leads (1980,
Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) MP 2663	Calculating borehole geometry from standard measurements of borehole inclinometry (1984, 18p.) SR 84-15	p 2057-2063 ₁ MP 1410
Akagawa, S. Evaluation of the X-ray radiography efficiency for heaving	Rheology of glacier ice (1985, p.1335-1337) MP 1844	Effects of volume averaging on spectra measured with a Ly- man-alpha hygrometer (1981, p 467-475) MP 1728
and consolidation observation (1988, p.23-28)	Effect of stratigraphy on radar-altimetry data collected over ice sheets [1988, p 60-63] MP 2458	Observations of condensate profiles over Arctic leads with a hot-film anemometer [1981, p.437-460] MP 1479
MP 2376 X-ray photography method for experimental studies of the	Alter, A.J.	On the differences in ablation seasons of arctic and antarctic
frozen fringe characteristics of freezing soil (1990, 69p.) SR 90-05	WATER SUPPLY IN COLD REGIONS (1969, 85p) M III-C5a	sea ice (1982, p 440-447) MP 1517 Sensible and latent heat fluxes and humidity profiles following
Akkek, M.	SEWERAGE AND SEWAGE DISPOSAL IN COLD RE- GIONS (1969, 106p) M III-CSb	a step change in surface moisture [1982, 18p] CR 82-12
Parameters affecting the kinetic friction of ice (1987, p.552- 561) MP 2258	Waste management in the north (1974, p.14-21)	Evaluation of Vassala's MicroCORA Automatic Sounding
Albert, D.G. Impact fuse performance in snow (Initial evaluation of a new	MP 1048 Alverson, K.	On the differences in ablation seasons of Arctic and Antarctic
test technique) [1980, p.31-45] MP 1347	MIZEX 84 mesoscale sea ice dynamics post operations re- port [1984, p 66-69] MP 1257	sea ice (1982, 9p) CR 82-33 Atmospheric boundary layer measurements in the Weddell
Dynamic testing of free field stress gages in frozen soil (1980, 26p.) SR 80-30	Amacher, M.C.	Sea (1982, p.113-115) MP 1610
Seismic site characterization techniques applied to the NATO RSG-11 test site in Münster Nord, Federal Republic of	Retention and release of metals by soils—evaluation of sever- al models [1986, p.131-154] MP 2186	Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langleben (1983, p.779-782) MP 1577
Germany (1982, 33p.) CR 82-17	Modeling the transport of chromium (VI) in soil columns	Reports of the U.SU.S.S.R. Weddell Polynya Expedition, October-November 1981 Volume 7. Surface-level meteoro-
Deceleration of projectiles in snow [1982, 29p.] CR 82-20	(1989, p.996-1004) MP 2670 Correlation of Freundlich Kd and n retention parameters with	logical data (1983, 32p) SR 83-14 Reports of the U.SU.S.S.R. Weddell Polynya Expedition,
Review of the propagation of inelastic pressure waves in snow [1983, 26p.] CR 83-13	soils and elements [1989, p 370-379] MP 2570 Ambach, W,	October-November 1981, Volume 6: Upper-air data (1983,
Effects of snow on vehicle-generated seismic signatures	Study of water drainage from columns of snow (1979, 19p.)	288p; SR 83-13 Atmospheric turbulence measurements at SNOW-ONE-B
[1984, p.83-109] MP 2074 Effect of snow on vehicle-generated seismic signatures	CR 79-01 Andersen, B.G.	(1983, p 81-87) MP 1846 Simple boom assembly for the shipboard deployment of air-
(1984, 24P.) CR 84-23 Fortran subroutines for zero-phase digital frequency filters	International Workshop on the Seasonal Sea Ice Zone, Mon- terey, California, Feb. 26-Mar 1, 1979 (1980, 357p)	sea interaction instruments (1983, 14p.) SR 83-28
(1986, 26p.) SR 86-04	MP 1292	Atmospheric boundary-layer modification, drag coefficient, and surface heat flux in the antarctic marginal ice zone
Effect of snow on vehicle-generated seismic signatures [1987, p.881-887] MP 2229	Anderson, D.M. Arctic and Subarctic environmental analyses utilizing ERTS-	[1984, p 649-661] MP 1667 Variation of the drag coefficient across the Antarctic marginal
Recent research on acoustic to seismic coupling (1987, p 223-225) MP 2418	1 imagery; bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) MP 991	ice zone (1984, p 63-71) MP 1784
Seismic and acoustic wave propagation working group report	Arctic and subarctic environmental analysis (1972, p 28-	Atmosphere subgroup discussions (1984, p.97-98) MP 2603
(1987, p.253-255) MP 2419 Information systems planning study (1987, 48p.)	Jonic migration and weathering in frozen Antarctic soils	Simple boom assembly for the shipboard deployment of air- sea interaction instruments (1984, p.227-237)
SR 87-23 Experimental and theoretical studies of acoustic-to-seismic	(1973, p 461-470) MP 941 Arctic and subarctic environmental analyses using ERTS-1	MP 1752 New method for measuring the snow-surface temperature
coupling (1988, p.19-31) MP 2432	imagery Progress report Dec. 72-June 73 (1973, 75p.) MP 1003	(1984, p 161-169) MP 1867
Observations of low-frequency acoustic-to-seismic coupling in the summer and winter [1989, p.352-359]	Arctic and subarctic environmental analyses utilizing ERTS-	Heat and moisture advection over antarctic sea ice (1985, p.736-746) MP 1888
MP 2654 Acoustic pulse propagation above grassland and snow; com-	1 imagery (1973, 5p.) MP 1611 Mesoscale deformation of sea acc from satellite imagery	Energy exchange over antarctic sea ice in the spring [1985, p 7159-7212] MP 1889
parison of theoretical and experimental waveforms (1990, p.93-100) MP 2573	[1973, 2p] MP 1120 Arctic and subarctic environmental analyses utilizing ERTS-	New method of measuring the snow-surface temperature (1986, p 139-156) MP 2166
Albert, M.R.	1 imagery. Bimonthly progress report, 23 Aug 23 Oct.	Measurements of refractive index spectra over snow [1986,
Computer models for two-dimensional steady-state heat con- duction (1983, 90p) CR 83-10	1973 (1973, 3p) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-	p 248-260; MP 2212 Calibrating cylindrical hot-film anemometer sensors (1986).
Computer models for two-dimensional transient heat conduc- tion (1983, 66p.) CR 83-12	1 imagery. Bimonthly progress report, 23 Oct 23 Dec. 1973 (1973, 6p.) MP 1031	p.283-298 ₁ MP 1860 Spectra and cospectra of atmospheric turbulence over snow
2-d transient freezing in a pipe with turbulent flow, using a	Arctic and subarctic environmental analysis utilizing ERTS- 1 imagery Final report June 1972-Feb 1974 (1974)	(1986, p 219-233; MP 2661
continually deforming mesh with finite elements (1983, p.102-112) MP 1893	125p) MP 1047	Theory for the scalar roughness and the scalar transfer coeffi- cients over snow and sea ice (1986, 19p) CR 86-89
Use of transfinite mappings with finite elements on a moving mesh for two-dimensional phase change (1983, p.85-110)	New England reservoir management Land use segetation mapping in reservoir management (Merrimack River basin)	Bulk transfer coefficients for heat and momentum over leads and polynyas (1986, p 1875-1883) MP 2187
MP 2161 Modeling two-dimensional freezing using transfinite map-	(1974, 30p) MP 1039 Near real time hydrologic data acquisition utilizing the	Theory for the scalar roughness and the scalar transfer coeffi-
pings and a moving-mesh finite element technique (1784)	LANDSAT system (1975, p 200-211) MP 1055	cients over snow and sea ice (1987, p 159-184) MP 2195
45p ₃ CR 84-10 Computation of porous media natural convection flow and	Applications of remote sensing for Corps of Engineers programs in New England (1973, 8p. + 14 figs and tables)	Comment on "Atmospheric boundary layer modification in the marginal ice zone" by T.J. Bennett, Jr. and K. Hunkins
phase change (1984, p.213-229) MP 1895 Translent two-dimensional phase change with convection,	MP 913 Prediction of unfrozen water contents in frozen soils from	(1937, p 3965-3969) MP 2394 Spectral measurements in a disturbed boundary layer over
using deforming finite elements (1985, p 229-24)	liquid determinations (1976, 9p) CR 76-08	snow (1987, p 1912-1939) MP 2254
MP 2162 Moving boundary—moving mesh analysis of phase change	Examining antaretic soils with a scanning electron micro- scope (1976, p 249-251) MP 931	Spectral measurements in a disturbed boundary layer over show [1987, 41p] CR 87-21
using finite elements with transfinite mappings (1936, p.591-607) MP 2159	Mars soil-water analyzer, instrument description and status [1977, p.149-158] MP 912	Estimating turbulent surface heat fluxes over polar, marine surfaces (1988, p 65-68) MP 2448
Automatic finite element mesh generator (1987, 27p.) CR 87-18	Antarctic soil studies using a scanning electron microscope	Estimating Cn square over snow and sea ice from meteorolog-
CH 61.19	(1978, p 106-112) MP 1386	scal quantities [1988, p 258-267] MP 2440

Andreas, E.L. (cont.)	Distortion of model subsurface radar pulses in complex die-	Arion, D.N.
Estimating averaging times for point and path-averaged meas-	lectrics [1981, p.855-864] MP 1472	Review of techniques for measuring soil moisture in situ
urements of turbulence spectra [1988, p 295-304] MP 2434	Some field studies of the correlation between electromagnetic and direct current measurements of ground resistivity	(1980, 17p) SR 80-31 Asce, M.
Estimating Cn square over snow and sea ice from meteorological data (1988, p 481-495) MP 2393	[1982, p.92-110] MP 1513 Measurement of ground dielectric properties using wide-angle	River wave response to the friction-inertia balance (1987, p 764-769) MP 2237
Atmospheric stability from scintillation measurements (1988, p.2241-2246) MP 2386	reflection and refrz tion (1982, 11p) CR 82-06	Ashline, C.E.
Theory for a two-wavelength measurement of the path-ave-	Laboratory measurements of soil electric properties between 0.1 and 5 GHz (1982, 12p) CR 82-10	Haines-Fairbanks pipeline: design, construction and opera- tion (1977, 20p) SR 77-04
raged turbulent surface heat flux (1988, p.219-220) MP 2526	Dielectric properties of thawed active layers overlying perma- frost using radar at VHF (1982, p 618-626) MP 1547	Ashton, G.D. Temperature and flow conditions during the formation of
On the Kolmogorov Constants for the temperature-humidity cospectrum and the refractive index spectrum [1988,	Improving electric grounding in frozen materials (1982.	river ice (1970, 12p.) MP 1723
p.2399-2406 ₃ MP 2437	12p. ₁ SR 82-13 Electrical properties of frozen ground at VHF near Point Bar-	Formation of ice ripples on the underside of river ice covers (1971, 157p) MP 1243
Two-wavelength method of measuring path-averaged turbu- lent surface heat fluxes [1989, p.280-292] MP 2648	row, Alaska (1982, p 485-492) MP 1572 Radar profiling of buried reflectors and the groundwater table	River-sce problems: a state-of-the-art survey and assessment of research needs [1974, p.1-15] MP 1002
Lidar detection of leads in Arctic sea ice [1989, p 530-532] MP 2602	[1983, 16p.] CR 83-11	Snow and ice [1975, p.435-441, 475-487] MP 844
Thermal and size evolution of sea spray droplets [1989, 37p.] CR 89-11	Field dielectric measurements of frozen silt using VHF pulses (1984, p.29-37) MP 1774	Passage of ice at hydraulic structures (1976, p.1726-1736) MP 966
Year of Bowen ratios over the fragen Beaufort Sea (1989,	Dielectric measurements of frozen silt using time domain re- flectometry (1984, p.39-46) MP 1775	Arching of model ice floes Effect of mixture variation on two block sizes [1976, 11p] CR 76-42
p.12,721-12,724; MP 2508 Time constants for the evolution of sea spray droplets (1989,	Conductive backfill for improving electrical grounding in	Numerical simulation of air bubbler systems (1977, p.765-
p.147-149 ₁ MP 2555 Refractive index structure parameter for a year over the froz-	Pulse transmission through frozen silt (1984, 9p)	778 ₁ MP 936 Numerical simulation of air bubbler systems (1978, p 231-
en Beaufort Sea [1989, p 667-679] MP 2575	CR 84-17 Large-size coaxial waveguide time domain reflectometry unit	238 ₁ MP 1618 Isua, Greenland glacier freezing study (1978, p.256-264 ₁
Comments on "A physical bound on the Bowen ratio" (1989, p.1252-1254) MP 2560	for field use (1984, p 428-431) MP 2048	MP 1174
Environment of wintertime leads and polynyas (1989, p 273- 2881 MP 2689	Radar investigations above the trans-Alaska pipeline near Fairbanks (1984, 15p) CR 84-27	Entrainment of ice floes into a submerged outlet (1978, p 291-299) MP 1137
Lidar detection of leads in arctic sea ice (1990, p.119-123)	Field observations of electromagnetic pulse propagation in dielectric slabs (1984, p.1763-1773) MP 1991	Computer simulation of bubbler-induced melting of ice covers using experimental heat transfer results [1978, p.362-366]
MP 2733 Prospects for measuring path-averaged turbulent heat fluxes	Discussion: Electromagnetic properties of sea ice by R.M.	MP 1160
using scintillation at three wavelengths (1990, p.74-77) MP 2696	Morey, A. Kovacs and G.F.N. Cox (1984, p.93-94) MP 1821	River ice (1978, p.369-392) MP 1216 River ice (1979, p.38-45) MP 1178
Lidar-derived particle concentrations in plumes from arctic leads [1990, p 9-12] MP 2758	Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31	Turbulent heat transfer in large aspect channels (1979, 5p.) CR 79-13
Andresen, M.J.	Mapping resistive seabed features using DC methods (1985,	Point source bubbler systems to suppress ice (1979, 12p.)
ORIGIN AND PALEOCLIMATIC SIGNIFICANCE OF LARGE-SCALE PATTERNED GROUND IN THE	p.136-147; MP 1918 Dielectric studies of permafrost using cross-borehole VHF	CR 79-12 Modeling of ice in rivers (1979, p.14/1-14/26)
DONNELLY DOME AREA, ALASKA (1969, 87p) MP 1180	pulse propagation (1985, p.3-5) MP 1951	MP 1335
Andrews, J.T.	Galvanic methods for mapping resistive seabed features (1985, p.91-92) MP 1955	Point source bubbler systems to suppress ice (1979, p.93- 100) MP 1326
Environmental and societal consequences of a possible CO2- induced climate change: Volume 2, Part 3—Influence of	Dielectric properties at 4.75 GHz of saline ice slabs (1985, p.83-86) MP 1911	Suppression of river ice by thermal effluents (1979, 23p.) CR 79-30
short-term climate fluctuations on permafrost terrain [1982, 30p] MP 1546	Preliminary investigations of mine detection in cold regions	Freshwater ice growth, motion, and decay [1980, p 261-
Andrews, M.	using short-pulse radar (1985, 16p) SR 85-23 Model studies of surface noise interference in ground-probing	304 ₁ MP 1299 Proceedings of the Specialty Conference on Computer and
Selected bibliography of disturbance and restoration of soils and vegetation in permafrost regions of the USSR (1970-	radar (1985, 23p) CR 85-19 Short-pulse radar investigations of freshwater ice sheets and	Physical Modeling in Hydraulic Engineering (1980, 492p) MP 1321
1976) (1977, 116p) SR 77-07 Selected bibliography of disturbance and restoration of soils	brash ice (1986, 10p) CR 86-06	Bottom heat transfer to water bodies in winter [1981, 8p.]
and vegetation in permafrost regions of the USSR (1970-	Morphology, hydraulics and sediment transport of an ice- covered river. Field techniques and initial data 1986,	SR 81-18 River ice suppression by side channel discharge of warm
1977) (1978, 175p.) SR 78-19 Anne, Y.	37p. ₁ CR 84-11	water (1982, p.65-80) MP 1528 Performance of a point source bubbler under thick ice (1982,
Modelling a snowdrift by means of activated clay particles 1985, p.48-52 ₁ MP 2007	Microwave dielectric, structural, and salinity properties of simulated sea ice (1986, p 832-839) MP 2188	p.111-124 ₁ MP 1529
Appel, G.C.	Structure and dielectric properties at 4.8 and 9.5 GHz of saline ice (1986, p 14,281-14,303) MP 2182	Theory of thermal control and prevention of ice in rivers and lakes (1982, p.131-185) MP 1554
Analysis of the midwinter temperature regime and snow oc- currence in Germany [1978, 56p] CR 78-21	Airborne river-ice thickness profiling with helicopter-borne UHF short-pulse radar [1987, p 330-340] MP 2312	Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01
Relationships between January temperatures and the winter regime in Germany (1979, p.17-27) MP 1218	Evaluation of the magnetic induction conductivity method for	Predicting lake ice decay (1983, 4p) SR 83-19
Arcone, S.A.	detecting frazil ice deposits (1987, 12p) CR 87-17 Field observations of mine detection in snow using UHF	First-generation model of ice deterioration [1983, p.273- 278] MP 2000
Airborne resistivity and magnetometer survey in northern Maine for obtaining information on bedrock geology	short-pulse radar (1987, 24p) SR 87-19	Lake ice decay (1983, p.83-86) MP 1684
(1976, 19p ₁ CR 76-37 Computer program to determine the resistance of long wires	Microwave and structural properties of saline ice (1987, 36p.) CR 87-20	ice engineering for civil work: baseline study (1983, 91p.) MP 2441
and rods to nonhomogeneous ground (1977, 16p)	DC resistivity measurements of model saline ice sheets (1987, p.845-849) MP 2308	Deterioration of floating ice covers (1984, p.26-33) MP 1676
Numerical studies to aid interpretation of an airborne VLF	Single-horn reflectometry for in situ dielectric measurements	fee bands in turbulent pipe flow [1984, 7p] MP 2007
resistivity survey [1977, 10p] CR 77-05 Preliminary evaluation of new LF radiowave and magnetic	at microwave frequencies (1988, p. 89-92) MP 2333 Borehole investigations of the electrical properties of frozen	lee deterioration (1984, p.31-38) MP 1791 Deterioration of floating see covers (1925, p.177-182)
induction resistivity units over permafrost terrain (1977, p.39-42) MP 925	silt (1988, p 910-915) MP 2364	MP 2122 Bubblers and pumps for melting ice (1926, p.223-234)
Investigation of an airborne resistivity survey conducted at	Seasonal variations in resistivity and temperature in discontinuous permafrost [1988, p 927-932] MP 2365	MP 2133
very low frequency (1977, 48p) CR 77-20 Interaction of a surface wave with a dielectric slab discon-	D.C. resistivity along the coast at Prudhoe Bay, Alaska [1988, p.988-993] MP 2366	River and lake ice engineering (1936, 485p.) MP 2144 Perspectives in ice technology (1986, 4p.) MP 2288
tinuity (1978, 10p.) CR 78-08 Shallow electromagnetic geophysical investigations of perma-	Correlation function study for sea ice [1988, p.14,055-14,-	Corps of Engineers research in Arctic and Arctic-related envi-
frost (1978, p 501-507) MP 1101	O631 MP 2511 Authorne radar survey of a brash ice jam in the St Clair River	ronmental sciences (1987, p.81-87) MP 2411 Snow see 'frozen ground properties working group report
Investigation of a VLF airborne resistivity survey conducted in northern Maine (1978, p.1399-1417) MP 1166	[1989, 17p] CR 89-02 Investigations of dielectric properties of some frozen materi-	[1987, p 163-166] MP 2416 Winter water quality in lakes and streams [1988, 8p]
Electrical ground impedance measurements in the United States between 200 and 415 kHz g1978, 92p ₁	als using cross-borehole radiowave pulse transmissions	MP 2507
MP 1221	(1989, 18p) CR 89-06 Water detection in the coastal plains of the Arctic National	Intake design for see conditions [1988, p 107-138] MP 2518
Electromagnetic geophysical survey at an interior Alaska per- mafrost exposure (1979, 7p.) SR 79-14	Wildlife Refuge using helicopter-borne short pulse radar (1989, 25p.) CR 89-07	lcc formation downstream of Oahe Dam 1987-1988 winter g1988, 37p 1 MP 2506
Review of electrical resistivity of frozen ground and some electromagnetic methods for its measurement [1979, p. 32-	Coastal subsea permafrost and bedrock observations using de-	lee cover formation downstream of a large reservoir with
37 ₁ MP 1623	resistivity (1989, 13p) CR 89-13 Analysis of a short pulse radar survey of revelments along the	variable release (1933, p. 189-193) MP 2496 Flow developers for melting see experimental results
Detection of Arctic water supplies with geophysical techniques (1979, 30p.) CR 79-15	Mississippi River (1989, 20p.) MP 2692 River-ice mounds on Alaska's North Slope (1989, p. 288-	(1989, p.151-160) MP 2465
Effects of seasonal changes and ground ace on electromagnetic surveys of permafrost [1979, 24p] CR 79-23	290 ₃ MP 2563	Thin see growth (1989, p. 564-566) MP 2657 Effect of Toston dam on upstream see conditions (1989,
Delineation and engineering characteristics of permafrost	Radar surveying of the bottom surface of ice covers (1990, p.30-39) MP 2766	9p.; SR 89-16 Unconventional power sources for see control at locks and
Low-frequency surface impedance measurements at some gla-	Arctic Institute of North America	dams (1989, p.107-126) MP 2572
eral areas in the United States (1980, p.1-9) MP 1280 HF to VHF radio frequency polarization studies in sea ice at	Analysis of environmental factors affecting army operations in the Arctic Basin (1962, 11p.) MP 984	lcc effects on hydraulies and fish habitat (1990, 24p.) SR 98-88
Pt Barrow, Alaska (1980, p. 225-245) MP 1324	Arctic Technology Workshop, Hanover, NH, June 20-23, 1989	ASSEC, A.
VIIF electrical properties of frozen ground near Point Barrow, Alaska [1981, 18p] CR 81-13	Proceedings (1989, 475p) SR 89-39	MECHANICAL PROPERTIES OF SEA ICE (1967, 10p) M II-C3

Structures in ice infested water (1972, p 93-97) MP 1016	Bend, L.E. Potential use of SPOT HRV imagery for analysis of coastal	Lake Champlain ice formation and ice free dates and predic- tions from meteorological indicators (1960, p.125-143) MP 1429
Sea ice engineering (1976, p 231-234) MP 986 Some promising trends in ice mechanics (1980, p.1-15)	sediment plumes (1984, p.199-204) MP 1744 Bania, A.	New 2 and 3 inch diameter CRREL snow samplers (1990, p.199-200) MP 1430
Soviet construction under difficult climatic conditions [1980, p.47-53] MP 1345	Prediction of unfrozen water contents in frozen soils from liquid determinations (1976, 9p.) CR 76-96 Barnes, P.W.	Analysis of ice jams and their meteorological indicators for three winters on the Ottauquechee River, Vermont 1961.
Tertiary creep model for frozen sands (discussion) [1984.	Statistical aspects of ice gouging on the Alaskan Shelf of the	27p ₃ CR 81-91 Meteorology (1982, p.43-180 ₃ MP 1560
Surfacing submarines through ice (1984, p.309-318)	Some probabilistic aspects of ice gouging on the Alaskan Shelf	Snow cover characterization (1982, p 559-577) MP 1564
Atkins, R.T.	of the Besufort Ses (1984, p.213-236) MP 1838 Berney, R.J.	Microbiological acrosols from a field-source wastewater irri- gation system (1983, p.65-75) MP 1578
Use of instrumentation under Arctic conditions (1972, p.183-188) MP 990	FIRE IN THE NORTHERN ENVIRONMENT-A SYM- POSIUM (1971, 275p.) MP 878	Northwest snowstorm of 15-16 December 1981 (1983, p.19-
Development of a remote-reading tensionseter/transducer system for use in subfreezing temperatures (1976, p.31-	Beron, J.A.	SNOW-ONE-B data report (1983, 284p.) SR 83-16
45 ₁ MP 997	Optimization model for land treatment planning, design and operation. Part 1. Background and literature review (1983, 35m; SR 83-86	Site-specific and synoptic meteorology (1983, p.13-80) MP 1845
Stake driving tools: a preliminary survey (1977, 43p) SR 77-13	Optimization model for land treatment planning, design and	Climate at CRREL, Hanover, New Hampshire (1984, 789.) SR 84-24
Determination of frost penetration by soil resistivity measure- ments (1979, 24p.) SR 79-22	operation. Part 2. Case study (1983, 30p.) SR 83-87 Optimization model for land treatment planning, design and	Overview of meteorological and snow cover characterization at SNOW-TWO (1984, p.171-191) MP 1868
In-situ thermal conductivity measurements [1983, 38p.] MP 2214	operation. Part 3. Model description and user's guide [1983, 38p.] SR 83-86	Explosive obscuration sub-test results at the SNOW-TWO
Information systems planning study (1987, 48p.) SR 87-23	Berrett, S.	Meteocological and snow cover measurements at Grayling.
Determination of frost penetration by soil resistivity measurements (1989, p.87-100) MP 2565	Window performance in extreme cold (1981, p.396-406) MP 1393	Michigan (1985, p.212-229) MP 2176 Intensity of snowfall at the SNOW experiments (1986,
Simple and economical thermal conductivity measurement	Window performance in extreme cold [1982, 21p] CR 82-36	p.205-217 ₃ MP 2287 Thermal measurements in snow ₂ 1986, p.183-193
Atkinson, J.	Effects of phase III construction of the Chena Flood Control Project on the Tanana River near Fairbanks, Alaska—a	Meteorological instrumentation for characterizing atmo-
Dynamics of NH4 and NO3 in cropped soils irrigated with wastewater [1980, 20p.] SR 88-27	preliminary analysis (1984, 11p. + 5qs.) MP 1745 Barry, R.G.	spheric icing (1967, p.23-30) MP 2276
Atlas, R.M. Introduction to the Workshop on Ecological Effects of Hy-	Lider detection of leads in Arctic sea ice (1989, p.530-532) MP 2602	Meteorological system performance in icing conditions [1987, p.73-86] MP 2285
drocarbon Spills in Alaska (1978, p.155-157)	Lidar detection of leads in arctic sea ice (1990, p.119-123)	WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7) MP 2396
Fate of crude and refined oils in North Slope soils (1978,	MP 2733 Lider-derived particle concentrations in plumes from arctic	SAP 2396 Environmental factors and standards for atmospheric obscu-
p.339-347 ₁ MP 1186 Atweed, D.M.	leads (1990, p.9-12) MP 2758	rants, climate and terrain (1967, 137p.) MP 2309 Comparison of anomfall amounts and snow depths for loca-
Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska (1977, 32p.) SR 77-31	Barton, C.C. Measurement of the resistance of imperfectly elastic rock to	tions in Germany and the Northeast United States (1988,
Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska [1978, 63p.] SR 78-16	the propagation of tensile cracks (1985, p.7827-7836) MP 2052	Prediction of winter battlefield weather effects (1988, p.357-
Aper, A.H., Jr.	Microstructure and the resistance of rock to tensile fracture [1905, p.11,533-11,546] MP 2157	362 ₁ 34P 3402 Impact of wet snow on visible, infrared and millimeter wave
Propose dispenser for cold fog dissipation system (1973, 36p.) MP 1033	Bertsch-Winkler, S.R. Subsidence, inundation, and sedimentation: environmental	attenuation (1908, p.523-535) MP 2008 Comparative studies of the winter climate at selected loca-
Axelon, K.D. Estimation of time to maximum supercooling during dynamic	consequences of the 1964 Alaska earthquake in the Portage, Alaska, area [1974, p.3-9] MP 2409	tions in Europe and the United States (1969, p.283-293) MP 2998
frazil ice formation (1989, 13p.) SR 89-26 Freezeup dynamics of a frazil ice screen (1990, 8p.)	Placer River Sik-an intertidal deposit caused by the 1964	Synoptic meteorology, crystal babit, and snowfall rates in Northeastern snowstorms (1989, p.335-345)
Six 90-04 Solmon River ice jam control studies: interim report (1990.	Bess, D.W.	MP 2999
\$p ₁ 3K 70-00	Dynamic simulations of iceberg-scabed interactions (1989, p.137-151) MP 2684	Millimeter-wave performance during mixed precipitation
Ayorinde, O.A. Experimental methods for decontaminating soils by freezing 1988, 17a., MP 2513	Bastian, R. Wetlands for wastewater treatment in cold climates (1984.	Seast-surface temperature againsts (1969, p.109-116)
Prototype testing facilities for field evaluation of contaminant	9p. + figs.; MP 1945 Basties, R.K.	MP 2753 SNOW IV field experiment data report (1989, 250p.)
transport in freezing soils (1988, 292) MP 2514 Pressure buildup in permafrost pile supports induced by	Aquaculture systems for wastewater treatment, an engineer-	Synoptic meteorology during the SNOW IV Field Experi-
freezeback (1989, p.236-251) MP 2467 Use of innovative freezing technique for in-situ treatment of	Engineering assessment of aquacuiture systems for wastewa-	ment (1919, p.5-12) MP 2640 Site-specific meteorology (1909, p.13-15) MP 2641
contaminated soils (1989, p.489-498) MP 2515 Nandestructive evaluation of moisture migration in insulation	ter treatment: an overview (1980, p.1-12) MP 1423 Bates, R.	Hearly meteorological data for SNOW IV (1989, p.159-
material under prolonged exposure to water (1989, p.111- 121; MP 2716	Meteorological conditions causing major ice jum formation and flooding on the Ottanquechee River, Vermont (1982.	250 ₁ Cold regions weather data systems (1989, p.139-145 ₁ MP 2568
Law-temperature effects on systems for composting of explo- sives-contaminated soils. Part 1: Literature review (1989)	25p.; SR 82-86 Meteorological measurements at Camp Ethan Allen Training	Batson, G.B.
18p.) SR 29-38	Center, Vermont [1982, p.77-112] MP 1984 Snow cover and meteorology at Allagash, Maine, 1977-1980	Field investigation of St. Lawrence River hanging see doms, winter of 1983-84 (1984, 85p.) MP 2178
Determination of the undersaturation in thawed permafrost at	(192), 49p.) SR 23-20	Boteli, G.O. RATE The influence of grazing on the Arctic tundra ecosys-
the beginning of freezeback (1990, p.317-321) MP 2582	Snow-cover characterization: SADARM support (1984, p.409-411) MP 2095	Ecres (1976, p.153-160) MP 970 Boser, C.F.
Fate and transport of contaminants in frozen soils [1990, p.202-211] MP 2679	Botes, R.E. Mesoscale measurement of snow-cover properties (1973).	Reverse phase HPLC method for analysis of TNT, RDX, HMX and 2,4-DNT in summons wastewater (1984, 950.)
Boler, H. GREENLAND ICE SHEET (1961, 18p.) M 1-B2	p.624-643; MP 1029	CR 84-77
PHYSICS AND MECHANICS OF SNOW AS A MATERI- AL (1962, 79a) M II-B	plain, Vermont (1976, 22p.) CR 76-13	Reversed-phase high-performance liquid chromatographic determination of attroorganics in munitiess wantewier 1946 a 170-175. MP 2009
Belley, D.M.	regions (1977, 452.) SR 77-37	Interlaboratory evaluation of high-performance liquid
Roofer a management tool for maintaining built-up roofs (1989, p.6-10) MP 2488	urigation with wastemater [1978, p.273-250]	chromatographic determination of autroorganics in muni- tion plant wastemater (1996, p.176-182) MP 2050
ROOFER: a minagement tool for maintaining built-up roofs (1989, 9p.) MP 2576	Chmatic survey at CRREL in association with the land treat-	Development of an analytical method for the determination of explosery residues in soil. Part II Additional develop-
Balley, P.K. Periglacial landforms and processes in the southern Kenai	ment project (1978, 37p.) SR 78-21 Snow over mapping in northern Maine using LANDSAT	ment and ruggedness testing (1933, 45p.) CR 88-88. Development of an analytical method for the determination.
Mountains, Alaska (1485, 60p.) SR 85-83 Bulley, R.	digital processing techniques (1979, p. 197-198) MP 1510	of explosive residues in soil. Part J. Collaborative test re- soits and final performance evaluation (1989, 1981).
Effects of temperature and species on TNT injury to plants	Documentation of soil characteristics and climatology during five years of wastewater application to CRREL test cells	CR 89-49 Laqued chromatographic method for determination of extract-
Balliel, C.R.	[1979, \$2p.] SR 79-23	able mirrarements and miramme repelats in sed (1919, p. 290-299) MP 2506
Preliminary evaluation of \$8 years rapid infiltration of raw municipal sewage at Calumet, Michigan (1977, p. 489-	regrees, Part 2 (1979, 36p.) NR 19140	Speed, H.T.
510 ₁ MP 976 Baker, D.J.	Aler urigation. Derr Creek Lake State Park, Ohio (1979,	Microbiological acrosols from a field source during spenialier irrigation with waitemater (1978, p. 273-190) MP 1154
Sateliste-horne remote sensing and large-scale programs for the arctic seas in the 1990s (1989, p.510-530)	Lake Champiain see formation and see free dates and predic	Racterial acrosses from a field source during multiple-sprin-
MP 2499 Ballard, H.	tions from meteorological indicators (1979, 21p g CR 79-26	Eler strigation Deer Creek Lake State Park, Ohio 1979, 64p. SR 79-32
Humidity and temperature measurements obtained from an unmanned aerisl vehicle (1987, p.35-45) MP 2293	Winter thermal structure, see conditions and climate of Lake Champlain [1980, 26p.; CR 2002]	Macrobiological acrossis from a field-source wastenater atte- gation system (1983, p.65-75) MP 1578
mendende arrest stante (1) (1)	• • •	

Bayer, J.J. Five-year performance of CRREL land treatment test cells;	Near real time hydrologic data acquisition utilizing the LANDSAT system [1975, p.200-21] MP 1055	Performance of pavement at Central Wisconsin Airport
water quality plant yields and nutrient uptake (1978,	Delineation and engineering characteristics of permafrost	(1989, p 92-103) MP 2463 Comparison of insulated and noninsulated pavements (1989,
24p.j SR 78-26 Roof blisters Physical fitness building, Fort Lee, Virginia	beneath the Beaufort Sea [1976, p.391-408] MP 1377 Thermoinsulating media within embankments on perennially	p 367-378 ₁ MP 2471
(1986, 15p.) Sr 86-35	frozen soil (1976, 161p) SR 76-03	Definition of research needs to address airport pavement dis- tress in cold regions (1989, 142p.) CR 89-10
Porous portland cement concrete as an airport runway over- lay: laboratory evaluation [1989, 20p] SR 89-12	Development of a remote-reading tensiometer/transducer system for use in subfreezing temperatures [1976, p 31-	Monitoring pavement performance in seasonal frost areas (1989, p.10-19) MP 2564
Bayer, J.J., Jr.	45 ₃ MP 897	Unfrozen water contents of undisturbed and remolded Alas-
Performance of wall coatings for concrete and masonry build- ings in Alaska (1989, 27 refs.) SR 89-36	Galerkin finite element analog of frost heave [1976, p.111- 113] MP 898	kan silt ₁ 1989, p.103-111 ₃ MP 2683 Berger, R.H.
Bechtel, R.B.	Observations along the pipeline haul road between Livengood and the Yukon River [1976, 73p.) SR 76-11	Snowpack optical properties in the infrared (1979, 16p)
Temporary environment. Cold regions habitability [1976, 162p.] SR 76-10	Delineation and engineering characteristics of permafrost	CR 79-11 Analysis of vehicle tests and performance predictions (1981,
Post occupancy evaluation of a planned community in Arctic	beneath the Beaufort Sea [1976, p 53-60] MP 919 Delineation and engineering characteristics of permafrost	p 51-67 ₃ MP 1477
Canada (1980, 27p.) SR 80-06 Post occupancy evaluation of a remote Australian communi-	beneath the Beaufort Sea (1977, p 234-237) MP 927	Airborne snow and fog distributions (1982, p.217-223) MP 1562
- Shay Gap, Australia (1980, 57p) SR 80-29	Use of a light-colored surface to reduce seasonal thaw pene- tration beneath embankments on permafrost £1977, p.86-	Snow and fog particle size measurements (1982, p.47-58)
Becker, A. Airborne electromagnetic sensing of sea ice thickness (1987,	99 ₁ MP 954	MP 1982 Falling snow characteristics and extinction (1983, p.61-69)
77p) MP 2673	Mathematical model to predict frost heave (1977, p 92- 109 ₁ MP 1131	MP 1756
Ecget, J. Observations of jökulhlaups from ice-dammed Strandline	Temperature effects in compacting an asphalt concrete over- lay [1978, p.146-158] MP 1083	Developing a model for predicting snowpack parameters af- fecting vehicle mobility (1983, 26p) CR 83-16
Lake, Alaska implications for paleohydrology (1987, p 79- 94) MP 2307	Design considerations for airfields in NPRA (1978, p 441-	Snow characterization at SNOW-ONE-B (1983, p.155-
Bell, D.L.	458) MP 1086 Improved drainage and frost action criteria for New Jersey	1953 MP 1847 Characterization of snow for evaluation of its effect on elec-
Multifrequency passive microwave observation of saline ice grown in a tank [1988, p.1687-1690] MP 2459	pavement design. Phase 2: Frost action (1978, 80p)	tromagnetic wave propagation [1983, p 35-42] MP 1648
Beltaos, S.	SR 78-09 Thaw penetration and permafrost conditions associated with	Observations of the backscatter from snow at millimeter
Field investigations of a hanging ice dam (1982, p.475-488) MP 1533	the Livengood to Prudhoe Bay road, Alaska [1978, p.615-621] MP 1102	wavelengths [1986, p.311-316] MP 2665
Ice jams in shallow rivers with floodplain flow. Discussion	Design of airfield pavements for seasonal frost and permafrost	Comments on the characteristics of in situ snow at millimeter wavelengths (1986, p.317-320) MP 2666
(1984, p 370-371) MP 1798 Benfer, R.H.	conditions [1978, 18p] MP 1189 Improved drainage and frost action criteria for New Jersey	Scattering at mm wavelengths from in situ snow [1986, p.1.6.1-1.6.2] MP 2141
Ice-cratering experiments Blair Lake, Alaska (1966, Various	pavement design Phase 2 (Data analysis) (1979, 51p)	Overview of obscuration in the cold environment (1988,
pagings; MP 1034	SR 79-15 Mathematical model to correlate frost heave of pavements	p 537-555 ₁ MP 2609 Radar backscatter comparisons of a 2- to 5-GHz FMCW
Beamett, B.M. Cazenovia Creek Model data acquisition system [1985]	with laboratory predictions [1980, 49p] CR 80-10	radar and a 35-GHz radar [1989, p.133-136]
p.1424-1429; MP 2090 Bennett, F.L.	Frost heave in an instrumented soil column (1980, p.211- 221) MP 1331	MP 2631 Airborne particle measurements (1989, p.31) MP 2644
Estimating heating requirements for buildings under con-	One-dimensional frost heave model based upon simultaneous	Berggren, P.A.
struction in cold regions—an interactive computer ap- proach (1977, 113p) SR 77-03	heat and water flux [1980, p.253-262] MP 1333 New Hampshire field studies of membrane encapsulated soil	User's index to CRREL land treatment computer programs and data files [1982, 65p] SR 82-26
Temporary protection of wintertime building construction,	layers with additives (1980, 46p) SR 80-33 Environmental engineering and ecological baseline investiga-	Corps of Engineers land treatment of wastewater research
Fairbanks, Alaska, 1976-77 [1977, 41p] SR 77-39 Roof construction under wintertime conditions a case study	tions along the Yukon River-Prudhoe Bay Haul Road	program an annotated bibliography [1983, 82p.] SR 83-09
(1978, 34p) SR 78-24	[1980, 187p.] CR 80-19 Road performance and associated investigations [1980, p 53-	Best, W.C.
Beason, C. Ice problems associated with rivers and reservoirs [1986,	100 ₁ MP 1351	Design procedures for underground heat sink systems [1979, 186p. in var. pagns.] SR 79-08
p.70-98 ₁ MP 2155	Field cooling rates of asphalt concrete overlays at low temper- atures [1980, 11p] CR 80-30	Bezinge, A.
- · · · · · · · · · · · · · · · · · · ·		OI I I
Permafrost [1986, p 99-106] MP 2156 Observations of likelihouse from ice-dammed Strandline	Some approaches to modeling phase change in freezing soils	Glaciers and sediment (1986, p 53-69) MP 2154 Bigl. S.R.
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p 79-	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave (1981, p 2-	Bigl, S.R. Comparative field testing of buried utility locators (1984,
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska. implications for paleohydrology (1987, p 79- 94) MP 2307	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave (1981, p 2-6) MP 1483	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79- 94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) MP 2439	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil country (1981, p 34-42) MP 1485	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow [1984, 20p] CR 84-20
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79- 94) MP 2307 Field observations of thermal convection in a subarctic snow	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave (1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p.] MP 1977 Change in orientation of artillery-delivered anti-tank mines in
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) MP 2431 Beason, C.S.	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column (1981, p 127-140) MP 1534	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p.] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow [1984, 20p.] CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study [1984, 36p.] CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegeta-
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-15) MP 1567	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p. 105-118) MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Benson, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R.	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave [1981, p 2-6] MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column (1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow [1984, 20p] Detection of buried utilities. Review of available methods and a comparative field study [1984, 36p.] CR 24-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR [1984, 128p] SR 24-34 Locating buried utilities [1985, 48p.] SR 25-14 Cold-temperature characterization of polymer concrete
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Beason, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1483 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column (1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements (1983, p 57-61) MP 1652 Field tests of a frost-heave model (1983, p 409-414)	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-31 Locating buried utilities (1985, 48p.) SR 85-14 Cold-temperature characterization of polymer concrete (1986, 46p.) MP 2521 Detecting underground objects/utilities (1987, p.36-43)
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) MP 2431 Benson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p.381-384) MP 1919 Bentley, D.L.	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost hease model to the method of numerical simulation (1982, p.1-13) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements (1983, p.57-61) MP 1652 Field tests of a frost-heave model (1983, p.409-414) MP 1657 Comparison of two-dimensional domain and boundary inte-	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43), MP 2281
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p. 105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Beason, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column (1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements (1983, p 57-61) MP 1652 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p] CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study [1984, 36p.] CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR [1984, 128p] SR 83-514 Locating buried utilities [1985, 48p.] SR 85-14 Cold-temperature characterization of polymer concrete (1986, 46p.) MP 2521 Detecting underground objects/utilities [1987, p.36-43] MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973,
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctuc snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Bentley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular so.ls for	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1655 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of transcent processes in an advancing zone of	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) MP 1029
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular so, is for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave [1981, p 2-6] MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140] MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements (1983, p 57-61) MP 1652 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) MP 1659 Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1663	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p] CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study [1984, 36p.] CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR [1984, 128p] SR 83-514 Locating buried utilities [1985, 48p.] SR 85-14 Cold-temperature characterization of polymer concrete (1986, 46p.) MP 2521 Detecting underground objects/utilities [1987, p.36-43] MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties [1973, p.624-643] Environmental analyses in the Kootenai River region, Montana [1976, 53p.] SR 76-13
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Beason, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross ice Shelf, Antarctica (1984, p.381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p.365-376) MP 2125 Resilient modulus of freeze-thaw affected granular so.ls for pavement design and evaluation Part I Laboratory tests	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Results from a mathematical model of frost heave [1981, p 2-6) MP 1485 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p,1-12) MP 1556 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1655 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of traisment processes in an advancing zone of freezing (1983, p 821-825) Two-dimensional model of coupled heat and moisture transport in frost heaving soils (1984, p.91-98) MP 1678	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p.) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p.) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-30 Permaffeots, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) Study of climatic elements occurring concurrently (1976, 53p.)
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow ocover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Resent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) MP 2431 Benson. C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Bentley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular so.ls for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2 Field validation	Some approaches to modeling phase change in freezing soils (1981, p 137-145) MP 1437 Results from a mathematical model of frost heave [1981, p 2-6] MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140] MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements (1983, p 57-61) MP 1652 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) MP 1659 Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1663 Two-dimensional model of coupled heat and moisture transport in frost heaving soils (1984, p.91-98) MP 1678 Frost action and its control (1984, 145p.) MP 1704	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 85-14 Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Beason, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular sols for pavement design and evaluation 1986, 70p) Resilient modulus of freeze-thaw affected granular sols for pavement design and evaluation. Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) Resilient modulus of freeze-thaw affected granular sols for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-02	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation [1982, p.1-12) MP 1557 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1655 Field tests of a frost-heave model [1983, p 409-414) Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 509-513) Investigation of traisment processes in an advancing zone of freezing [1983, p 821-825] Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1678 Fros action and its control [1984, 145p.) MP 1704 Survey of methods for classifying frost susceptibility [1934, p 104-141] MP 1707	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow [1984, 20p] Detection of buried utilities. Review of available methods and a comparative field study [1984, 36p.] CR \$4-30 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR [1984, 128p.] Locating buried utilities [1985, 48p.] Cold-temperature characterization of polymer concrete [1986, 46p.] MP 2521 Detecting underground objects/utilities [1987, p.36-43] MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties [1973, p.624-643] p.624-643] Environmental analyses in the Kootenai River region, Montana [1976, 53p.] Study of climatic elements occurring concurrently [1976, p.23-30] MP 1613
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Beason, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation 1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-13) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1652 Field tests of a frost-heave model [1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 509-513] MP 1659 Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1663 Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1678 Frost action and its control [1984, 145p.) MP 1678 Status of numerical models for heat and mass transfer in frost susceptible soils [1984, p.67-71] MP 1851	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 85-43 Locating buried utilities (1985, 48p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 66p.)
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctuc snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Resent (25) Responsible of the Mr. 2431 Resent (25) Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Restley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Rentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2: Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation.	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation [1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 509-513] Investigation of transient processes in an advancing zone of freezing [1983, p 821-825] Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1678 Frost action and its control [1984, 145p.] MP 1704 Survey of methods for classifying frost susceptibility [1934, p 104-141] MP 1707 Status of numerical models for heat and mass transfer in frost-susceptible soils [1984, p 67-71] Two-dimensional model of coupled heat and moisture trans-	Bigl, S.R. Comparative field testing of buried utility locators [1984, 25p] MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow [1984, 20p] CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study [1984, 36p.] CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR [1984, 128p.] SR 84-36 Locating buried utilities [1985, 48p.] SR 85-14 Cold-temperature characterization of polymer concrete [1986, 46p.] MP 2521 Detecting underground objects/utilities [1987, p.36-43] MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties [1973, p624-643] SR 1964-649 Environmental analyses in the Kootenai River region, Montana [1976, 53p.] SR 76-13 Study of climatic elements occurring concurrently [1976, p.23-30] MP 1613 Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit [1977, 66p.] SR 77-15 lice decay patterns on a lake, a river and coastal bay in Canada (1977, p 120-127) Decay patterns of land-fast sea ice in Canada and Alaska
Observations of jökulhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) MP 2431 Beason, C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation 1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-02 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 87-02 Experimental determination of the fracture toughness of urea	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Results from a mathematical model of frost heave [1981, p 2-6) MP 1485 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p,1-12) MP 1556 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1655 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1663 Two-dimensional model of coupled heat and moisture transport in frost heaving soils (1984, p.91-98) MP 1678 Fros' action and its control (1984, 145p.) MP 1707 Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p.67-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p.) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p.) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Sudy of climatic elements occurring concurrently (1976, p.23-30) Study of climatic elements occurring concurrently (1976, p.23-30) MP 1613 Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 66p.) SR 77-15 Ice decay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) MP 969 Decay patterns of land-fast sea ice in Canada and Alaska
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctuc snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Resent (25) Resent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Resent (25) Beanson, C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2 Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-04 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 87-02 Experimental determination of the fracture toughness of urea model ice (1988, p.289-297) MP 2348	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1652 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 595-513) MP 1659 Investigation of traisient processes in an advancing zone of freezing [1983, p 821-825) MP 1659 Investigation of traisient processes in an advancing zone of freezing (1983, p 821-825) MP 1659 Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1704 Survey of methods for classifying frost susceptibility [1934, p 104-141) Status of numerical models for heat and mass transfer in frost-susceptible soils [1984, p 67-71] MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343]	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 85-14 Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) MP 1029 Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 66p.) SR 77-15 lee decay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10) MP 161 Subarctic watershed research in the Soviet Union (1978, p.305-313) MP 1273
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) MP 2431 Banson, C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular so.ls for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2 Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p)	Some approaches to modeling phase change in freezings soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation [1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1657 Frield tests of a frost-heave model [1983, p 409-414] Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 509-513] Investigation of transient processes in an advancing zone of freezing [1983, p 821-825] Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1678 Fros action and its control [1984, 145p.] MP 1704 Survey of methods for classifying frost susceptibles soils [1984, p.67-71] Two-dimensional model of ovupled heat and moisture transport in frost-heaving soils [1984, p.36-343] MP 1705 Pattal verification of a thaw settlement model [1985, p.18-25] MP 1924 Hydraulic properties of selected soils [1985, p.26-35]	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-20 Permaffeots, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Sowet scientific exchange visit (1977, 66p.) Ice decay patterns on a lake, a river and cosstal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10) Subarctic watershed research in the Soviet Union (1978, p.305-313) Analysis of the midwinter temperature regime and snow oc-
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) Fracture toughness of model ice (1986, p. 365-376) Fracture toughness of model ice (1986, p. 365-376) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation (1986, 70p) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 66-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 66-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 70-02 Experimental determination of the fracture toughness of urea model ice (1988, p.289-297) MP 2348 Fracture of S2 columnar freshwater ice (loating double can-	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Results from a mathematical model of frost heave [1981, p 2-6) MP 1485 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p,1-13) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1655 Field tests of a frost-heave model [1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1668 Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1678 Frost action and its control [1984, 145p.) MP 1707 Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p 67-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p 336-343) MP 1765 Pattial verification of a thaw settlement model [1985, p 18-25] MP 1924 Hydraulic properties of selected soils [1985, p 26-35] MP 1925 Frost heave of full-depth asphalt concrete pavements [1985,	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) MP 1977 Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 85-14 Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Study of climatic elements occurring concurrently (1976, p.23-30) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 66p.) Ice decay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10; MP 1613 Substrict watershed research in the Soviet Union (1978, p.305-313) MP 1273 Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) Climatic survey at CRREL in association with the land treat-
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2431 Benson. C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Bentley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2 Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany English (1986, 1986, 1986, 1986, 1	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation [1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1657 Frield tests of a frost-heave model [1983, p 409-414] Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 509-513] Investigation of transient processes in an advancing zone of freezing [1983, p 821-825] Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1678 Frost action and its control [1984, 145p.] MP 1704 Survey of methods for classifying frost susceptible soils [1984, p.67-71] Two-dimensional model of robupled heat and moisture transport in frost-heaving soils [1984, p.36-343] MP 1705 Pattial verification of a thaw settlement model [1985, p 18-25] MP 1924 Hydraulic properties of selected soils [1985, p 26-35] MP 1925 Frost heave of full-depth asphalt concrete pavements [1985, p 66-76) MP 1927	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p.) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p.) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-30 Permaffeost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Sowiet scientific exchange visit (1977, 66p.) Ice decay patterns on a lake, a river and coastal bay in Canada (1977, p.1-10) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10) Subarctic watershed research in the Soviet Union (1978, p.305-313) Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) CR 78-21 Climatic survey at CRREL in association with the land treatment project (1978, 37p.) SR 78-21
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reason, C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2: Field validation tests at Winchendon, Massachusetts, test sections (1986, 52p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 2: Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3: Laboratory tests on soils from Albany County Airport (1987, 36p) CR 87-02 Experimental determination of the fracture toughness of urea model ice (1988, p.289-297) Fracture of S2 columnar freshwater ice floating double cantilever beam tests (1988, p.152-161) MP 2493 Fracture experiments on freshwater and urea model ice (1988, 152p) MP 2502	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-13) MP 1556 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1655 Field tests of a frost-heave model [1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1658 Survey of methods for classifying frost susceptibility (1984, p 104-141) Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p 67-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p 336-343] MP 1707 Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p 67-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p 336-343] MP 1765 Pattial verification of a thaw settlement model (1985, p 18-25) Frost heave of full-depth asphalt concrete pavements (1985, p 66-76) MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p) MP 2077	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p.) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p.) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) Situdy of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 61p.) Environmental of snow-cover scientific exchange visit (1977, p.120-127) Decay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska p. 305-313; MP 1273 Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) CR 78-21 Notes and quotes from snow and ice observers in Alaska (1979, p.116-118) MP 1631
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow ocover (1987, p.105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Reson. C.S. Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2 Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Aibany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 1 Laboratory tests on soils from Aibany Coun	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1652 Field tests of a frost-heave model [1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 590-513] Investigation of transient processes in an advancing zone of freezing [1983, p 821-825] MP 1653 Investigation of transient processes in an advancing zone of freezing (1983, p 590-513) MP 1659 Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1659 Survey of methods for classifying frost susceptibility [1984, p 104-141] Survey of methods for classifying frost susceptibility [1984, p 104-141] Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p 336-343] MP 1705 Survey of methods for classifying frost susceptibility [1984, p 1185] Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p 336-343] MP 1705 Partial verification of a thaw settlement model [1985, p 18-25] MP 1925 Frost heave of full-depth asphalt concrete pavements [1985, p 66-76] MP 1927 Model of 2-dimensional freezing front movement using the	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Care and the state of the state
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p. 105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 31 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 32 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 32 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Fracture of S2 columnar freshwater ice floating double cantilever beam tests (1988, p.189-297) Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) MP 2012 Effect of unconfined loading on the unfrozen water content	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1556 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1655 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of traisment processes in an advancing zone of freezing (1983, p 821-825) MP 1663 Two-dimensional model of coupled heat and moisture transport in frost heaving soils (1984, p.91-98) MP 1678 Frost action and its control (1984, 145p.) MP 1679 Survey of methods for classifying frost susceptibility (1984, p 104-141) Status of numerical models for heat and mass transfer in frost-basic proble soils (1984, p.57-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1705 Status of numerical models for heat and mass transfer in frost-basic port in frost-heaving soils (1984, p.336-343) MP 1765 Pathal verification of a thaw settlement model (1985, p. 18-25) Frost heave of full-depth asphalt concrete pavements (1985, p. 66-76) MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p) MP 2077 Frost action predictive techniques on overview of research results (1986, p. 147-16) MP 2267 Frost action predictive techniques for roads and airfields A	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 84-36 Locating underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) Study of climatic elements occurring concurrently (1976, p.23-30) MP 1633 Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, p.66p.) SR 77-15 Locadecay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.120-127) MP 269 Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.120-127) Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) CR 78-21 Notes and quotes from snow and ice observers in Alaska (1979, p.116-118) MP 1631 Relationships between January temperatures and the winter regime in Germany (1979, p.17-7) MP 1631 MR 1631 Relationships between January temperatures and the winter regime in Germany (1979, p.17-7) MP 1278
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctuc snow cover (1987, p. 105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2431 Benson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Bentley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 86-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 87-02 Experimental determination of the fracture toughness of urea model ice (1988, p.289-297) MP 2248 Fracture of S2 columnar freshwater ice floating double cantilever beam tests (1988, p.152-161) MP 2493 Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) MP 2502 Berg, R. Mobility of water in frozen soils (1982, c.15p.) MP 2512 Effect of unconfined loading on the unfrozen water content of Manchester sit (1983, 17p.) SR 83-1t	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Results from a mathematical model of frost heave [1981, p 2-6) MP 1485 Probabilisting frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p,1-13) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61) MP 1657 Field tests of a frost-heave model [1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1658 Survey of methods for classifying frost susceptibility (1984, p 104-141) Status of numerical models for heat and moisture transport in frost heaving soils [1984, p.91-98] MP 1707 Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p 57-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p 336-343) MP 1705 Partial verification of a thaw settlement model (1985, p 18-25) MP 1924 Hydraulic properties of selected soils (1985, p 26-35) MP 1927 Frost heave of full-depth asphalt concrete pavements (1985, p 66-76) MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p) MP 2077 Frost action predictive techniques an overview of research results (1986, p 147-161) MP 2267 Frost action predictive techniques an overview of research findings (1986, 45p) CR 86-18	Bigl. S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 66p.) Ice decay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.120-127) Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) Chimatic survey at CRREL in association with the land treatment project (1978, 37p.) Notes and quotes from snow and ice observers in Alaska (1979, p.116-118) MP 1631 Relationships between January temperatures and the winter regime in Germany (1979, p.17-27) MP 2128 Maximum thickness and subsequent decay of lake, river and lasts sea ice in Canada and Alaska (1980, 160p.)
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p. 105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2431 Beason. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1988, 199) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 66-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 66-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Fracture et genements on freshwater ice floating double cantilever beam tests (1988, p.152-161) MP 2493 Fracture experiments on freshwater and urea model ice (1988, p.289-297) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) SR 83-14 Rev	Some approaches to modeling phase change in freezings soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140, MP 1534 Sensitivity of a frost heave model to the method of numerical simulation [1982, p.1-12) MP 1556 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61, MP 1655 Field tests of a frost-heave model [1983, p 409-414, MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 509-513, MP 1659 Investigation of transient processes in an advancing zone of freezing [1983, p 821-825, MP 1659 Two-dimensional model of coupled heat and moisture transport in frost heaving soils [1984, p.91-98, MP 1678 Frost action and its control [1984, 145p., MP 1704 Survey of methods for classifying frost susceptible soils [1984, p.67-71, MP 1851 Two-dimensional models for heat and mass transfer in frost-susceptible soils [1984, p.67-71, MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.36-343, MP 1705 Status of numerical models for heat and mass transfer in frost-susceptible soils [1984, p.67-71, MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.36-343, MP 1705 Patrial verification of a thaw settlement model [1985, p.18-251, MP 1925 Prost heave of full-depth asphalt concrete pavements [1985, p.66-76, MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method [1985, 91, MP 2077 Frost action predictive techniques an overview of research results [1986, 45p, 17-161, MP 267 Frost action predictive techniques an overview of research results [1986, 147-161, MP 267 Frost action predictive techniques an overview of research results [1986, 45p, 17-	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permaffeots, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) SR 84-36 Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2251 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast US S R. United States-Soviet scientific exchange visit (1977, 66p.) Sce decay patterns on a lake, a river and coastal bay in Canada (1977, p.1-10) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10, p.10-10, p
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow cover (1987, p. 105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 18p) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 19p) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Beatley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2 Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 86-04 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) CR 87-02 Experimental determination of the fracture toughness of urea model ice (1988, p.289-297) MP 2508 Fracture of S2 columnar freshwater ice floating double cantilever beam tests (1988, p.152-161) MP 2493 Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) MP 2502 Berg, R. Mobility of water in frozen soils (1982, c15p) MP 2012 Effect of unconfined loading on the unfrozen water content of Manchester sit (1983, 17p) SR 83-11 Revised procedure for pavement design under seasonal frost conditions (1983, 129p) SR 83-12 Survey of airport pavement distress in cold regions (198	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Rimulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1556 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1655 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) MP 1669 Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1663 Two-dimensional model of coupled heat and moisture transport in frost heaving soils (1984, p.91-98) MP 1678 Frost action and its control (1984, 145p.) MP 1679 Survey of methods for classifying frost susceptibility (1984, p 104-141) MP 1707 Status of numerical models for heat and mass transfer in frost-basiceptible soils (1984, p.67-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Pathal verification of a thaw settlement model (1985, p. 18-25) MP 1924 Hydraulic properties of selected soils (1985, p. 26-35) MP 1925 Frost heave of full-depth asphalt concrete pavements (1985, p. 66-76) MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p) MP 2077 Frost action predictive techniques an overview of research results (1986, p. 147-16); MP 2076 Frost action predictive techniques for roads and airfields A comprehensive survey of research findings (1986, 45p) MP 208 CR 86-18 Statement of research needs to address airport pavement distress (1987, p.88-1012)	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Comparative field testing of buried utility locators (1984, 25p) Comparative field structured anti-tank mines in snow (1984, 20p) Cr. 84-20 Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) Cr. 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) Sr. 84-36 Locating buried utilities (1985, 48p.) Sr. 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Situdy of climatic elements occurring concurrently (1976, 53p.) Sr. 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) MP 1613 Solyma water balance station, Magadan Oblast, northeast U.S.R. United States-Soviet scientific exchange visit (1977, 6p.10-127) Decay patterns on a lake, a river and coastal bay in Canada (1977, p.120-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.110-127) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.110-127) Notes and quotes from snow and ice observers in Alaska (1979, p.116-118) MP 1631 Relationships between January temperatures and the winter regime in Germany (1979, p. 17-27) Maximum thickness and subsequent decay of lake, river and last sea ice in Canada and Alaska (1980, 160p.) CR 80-06 Winter environmental data survey of the drainage basin of the upper Susinta River, Alaska (1980, 30p.) SR 80-19 Othole primer, a public administrator's guide to understand-
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska implications for paleohydrology (1987, p. 79-94) MP 2307 Field observations of thermal convection in a subarctic snow cover (1987, p. 105-118) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross Ice Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) CR 66-04 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) CR 66-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests on soils from Albany County Airport (1987, 36p) CR 66-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests on soils from Albany County Airport (1987, 36p) CR 66-12 Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests on soils from Albany County Airport (1987, 36p) CR 86-12 Practure of Secolumnar freshwater toe floating double cantilever beam tests (1988, p.289-297) Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) Fracture toughness of columnar freshwater ice from large scale DCB tests (1989, p.7-20) SR 83-15 Revised procedure for pavement design under seasonal frost conditi	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-13) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1652 Field tests of a frost-heave model [1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data (1983, p 509-513) Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1653 Investigation of transient processes in an advancing zone of freezing (1983, p 821-825) MP 1658 Frost action and its control (1984, 1959-) MP 1678 Frost action and its control (1984, 145p.) MP 1707 Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p 67-71) MP 1851 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p 336-343) MP 1705 Partial verification of a thaw settlement model (1985, p 18-25) MP 1924 Hydraulic properties of selected soils (1985, p 26-35) MP 1925 Frost heave of full-depth asphalt concrete pavements (1985, p 66-76) MP 1927 MP 207 Frost action predictive techniques an overview of research results (1986, p 147-161) MP 227 Frost action predictive techniques an overview of research results (1986, p 187-161) MP 227 Frost action predictive techniques an overview of research results (1986, p 187-161) MP 227 Frost action predictive techniques an overview of research results (1986, p 187-161) MP 227 Frost action predictive techniques an overview of research results (1986, p 187-161) MP 227 Frost action predictive techniques for roads and articleds. A comprehensive survey of research findin	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p.) Camparative field testing of buried utility locators (1984, 25p.) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p.) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR \$4-30 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR \$4-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) MP 2521 Detecting underground objects/utilities (1987, p.36-43) MP 2281 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13 Study of climatic elements occurring concrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast US SR. United States-Soviet scientific exchange visit (1977, 66p.) Ice decay patterns on a lake, a river and coastal bay in Canada (1977, p.1-10) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10; Subarctic watershed research in the Soviet Union (1978, p.305-313) Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) CR 78-21 Chimatic survey at CREEL in association with the land treatment project (1978, 37p.) Notes and quotes from snow and ice observers in Alaska (1979, p.116-118) Relationships between January temperatures and the winter regime in Germany (1979, p.17-27) MP 1218 Maximum thickness and subsequent decay of lake, river and last sea ice in Canada and Alaska (1980, 160p.) CR 80-06 Winter environmental data survey of the drainage basin of the upper Susiting River, Alaska (1980, 30p.) SR 86-19
Observations of jökuhlaups from ice-dammed Strandline Lake, Alaska, implications for paleohydrology (1987, p. 79-94) Field observations of thermal convection in a subarctic snow MP 2439 Recent glacier-volcano interactions on Mt Redoubt, Alaska (1988, 189) Reson. C.S. Jökuhlaups from Strandline Lake, Alaska, with special attention to the 1982 event (1989, 199) MP 2520 Beatley, C.R. Reconsideration of the mass balance of a portion of the Ross lee Shelf, Antarctica (1984, p. 381-384) MP 1919 Bentley, D.L. Fracture toughness of model ice (1986, p. 365-376) MP 2125 Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections (1986, 70p) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986, 62p) Resilient modulus of freeze-thaw affected granular soils for pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p) Resperimental determination of the fracture toughness of urea model ice (1988, p.289-297) Fracture experiments on freshwater ice floating double cantilever beam tests (1988, p.152-161) MP 2493 Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture experiments on freshwater and urea model ice (1988, 152p) Fracture toughness of columnar freshwater ice from large scale DCD tests (1989, p.7-20) Berg, R. Mobility of water in frozen soils (1982, c15p) MP 2012 Effect of unconfined loading on the unfrozen water content of Manchester silt (1983, 17p) SR 83-14 Revised procedure for pavement design under seasonal frost conditions (1983, 12p) Survey of airport pavement distress in cold regions (1986, p.41-50) MP 2002	Some approaches to modeling phase change in freezing soils (1981, p 137-145) Results from a mathematical model of frost heave [1981, p 2-6) MP 1483 Simulating frost action by using an instrumented soil column (1981, p 34-42) MP 1485 Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column [1981, p 127-140) MP 1534 Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-12) MP 1567 Effect of color and texture on the surface temperature of asphalt concrete pavements [1983, p 57-61] MP 1657 Field tests of a frost-heave model (1983, p 409-414) MP 1657 Comparison of two-dimensional domain and boundary integral geothermal models with embankment freeze-thaw field data [1983, p 595-513] MP 1659 Investigation of traisient processes in an advancing zone of freezing (1983, p 590-513) MP 1659 Investigation of traisient processes in an advancing zone of freezing (1983, p 582-55) MP 1659 Investigation of traisient processes in an advancing zone of freezing (1983, p 582-513) MP 1659 Stave of methods for classifying frost susceptibility (1984, p 104-141) Survey of methods for classifying frost susceptibility (1984, p 104-141) Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p 50-31) MP 1705 Status of numerical models for heat and mass transfer in frost-susceptible soils (1984, p 67-71) MP 1707 Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p 336-333) MP 1765 Partial verification of a thaw settlement model (1985, p 18-25) MP 1924 Hydraulic properties of selected soils (1985, p 26-35) MP 1925 Frost heave of full-depth asphalt concrete pavements (1985, p 66-76) MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p) MP 1927 Frost heave of full-depth asphalt concrete pavements (1985, p 66-76) MP 1927 Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p) MP 1927 Frost heave of full-depth aspha	Bigl, S.R. Comparative field testing of buried utility locators (1984, 25p) Camparative field testing of buried utility locators (1984, 25p) Change in orientation of artillery-delivered anti-tank mines in snow (1984, 20p) Detection of buried utilities. Review of available methods and a comparative field study (1984, 36p.) CR 84-31 Permafrost, seasonally frozen ground, snow cover and vegetation in the USSR (1984, 128p.) SR 84-36 Locating buried utilities (1985, 48p.) Cold-temperature characterization of polymer concrete (1986, 46p.) Detecting underground objects/utilities (1987, p.36-43) MP 2521 Bilello, M.A. Mesoscale measurement of snow-cover properties (1973, p.624-643) Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13 Study of climatic elements occurring concurrently (1976, p.23-30) Kolyma water balance station, Magadan Oblast, northeast USSR. United States-Soviet scientific exchange visit (1977, 66p.) Ecc decay patterns on a lake, a river and coastal bay in Canada (1977, p.1-10) Decay patterns of land-fast sea ice in Canada and Alaska (1977, p.1-10) Subarctic watershed research in the Soviet Union (1978, p.305-313) Analysis of the midwinter temperature regime and snow occurrence in Germany (1978, 56p.) Chimatic survey at CRREL in association with the land treatment project (1978, 37p.) Notes and quotes from snow and ice observers in Alaska (1979, p.116-118) Relationships between January temperatures and the winter regime in Germany (1979, p.17-27) MR 1218 Maximum thickness and subsequent decay of lake, river and last sea ice in Canada and Alaska (1980, 160p.) CR 80-06 Winter environmental data survey of the drainage basin of the upper Susiting River, Alaska (1980, 30p.) SR 80-19 Pothole primer, a public administrator's guide to understanding and managing it the pothole problem (1981, 24p.)

Synoptic weather conditions during selected snowfall even		
42; 1982, p.9	tion (1982, 7p)	
Meteorology and observed sport annual and		716 rocks [1981, 23p] CR \$1-11
	SD 41	
Atmospheric conditions and concurrent snow crystal obsevations during SNOW-ONE-A [1983, p.3-18]		
Synuptic meteorology during the SNOW ONE A FILL P	CD 62	Polarization of skylight (1984, p.261-265)
		Bouren, C.F.
Regional and seasonal variations in snow-cover density in the U.S.S.R. (1984, 70p.)	Measurement and evaluation of tire performance under	01 ticles [1984, p.261-271]
Frozen precipitation and consumers		
The state of the s	Evaluation of Tire Performance under Wasser Comment a	nd Bonde, T.J.H. MP 1958
Statistical felationships between and and and		
34D 100	Need for snow tire characterization and authority and	15
cal conditions at the state of the conditions at the state of the stat	Design and the afet a company	
Techniques for measurement of snow and ice on freshwater	regions mobility measurements (1985, p.9-20)	SD 87.31
Regional and seasonal distributions of the		Growth of FO (A.B.)
systems in and around Norwegian waters [1986, p.53-66]	rield demonstration of traction testing procedures at 045	MP 2116
Analysis of 112 years of ice conditions observed and 2181	Comparative tractive performance of missealers and missealers	
	CONTROL LEGICAL CONTROL FLORE TO THE CONTROL OF THE	Q Dosworth, H.
Ice jams and an analysis of the winter climate at two sites near the White River in South Dakota (1987, p.154-162)	207)	
	Vehicle mobility over snow [1987, p 265-266]	Mechanical properties of multi-year see ice. Testing and
Comparison of snowfall amounts and snow depths for loca- tions in Germany and the Northeast United States 1988, p. 107-117.	MP 242 Mobility: working group report [1987, p 273-274]	1) Inques [1904, 390.)
p.107-117; MP 2401 Computer-generated graphics of river ice conditions 1988, p.211-219.	RED 141	Mechanical properties of multi-year sea ice. Phase 2: Test results (1985, 81p) CR 85-16
	Techniques for gas gun studies of shock wave attenuation is snow [1988, p 657-660] MP 254	n Studies of tick
1988, 43p.1	Considerations for winter use of the Ground Emplaced Min	(1983, p.117-123)
Comparative studies of the uninter attacks.	Instrumented vehicle for the measurement of makitim	7 lee accretion under natural and laboratory conditions (1985,
and the control States (1989, p 283-293)		
synoptic meteorology during the SNOW IV Field Experi-	Evaluation of the Caterpillar Challenger tractor for use in Antarctica (1989, 12p. + figs.) MP 271	Trinvial testing of Santana
Billfalk, L.	Wheeled versus tracked vehicle snow mobility test program	1 CTD 06.16
Breakup of solid ice covers due to rapid water level variations [1982, 17p]	Blaisdell, G.S.	Mukiuk ice stress measurement program (1988, p.457-463)
Bilmes, J.	Performance of an omni-directional wheel on snow and ice (1989, 21p + appends) MP 2711	Botros, M.M.
Analysis of diffusion wave flow routing model with applica- tion to flow in tailwaters (1983, 31p) CR 83-07	Blake, B.J.	1860, in ver nager
Modeling rapidly varied flow in tailwaters at 024 m 271	Construction and performance of platinum probes for measurement of redox potential (1978, 8p.) SR 78-27	Botz, J.J.
Bindschadler, R.A. MP 1711	EVAIUATION of nitrification inhabitant !	105p) Sp en.21
Glaciological investigations using the synthetic annual	102 mastewater Part 1. Nitrapyrin (1979, 25p)	Bouzoun, J.R.
Can relict crevase numes on annual MP 2342	Blanchard, P.P. SR 79-18	(1977, 24p) Dover, Vermont
11988, p.77-821	Radar backscattering from artificially grown sea ice 1989, p.259-2641 MP 2667	SDIBY application of wastewater affiliant in 1977 and
Birenzvige, A. MP 2460	Blom, B.E.	Freezing problems associated with approximately
CBR operations in cold weather: a bibliography, Vol 1 (1989, 88p.)	Effect of sediment organic matter on migration of various chemical constituents during disposal of dredged material	******* CD 46.14
Bishop, R.J. MP 2574	(1976, 183p.) Blouin, S.E. MP 967	2251
Progress report on 25 cm radar observations of the 1971 AID- JEX studies [1972, p.1-16] MP 989	Delineation and engineering above the	Removal of organics by overland flow (1980, 9p)
Black, P.B.		Spray application of wastewater effluent in a cold climate
Comparison of soil freezing curve and soil water curve data for Windsor sandy loam (1988, 37p.) CR 88-26	Analysis of explosively generated ground motions using Fourier techniques (1976, 86p.) CR 76-28	626;
Unifozen water contents of undiscushed and and and	Operational report: 1976 USACRREL-USGS subsea perma- frost program Beaufort Sea, Alaska (1976, 20p.)	Aquaculture for wastewater treatment in cold climates
r1988, 1701		(1981, p 482-492) MP 1394 Preliminary assessment of the nutrient film technique for was-
On the use of the phi-variable to describe the state of water in porous media 1989.	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea [1976, p 53-60] MP 919	
Evaluation of four well assessment of	Utilization and engineering observations of the	Pilot-scale evaluation of the nutrient film technique for was- tewater treatment [1982, 34p] SR 82-27
on the level of games in ground water (1989, 29p)	Delineation and engineering sharestonians MP 927	Case study of land treatment in a cold climate—West Dover,
CR 89-18 Comparison of soil freezing curve and soil water curve data		Wastewater treatment and reuse process for pold serious
145 cene	Dynamic in-situ properties test in fine-grained permafrost MP 963	t1983, p 547-557; MP 2112 Water supply and waste disposal on permanent snow fields r1984 p 441-413.
then silt along a load state of undisturbed and remoided Alas-	Freeze-thaw enhancement of the designed	
Hydraulic conductivity and unfrozen water content of au few	(1977, 94p)	Observations during BRIMFROST '83 (1984, 36p)
	beneath the Desufact Con 100 permafrost	Analysis of infiltration results at a proposed North Carolina
Predicting unfrozen water content behavior using freezing point depression data [1990, p.54-60] MP 2677	19// CKKEL-USGS permaferet program Popular at 1	On-site utility services for remote military facilities in the services
Infect functions that model ampiecastic	Delineation and engineering absence	
tivity [1990, 7p.]		water supply and waste disposal on permanent snowfields
Wetlands for wastewater treatment in cold climates [1984,	dredged from waterways 1978 n 622-628-	Initial assessment of the 600 setters and the second
7. 1 1001 AID 104E		ter battlefield (1986, 60)
Use of remote sensing to quantify	505) togion of the beautoft Sea (1978, p.629-635)	hour reverse paragraph water quality from the 600-gallon-per-
	1979 45n	supply on the winter battlefield (1988, 70) SR 88.02
Materials availability study of the Dickey-Lincoln day	Determining subsequent	Bowen, S. Proceedings 1972 Tundra Biome symposium (1972, 211p)
(1980, p.158-170) MP 1316	penetrometer—Fludnoe Bay, Alaska (1979, p.3-16)	
Macroscopic view of snow deformation under a make a	Field methods and preliminary results from subsea permafrost	Arctic research of the United States, Vol.3 (1989, 71p)
	213; Republis in the Beautort Sea, Alaska (1979, p 207-	United States arctic research plan biennial revision 1990-
Predicting wheeled vehicle motion resistance in shallow snow (1981, 18p) SR 81-30	bennestion and engineering characteristics of permafrost	1991 [1989, 72p.] MP 2544 Arctic research of the United States, Vol 4 [1990, 120p.]
regions mobility macricell instrumented vehicle for cold	Block motion from detonations of bursed personales	Bowen, S.L. 1209 MP 2765
MP 1515	sive arrays (1980, 62p) CR 80-26	SNOW ONE B date and a second
		SR 83-16

Bowen, S.L. (cont.)	Evaluation of several auger bits in frozen fine-grained soils,	Ecological baseline investigations along the Yukon River-
Catalog of smoke/obscurant characterization instruments [1984, p.77-82] MP 1865	asphalt, and concrete (1988, 10p) SR 88-08 lce cover distribution in Vermont and New Hampshire Atlan-	Prudhoe Bay Haul Road, Alaska (1978, 131p) MP 1115
Arctic research of the United States, Vol.1 (1987, 121p)	tic salmon rearing streams (1988, p.85-96) MP 2473	Distribution and properties of road dust and its potential im-
MP 2306 Arctic research of the United States, Vol.2 (1988, 76p)	Field assessment of fisheries habitat-enhancement structures in Bingo Brook, Vermont, after the Spring 1989 ice run	pact on tundra along the northern portion of the Yukon River-Prudhoe Bay Haul Road. Chemical composition of
MP 2379	(1989, 12p.) MP 2744	dust and vegetation [1978, p.110-111] MP 1116
Arctic research in the United States, Vol.3 [1989, 72p.] MP 2653	Cryogenic sampling of frazil ice deposits [1989, 6p] SR 89-28	Climatic and dendroclimatic indices in the discontinuous per- mafrost zone of the Central Alaskan Uplands (1978, p 392-
Boyne, H.S.	In-situ sampling and characterization of frazil ice deposits	398 ₁ MP 1099
Intercompanson of snow cover liquid water measurement	(1990, p 193-205) MP 2694	Thaw penetration and permafrost conditions associated with
techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement tech-	Brohm, D.R. Application of removal and control methods. Section 1:	the Livengood to Prudhoe Bay road, Alaska (1978, p 615- 621) MP 1102
niques (1987, p.1833-1836) MP 2283	Railways; Section 2: Highways; Section 3. Airports (1981,	1977 tundra fire at Kokolik River, Alaska (1978, 11p)
Radar backscatter companisons of a 2- to 5-GHz FMCW radar and a 35-GHz radar (1989, p 133-136)	p 671-706 ₁ MP 1447 Bronson, W.A.	SR 78-10 Ecological baseline investigations along the Yukon River-
MP 2631	Spray application of wastewater effluent in a cold climate:	Prudhoe Bay haul road, Alaska (1978, 131p)
Bracy, L.R.	performance evaluation of a full-scale plant [1980, p 620-	SR 78-13 Effects of low ground pressure vehicle traffic on tundra at
IMPACT OF SPHERES ON ICE CLOSURE (1972, p 473) MP 988	626; MP 1403 Energy conservation at the West Dover, Vermont, water pol-	Lonely, Alaska [1978, 63p.] SR 78-16
Brass, G.W.	lution control facility [1982, 18p.] SR 82-24	Introduction to the Workshop on Ecological Effects of Hy-
Geochemistry of freezing brines. Low-temperature proper- ties of sodium chloride [1987, 11p] CR 87-13	Brotherson, D.E. Roofer: a management tool for maintaining built-up roofs	drocarbon Spills in Alaska (1978, p 155-157; MP 1183
Bredow, J.	(1989, p 6-10) MP 2488	Effects of crude and diesel oil spill on plant communities at
Radar backscattering from artificially grown sea ice [1989,	ROOFER: a management tool for maintaining built-up roofs	Prudehoe Bay, Alaska, and the derivation of oil spill sen- sitivity maps [1978, p 242-259] MP 1184
p 259-264; MP 2667 Bredthauer, S.	(1989, 9p) MP 2576 Brown, J.	Human-induced thermokarst at old drill sites in northern
Runoff from a small subarctic watershed, Alaska [1983,	Tundra biome program [1970, p 1278] MP 881	Alaska (1978, p.16-23) MP 1254 Tundra disturbances and recovery following the 1949 ex-
p.115-120 _j MP 1654	Tundra biome applies new look to ecological problems in Alaska [1970, p.9] MP 880	ploratory drilling, Fish Creek, Northern Alaska (1978,
Bredthauer, S.R. Drainage network analysis of a subarctic watershed: Caribou-	Word model of the Barrow ecosystem [1970, p 41-43]	81p ₁ CR 78-28 Physical and thermal disturbance and protection of perma-
Poker Creeks research watershed, interior Alaska (1979,	MP 943	frost (1979, 42p) SR 79-05
9p ₁ SR 79-19 Drainage network analysis of a subarctic watershed (1979),	Synthesis and modeling of the Barrow, Alaska, ecosystem (1970, p.44-49) MP 944	Landsat digital analysis of the mitial recovery of the Kokolik
p 349-359 ₁ MP 1274	Environmental setting, Barrow, Alaska [1970, p 50-64]	River tundra fire area, Alaska (1979, 15p) MP 1638 Geobotanical atlas of the Prudhoe Bay region, Alaska (1980,
Tundra lakes as a source of fresh water: Kipnuk, Alaska	MP 945	69p) CR 80-14
(1979, 16p. ₃ SR 79-30 Brewer, M.C.	Bibliography of the Barrow, Alaska, IBP ecosystem model [1970, p.65-71] MP 946	Workshop on Environmental Protection of Permafrost Terrain (1980, p.30-36) MP 1314
Effects of low ground pressure vehicle traffic on tundra at	Ecological effects of oil spills and scepages in cold-dominated	Arctic ecosystem, the coastal tundra at Barrow, Alaska
Lonely, Alaska [1977, 32p] SR 77-31 Effects of low ground pressure vehicle traffic on tundra at	environments (1971, p.61-65) MP 905 Abiotic overview (1971, p.173-181) MP 906	(1980, 571p.) MP 1355
Lonely, Alaska [1978, 63p.] SR 78-16	Prediction and validation of temperature in tundra soils	Coastal tundra at Barrow [1980, p.1-29] MP 1356 LANDSAT digital analysis of the initial recovery of burned
Long-term effects of off-road vehicle traffic on tundra terrain	(1971, p.193-197) MP 907	tundra at Kokolik River, Alaska (1980, p 263-272)
(1984, p.283-294) MP 1820 Britton, K.B.	US Tundra Biome central program 1971 progress report (1971, p.244-270) MP 909	MP 1391 Environmental engineering and ecological baseline investiga-
Low temperature effects on sorption, hydrolysis and photoi-	Summary of the 1971 US Tundra Biome Program (1972,	tions along the Yukon River-Prudhoe Bay Haul Road
ysis of organophosphonates—a literature review [1986, 47 refs.] SR 86-38	p 306-313 ₁ MP 995 Proceedings 1972 Tundra Biome symposium (1972, 211p)	[1980, 187p] CR 80-19
Prediction of octanol-water partition coefficients of organo-	MP 1374	Road and its environment [1980, p.3-52] MP 1350 Tundra and analogous soils [1981, p 139-179]
phosphonates: Evaluation of structure-function relation- ships (1988, 24p) SR 88-11	Soil properties of the International Tundra Biome sites [1974, p.27-48] MP 1043	MP 1405
Brock, C.A.	Snow accumulation for arctic freshwater supplies (1975,	Abiotic components; introduction [1981, p.79] MP 1432
Lidar detection of leads in arctic sea ace (1990, p.119-123)	p 218-224) MP 860	Point Barrow, Alaska, USA [1981, p 775-776]
Brockett, B.E.	Barrow, Alaska, USA (1975, p.73-124) MP 1050 Computer simulation of the snowmelt and soil thermal regime	MP 1434
Environmental analyses in the Kootenas River region, Mon-	at Barrow, Alaska (1975, p 709-715) MP 857	Surface disturbance and protection during economic develop- ment of the North [1981, 88p] MP 1467
tana (1976, 53p) SR 76-13	Ecological investigations of the tundra biome in the Prudhoe Bay Region, Alaska (1975, 215p) MP 1053	Second National Chinese Conference on Permafrost, Lanz-
Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p 273-280)	Bay Region, Alaska (1975, 215p) MP 1053 Selected climatic and soil thermal characteristics of the	hou, China, 12-18 October 1981 (1982, 58p) SR 82-03
MP 1154	Prudhoe Bay region (1975, p.3-12) MP 1054	Environmental and societal consequences of a possible CO2-
Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site [1978, 43p]	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1976, p 391-408) MP 1377	induced climate change. Volume 2, Part 3—Influence of short-term climate fluctuations on permafrost terrain
SR 79-29	Climatic and soil temperature observations at Atkasook on	(1982, 30p) MP 1546
Construction and performance of platinum probes for measurement of redox potential (1978, 8p.) SR 78-27	the Meade River, Alaska, summer 1975 [1976, 25p] SR 76-01	Some recent trends in the physical and chemical characteriza- tion and mapping of tundra soils, Arctic Slope of Alaska
Bacterial aerosols from a field source during multiple-sprin-	RATE—The influence of grazing on the Arctic tundra ecosys-	(1982, p.264-280) MP 1552
kler irrigation Deer Creek Lake State Park, Ohio (1979, 64p.)	tems [1976, p 153-160] MP 970	Landsat-assisted environmental mapping in the Arctic Na-
Drilling and coring of frozen ground in northern Alaska,	Arctic transportation operational and environmental evalua- tion of an air cushion vehicle in Northern Alaska (1976,	tional Wildlife Refuge, Alaska (1982, 59p + 2 maps) CR 82-37
Spring 1979 (1980, 14p.) SR 80-12	7p ₁ MP 894	Guidebook to permafrost and related features along the Elli- ott and Dalton Highways, Fox to Prudhoe Bay, Alaska
Infiltration characteristics of soils at Apple Valley, Minn, Clarence Cannon Dam, Mo, and Deer Creek Lake, Ohio,	Ecological and environmental consequences of off-road traf- fic in northern regions (1976, p 40-53) MP 1383	(1983, 230p) MP 1640
land treatment sites (1980, 41p) SR 80-36	Delineation and engineering characteristics of permafrost	Observations on ice-cored mounds at Sukakpak Mountain,
Hydraulic characteristics of the Deer Creek Lake land treat- ment site during wastewater application (1981, 37p)	beneath the Beaufort Sea [1976, p 53-60] MP 919 Environmental analyses in the Kootenai River region, Mon-	south central Brooks Range, Alaska [1983, p.91-96] MP 1653
CR 81-07	tana (1976, 53p) SR 76-13	U.S tundra biome publication list (1983, 29p)
Baseline water quality measurements at six Corps of Engineers reservoirs, Summer 1981 (1982, 55p) SR 82-30	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1977, p 234-237) MP 927	SR 83-29 Interaction of gravel fills, surface drainage, and culverts with
Microbiological aerosols from a field-source wastewater irri-	Arctic transportation operational and environmental evalua-	permafrost terrain [1984, 35p.] MP 2215
gation system [1983, p 65-75] MP 1578 Observations on ice-cored mounds at Sukakpak Mountain,	tion of an air cushion vehicle in northern Alaska (1977,	Potential responses of mafrost to climatic warming (1984, p.92-105) MP 1710
south central Brooks Range, Alaska [1983, p 91-96]	p 176-182; MP 985 Symposium, geography of polar countries, selected papers	Long-term effects of off road vehicle traffic on tundra terrain
MP 1653	and summaries (1977, 61p) SR 77-06	(1984, p 283-294) MP 1820
Interaction of gravel fills, surface drainage, and culverts with permafrost terrain (1984, 35p) MP 2215	Computer modeling of terrain modifications in the arctic and subarctic (1977, p 24-32) MP 971	Workshop on Permafrost Geophysics, Golden, Colorado, 23- 24 October 1984 (1985, 113p) SR 85-05
Prototype drill for core sampling fine-grained perennially	Revegetation and erosion control observations along the	US permafrost delegation visit to the People's Republic of
frozen ground [1985, 29p] CR 85-01 Sub-ice channels and longitudinal frazil bars, ice-covered	Trans-Alaska Pipeline—1975 summer construction season (1977, 36p.) SR 77-08	China, 15-31 July 1984 (1985, 137p) SR 85-09 Terrain analysis from space shuttle photographs of Tibet
Tanana River, Alaska (1986, p 465-474) MP 2129	Delineation and engineering characteristics of permafrost	(1986, p 400-409) MP 2097
Frazil ice pebbles frazil ice aggregates in the Tanana River near Fairbanks, Alaska (1986, p 475-483) MP 2130	beneath the Beaufort Sea (1977, p 385-395) MP 1074	Disturbance and recovery of arctic Alaskan tundra terrain
Morphology, hydraulies and sediment transport of an ice-	Effects of low-pressure wheeled vehicles on plant communi- ties and soils at Prudhoe Bay, Alaska (1977, 49p)	(1987, 63p) CR 87-11 Arctic research of the United States, Vol.1 (1987, 121p)
covered river. Field techniques and initial data (1986,	SR 77-17	MP 2306
Development of a frazil ice sampler (1986, 12p)	Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska (1977, 32p) SR 77-31	Arctic research of the United States, Vol.2 (1988, 76p) MP 2379
SR 86-37	Delineation and engineering characteristics of permafrost	Arctic research in the United States, Vol.3 [1989, 72p]
Auger bit for frozen fine-grained soil (1986, 13p) SR 86-36	beneath the Beaufort Sea (1977, p.432-440) MP 1077 Delineation and engineering characteristics of permafrost	MP 2653
Bit design improves augers (1987, p 453-454) MP 2269	beneath the Beaufort Sea (1977, p 518-521) MP 1201	Arctic research of the United States, Vol 3 (1989, 71p) MP 2530
Evaluation of the magnetic induction conductivity method for detecting frazilise deposits [1987, 12p.] CR 87-17	1977 tundra fire in the Kokolik River area of Alaska [1978,	United States arctic research plan biennial revision 1990-
OK 01-11	p 54-58 ₁ MP 1125	1991 (1989, 72p) MP 2544

Arctic research of the United States, Vol.4 (1990, 120p)	Arctic ecosystem the coastal tundra at Barrow, Alaska r1980, 571p.; MP 1355	Analysis of potential ice jam sites on the Connecticut River at Windsor, Vermont [1976, 31p.] CR 76-31
Brown, J.A.	Burch, W.B.	Arching of model ice floes: Effect of mixture variation on two
Techniques for gas gun studies of shock wave attenuation in snow [1988, p 657-660] MP 2543	System for mounting end caps on ice specimens (1985, p 362-365) MP 2016	Lock wall deicing with high velocity water jet at Soo Locks,
Brown, J.M.	Burdick, J.	Mr (1977, p 23-35) Arching of model ice floes at bridge piers (1978, p.495-507)
Rapid detection of water sources in cold regions—a selected bibliography of potential techniques [1979, 75p.]	Proceedings of the Second International Symposium on Cold Regions Engineering [1977, 597p] MP 952	MP 1134
SR 79-10 Brown, L.	Yukon River breakup 1976 (1977, p 592-596) MP 960 Ice force measurement on the Yukon River bridge (1981,	Frazil ice formation in turbulent flow (1978, p 219-234) MP 1135
Snow accumulation for arctic freshwater supplies (1975, p.218-224) MP 860	p 749-777 ₁ MP 1396 Burgi, P.H.	Physical measurements of river ice jams [1978, p 693-695] MP 1159
Upland aspen/birch and black spruce stands and their litter	River-ice problems: a state-of-the-art survey and assessment	Acceleed ice growth in rivers [1979, 5p.] CR 79-14
and soil properties in interior Alaska [1976, p.33-44) MP 867	of research needs (1974, p 1-15) MP 1002 Burlbaw, E.J.	Measurement of the shear stress on the underside of simulated ice covers (1980, 11p) CR 80-24
Brown, ML. Lake Champlain ice formation and ice free dates and predic-	SNOW III WEST field experiment report. Volume 1 SR 88-28	Analysis of velocity profiles under ice in shallow streams [1981, p 94-111] MP 1397
tions from meteorological indicators [1979, 21p.] CR 79-26	Burns, B.A.	Port Huron ice control model studies (1982, p 361-373) MP 1530
Analysis of ice jams and their meteorological indicators for three winters on the Ottauquechee River, Vermont 1981,	100 MHz dielectric constant measurements of snow cover dependence on environmental and snow pack parameters 41985, p.829-834, MP 1913	Model study of Port Huron are control structure, wind stress simulation [1982, 27p.] CR 82-09
27p ₁ CR 81-01	Burns, C.D.	Resistance coefficients from velocity profiles in ice-covered
Meteorological conditions causing major ice jam formation and flooding on the Ottauquechee River, Vermont 1982,	Design considerations for airfields in NPRA t1978, p 441- 458 ₁ MP 1086	Ottauquechee River-analysis of freeze-up processes (1982,
25p ₃ SR 82-06 Brown, R.L.	Burrous, C.M.	p 2-37 ₃ MP 1738 Application of HEC-2 for ice-covered waterways (1982,
Volumetric constitutive law for snow subjected to large strains and strain rates [1979, 13p] CR 79-20	Determination of unfrozen water in frozen soil by pulsed nuclear magnetic resonance (1978, p.149-155) MP 1097	P 241-248 ₃ MP 1575 Hydraulic model study of Port Huron ice control structure
Analysis of plastic shock waves in snow [1979, 14p] CR 79-29	Phase composition measurements on soils at very high water	(1982, 59p ₁ CR 82-34
Volumetric constitutive law for snow based on a neck growth	contents by pulsed nuclear magnetic resonance technique (1978, p.11-14) MP 1210	Modeling of ice discharge in river models [1983, p.285-290] MP 2081
model (1980, p.161-165) MP 1803 Pressure waves in snow (1980, p 99-107) MP 1306	Burrows, R.L. Detection of coarse sediment movement using radio transmit-	Ice jams in shallow rivers with floodplain flow (1983, p 538- 548) MP 1644
Analysis of non-steady plastic shock waves in snow [1980, p 279-287] MP 1354	ters (1989, p 367-373(B)) MP 2752	Ice-related flood frequency analysis, application of analytical estimates [1984, p 85-101] MP 1712
Propagation of stress waves in alpine snow [1980, p 235- 243] MP 1367	Bush, M.A. Detecting structural heat losses with mobile infrared thermog-	Ice cover melting in a shallow river (1984, p 255-265) MP 1763
Application of energetics to vehicle trafficability problems	raphy. Part 4: Estimating quantitative heat loss at Dart- mouth College, Hanover, New Hampshire [1976, 9p.]	Salmon River ice jams [1984, p 529-533] MP 1796
ti981, p 25-38 ₁ MP 1474 Analysis of vehicle tests and performance predictions [1981,	CR 76-33 Bush, R.M.	Numerical simulation of freeze-up on the Ottauquechee River (1984, p 247-277) MP 1815
p 51-67 ₁ MP 1477 Proceedings of a workshop on the properties of snow, 8-10	Limnological investigations. Lake Koocanusa, Montana. Part 1: Pre-impoundment study, 1967-1972 [1982, 184p]	Cold facts of ice jams: case studies of mitigation methods [1984, p 39-47] MP 1793
April 1981, Snowbird, Utah (1982, 135p) SR 82-18 Comparison of two constitutive theories for compressive	SR 82-21 Limnological investigations: Lake Koocanusa, Montana.	Survey of ice problem areas in navigable waterways (1985, 32p)
deformation of columnar sea ice (1986, p 241-252) MP 2124	Part 3 Basic data, post-impoundment, 1972-1978 (1982,	Ice jam flood prevention measures. Lamoille River at Hard-
Evaluation of the rheological properties of columnar ridge sea	Businger, J.A.	Hydrologic aspects of ice iams (1986, p.603-609)
ice (1986, p.55-66) MP 2177 Improving snow roads and airstrips in Antarctica (1989,	Turbulent heat flux from Arctic leads (1979, p.57-91) MP 1340	MP 2116 Ice problems associated with rivers and reservoirs (1986,
18p ₁ SR 89-22 Brown, W.E.	Buska, J. Waste heat utilization through soil heating (1980, p 105-	p 70-98 ₁ MP 2155 River ice and salmonids (1986, p D-4.1-D-4.26 ₁
Progress report on 25 cm radar observations of the 1971 AID- JEX studies (1972, p 1-16) MP 989	120; MP 1363 Window performance in extreme cold [1981, p.396-408]	MP 2477 Calibrating HEC-2 in a shallow, ice-covered river (1986, 25
Brunner, W. Suppression of ice fog from the Fort Wainwright, Alaska,	MP 1393 Window performance in extreme cold [1982, 21p]	50 86-34
cooling pond (1982, 34p) SR 82-22	CR 82-38	Winter water quality in lakes and streams [1988, 8p] MP 2507
Bryan, K. Large-scale ice/ocean model for the marginal ice zone	Buska, J.S. Overview of Tanana River monitoring and research studies	lce cover distribution in Vermont and New Hampshire Atlan- tic salmon rearing streams (1988, p 85-96) MP 2473
(1984, p.1-7) MP 1778 Ocean circulation its effect on seasonal sea-ice simulations	near Fairbanks, Alaska (1984, 98p + 5 appends) SR 84-37	Deployment of floating bridges in ice-covered rivers (1988, 38p) SR 88-20
[1984, p.489-492] MP 1700 Diagnostic ice-ocean model [1987, p.987-1015]	Effects of phase III construction of the Chena Flood Control Project on the Tanana River near Fairbanks, Alaska—a	Water detection in the coastal plains of the Arctic National Wildlife Refuge using helicopter-borne short pulse radar
MP 2238 Bryan, M.L.	preliminary analysis [1984, 11p. + figs] MP 1745 Frost heave forces on H and pipe foundation piles [1988,	[1989, 25p] CR 89-07 Field assessment of fisheries habitat-enhancement structures
Imaging radar observations of frozen Arctic lakes (1976,	p 1039-10443 MP 2367 Measurement of frost heave forces on H-piles and pipe piles	in Bingo Brook, Vermont, after the Spring 1989 ice run (1989, 12p) MP 2744
Bucher, P.	[1988, 49p] CR 88-21	Winter habitats of Atlantic salmon, brook trout, brown trout
C-14 and other isotope studies on natural ice [1972, p D70- D92] MP 1052	Butler, P.L. Seven-year performance of CRREL slow-rate land treatment	and rainbow trout a literature review (1989, 9p) SR 89-34
Buchter, B. Correlation of Freundlich Kd and n retention parameters with	prototypes (1981, 25p) SR 81-12 Development of a rational design procedure for overland flow	Radar surveying of the bottom surface of ice covers (1990, p 30-39) MP 2766
soils and elements (1989, p 370-379) MP 2570 Buck, K.R.	systems (1982, 29p) CR 82-02 Pilot-scale evaluation of the nutrient film technique for was-	Cameron, J.J. On-site utility services for remote military facilities in the cold
Primary productivity in sea ice of the Weddell region (1978.	tewater treatment (1982, 34p.) SR 82-27 Baseline water quality measurements at six Corps of Engi-	regions (1984, 66p) SR 84-14 Campbell, W.J.
Sea ice and ice algae relationships in the Weddell Sea (1978,	neers reservoirs, Summer 1981 (1982, 55p) SR 82-30	Towing icebergs (1974, p 2) MP 1020
p 70-71; MP 1203 Standing crop of algae in the sea ice of the Weddell Sea region	Phase change heat transfer program for microcomputers	Results of the US contribution to the Joint US/USSR Bering Sea Experiment (1974, 197p) MP 1032
[1979, p.269-281] MP 1242 Morphology and distribution of the Acanthoecidae (Choano-	_ (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Meso-scale strain measurements on the Beaufourt sea pack ice (AIDJEX 1971) (1974, p 119-138) MP 1035
flagellata) from the Weddell Sea during the austral summer. 1977 (1980, 26p) CR 80-16	Land treatment of wastewaters [1974, p.12-13] MP 1036	Remote sensing program required for the AIDJEX model [1974, p 22-44] MP 1040
Sea ice studies in the Weddell Sea aboard USCGC Polar Sea (1980, p.84-96) MP 1431	Research activities of U.S. Army Gold Regions Research and Engineering Laboratory (1975, p.9-12) MP 1244	lce dynamics in the Canadian Archipelago and adjacent Arctic basin as determined by ERTS-1 observations (1975,
Study of the Choanofiagellates (Acanthoecidae) from the Weddell Sea, including a description of Diaphanoeca mul-	Land treatment of wastewaters for rural communities (1975,	p 853-877; MP 1585 Remote sensing plan for the AIDJEX - air experiment
tiannulata n. sp (1981, p 47-54) MP 1453	Calabrese, S.J.	(1975, p 21-48) MP 862
Physical mechanism for establishing algal populations in frazil tee (1983, p 363-365) MP 1717	561 ₃ MP 2258	Interesting features of radar imagery of ice overed North Slope lakes (1977, p 129-136) MP 923
Physical and structural characteristics of Weddell Sea pack ice (1987, 70p) CR 87-14	River-ice mounds on Alaska's North Slope (1989, p 288-	Integrated approach to the remete sensing of floating ice (1977, p 445-487) MP 1069
Buckelew, T.D. Use of the Landsat data collection system and imagery in	290 ₁ MP 2563	Visual observations of floating ice from Skylab [1977, p 353- 379] MP 1263
reservoir management and operation (1977, c150p) MP 1114		Measurement of mesoscale deformation of Beaufort sea ice
Budd, W.F.	Investigation of water jets for lock wall descing (1976, p. G2/13-22) MP 865	
	p G2713-22; MP 865 Passage of ice at hydraulic structures (1976, p 1726-1736)	(AIDJEX-1971) (1978, p.148-172) MP 1179 Continuum sea ice model for a global climate odel (1980)
Compacted-snow runways guidelines for their design and construction in Antarctica (1989, 68p) SR 89-10 Bunnell, F.L.	p G2713-22; MP 865 Passage of ice at hydraulic structures (1976, p 1726-1736) MP 966	(AIDJEX-1971) (1978, p.148-172) MP 1179

Campbell, W.J. (cont.)	Cate, D.W.	Field methods and preliminary results from subsea permafrost
MIZEX—a program for mesoscale air-ice-ocean interaction	Rating unsurfaced roads [1988, p.66-69] MP 2541	investigations in the Beaufort Sea, Alaska (1979, p.207-
experiments in Arctic marginal ice zones 2. A science	Arctic research of the United States, Vol.3 (1989, 71p.)	213 ₁ MP 1591
plan for a summer Marginal Ice Zone Experiment in the Fram Strait/Greenland Sea. 1984 [1983, 47p.]	MP 2530 Cavalieri, D.J.	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1979, p 93-115) MP 1287
SR \$3-12	Antarctic ice sheet brightness temperature variations (1990)	Buried valleys as a possible determinant of the distribution of
Marginal ice zones: a description of air-ice-ocean interactive processes, models and planned experiments (1984, p.133-	p 217-223 ₁ MP 2736	deeply buried permafrost on the continental shelf of the Beaufort Sea r1979, p.135-141, MP 1288
146 ₁ MP 1673	Chacho, E.F. Runoff from a small subarctic watershed, Alaska [1983,	Permafrost beneath the Beaufort Sea: near Prudhoe Bay,
Carbee, D.L.	p.115-120 ₃ MP 1654	Alaska (1980, p 35-48) MP 1346
Strength of frozen silt as a function of ice content and dry unit weight [1980, p 109-119] MP 1451	Overview of Tanana River monitoring and research studies	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1980, p.103-110) MP 1344
Thermal diffusivity of frozen soil [1980, 30p]	near Fairbanks, Alaska [1984, 98p. + 5 appends.] SR 84-37	Overconsolidation effects of ground freezing (1980, p.325-
SR 80-38 CRREL frost heave test, USA [1981, p.55-62]	Effects of phase III construction of the Chena Flood Control	337 ₁ MP 1452
MP 1499	Project on the Tanana River near Fairbanks, Alaska-a	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1981, p.125-157) MP 1428
Creep behavior of frozen silt under constant uniaxial stress	preliminary analysis (1984, 11p. + figs.) MP 1745 Glaciers and sediment (1986, p 53-69) MP 2154	Statistical evaluation of soil and climatic parameters affecting
[1983, p.1507-1512] MP 1805 Creep behavior of frozen silt under constant uniaxial stress	Ice problems associated with rivers and reservoirs (1986,	the change in pavement deflection during thawing of sub-
[1984, p 33-48] MP 1807	p.70-98 ₃ MP 2155	grades [1981, 10p.] CR 81-15 Comparative evaluation of frost-susceptibility tests [1981,
Uniaxial compressive strength of frozen silt under constant	Permafrost (1986, p 99-106) MP 2156	p.42-52; MP 1486
deformation rates (1984, p 3-15) MP 1773 Strain rate effect on the tensile strength of frozen silt (1985,	Sub-ice channels and longitudinal frazil bars, ice-covered Tanana River, Alaska [1986, p.465-474] MP 2129	Delineation and engineering characteristics of permafrost
p.153-157 ₁ MP 1898	Frazil ice pebbles: frazil ice aggregates in the Tanana River	beneath the Beaufort Sea [1981, p.137-156] MP 1600
Tensile strength of frozen silt [1986, p.15-28] MP 1971	near Fairbanks, Alaska (1986, p 475-483) MP 2130	Foundations of structures in polar waters [1981, 16p] SR 81-25
Creep and strength behavior of frozen silt in uniaxial compression (1937, 67p) CR 87-10	Morphology, hydraulics and sediment transport of an ice- covered river. Field techniques and initial data [1986,	Site investigations and submarine soil mechanics in polar re-
sion [1937, 67p] CR 87-10 Tensile strength of frozen silt [1987, 23p.] CR 87-15	37p) CR 86-11	gions (1981, 18p.) SR \$1-24
Triaxial compressive strength of frozen soils under constant	Evaluation of the magnetic induction conductivity method for	CRREL frost heave test, USA [1981, p 55-62] MP 1499
strain rates [1988, p 1200-1205b] MP 2371	detecting frazil ice deposits (1987, 12p) CR 87-17 Chacho, E.F., Jr.	Frost susceptibility of soil; review of index tests [1981.
Carey, K.L. leings developed from surface water and ground water	Detection of coarse sediment movement using radio transmit-	110p. ₃ M 81-02
[1973, 71p] M III-D3	ters (1989, p.367-373(B)) MP 2752	Frost susceptibility of soil; review of index tests (1982, 110p.) MP 1557
Solving problems of ice-blocked drainage facilities (1977,	Cryogenic sampling of frazil ice deposits [1989, 6p] SR 89-28	Frost heave of saline soils (1983, p.121-126) MP 1655
17p.; SR 77-25 Ice blockage of water intakes [1979, 27p.] MP 1197	Water and suspended solids discharge during snowmelt in a	Survey of methods for classifying frost susceptibility (1984,
Estimating costs of ice damage to private shoreline structures	discontinuous permafrost basin [1990, p 167-173]	p.104-141 ₁ MP 1707
on Great Lakes connecting channels (1980, 33p.) SR 80-22	MP 2706 Chalich, P.C.	Shear strength in the zone of freezing in saline soils (1985, p 566-574) MP 1879
Ice engineering for civil work baseline study (1983, 91p)	Sublimation and its control in the CRREL permafrost tunnel	Automated soils freezing test (1985, 5p) MP 1892
MP 2441	[1981, 12p] SR 81-08	Shear strength anisotropy in frozen saline and freshwater soils
Ice atlas, 1984-1985: Ohio River, Allegheny River, Monon-	Chamberlain, E.	[1985, p.189-194] MP 1931
gahela River [1986, 185p] SR 86-23 River ice mapping with Landsat and video imagery [1987,	Effect of freeze-thaw cycles on the permeability and macros- tructure of soils (1990, p 145-155) MP 2678	Geotechnical properties and freeze/thaw consolidation behavior of sediment from the Beaufort Sea, Alaska (1985,
p.352-363 ₁ MP 2273	Chamberlain, E.J.	83p ₁ MP 2025
Ice atlas 1985-1986 Monongahela River, Allegheny River,	Delineation and engineering characteristics of permafrost	Repeated load triaxial testing of frozen and thawed soils (1985, p.166-170) MP 2068
Ohio River, Illinois River, Kankakee River (1987, 367p) SR 87-20	beneath the Beaufort Sea (1976, p 391-408) MP 1377 Operational report: 1976 USACRREL-USGS subsea perma-	(1985, p.166-170) MP 2068 Ion and moisture migration and frost heave in freezing Morin
Carlon, H.R.	frost program Beaufort Sea, Alaska [1976, 20p.]	clay [1986, p.1014] MP 1970
CBR operations in cold weather; a bibliography, Vol.1 [1989, 88p] MP 2574	SR 76-12	Evaluation of selected frost-susceptibility test methods (1986, 51p.) CR-86-14
88p j MP 2574 Carlson, R.F.	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1976, p.53-60) MP 919	[1986, 51p] CR-86-14 Frost action predictive techniques for roads and airfields. A
Cold regions engineering research-strategic plan (1989,	Delineation and engineering characteristics of permafrost	comprehensive survey of research findings [1986, 45p]
p.172-190 ₁ MP 2571	beneath the Beaufort Sea [1977, p 234-237] MP 927	CR 86-18
Carpenter, T. Multivariable regression algorithm [1983, 41p]	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1977, p.385-395) MP 1074	Freeze-thaw test to determine the frost susceptibility of soils (1987, 90p.) SR 87-1
SR 83-32	Resilient modulus and Poisson's ratio for frozen and thawed	Laboratory investigations of low temperature cracking sus-
Carsey, F.	silt and clay subgrade materials [1977, p 229-281]	ceptibility of asphalt concrete [1987, p 397-415] MP 2233
Science program for an imaging radar receiving station in Alaska (1983, 45p) MP 1884	MP 1724 Freeze-thaw enhancement of the drainage and consolidation	Mechanical and physical properties of soils in cold regions
Alaska synthetic aperture radar (SAR) facility project (1987,	of fine-grained dredged material in confined disposal areas	(1987, p 155-161) MP 2415
p 593-396 ₁ MP 2408	[1977, 94p.] MP 978	Observations of moisture migration in frozen soils during
Carsey, F.D. Remote sensing of the Arctic seas [1986, p.59-64]	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1977, p.432-440) MF 1077	thawing (1988, p.308-312) MP 2373 New freezing test for determining frost susceptibility (1988,
MP 2117	1977 CRREL-USGS permafrost program Beaufort Sea, Alas-	p.1045-10501 MP 2368
Carstens, T.	ka, operational report (1977, 19p) SR 77-41	Geotechnical investigation of surficial soils to support hard
Working group on ice forces on structures (1980, 146p) SR 80-26	Defineation and engineering characteristics of permafrost beneath the Beaufort Sea (1977, p 518-521) MP 1201	mobile launcher (HML) studies frozen strength characterization of WES/CRREL NH&S test sites in Montana
Cass, J.R., Jr.	Effect of freeze-thaw cycles on resilient properties of fine-	(1988, var. p.) MP 2617
Subsurface explorations in permafrost areas (1959, p 31-41)	grained soils (1978, 19p) MP 1082	Physical changes in clays due to frost action and their effect on engineering structures (1989, p 863-893) MP 2595
MP 885 Cassell, E.A.	Effect of freezing and thawing on the permeability and struc- ture of soils (1978, p 31-44) MP 1080	on engineering structures (1989, p 863-893) MP 2595 Resilient modulus determination for frost conditions (1989,
Spray application of wastewater effluent in West Dover, Ver-	Densification by freezing and thawing of fine material	p 320-333 ₁ MP 2569
mont: an initial assessment (1979, 38p.) SR 79-06	dredged from waterways (1978, p 622-628) MP 1103	Chang, T.C.
Spray application of wastewater effluent in a cold climate performance evaluation of a full-scale plant (1980, p 620-	Engineering properties of subsea permatrost in the Prudhoe Bay region of the Beaufort Sea (1978, p.629-635)	Results of the US contribution to the Joint US/USSR Bering Sea Experiment [1974, 197p] MP 1032
626 ₁ MP 1403	MP 1104	Chaplin, M.
Case study of land treatment in a cold climate—West Dover,	Influence of freezing and thawing on the resilient properties	Investigation of the acoustic emission and deformation re-
Vermont (1982, 96p) CR \$2-44 Cassidy, W.A.	of a silt soil beneath an asphalt pavement (1978, p 662- 668) MP 1106	sponse of finite ice plates (1981, 19p) CR 81-06 Chen, R.L.
Emerging meteorite, crystalline structure of the enclosing ice	influence of freezing and thawing on the resilient properties	Nitrogen transformations in a simulated overland flow was-
(1989, p 87-91) MP 2503	of a silt soil beneath an asphalt concrete pavement (1978, 59p) CR 78-23	tewater treatment system [1980, 33p] SR 80-16
Caswell, D.M. Hydraulic characteristics of the Deer Creek Lake land treat-	Delineation and engineering characteristics of permafrost	Chensult, T.
ment site during wastewater application (1981, 37p)	beneath the Beaufort Sea (1978, p 50-74) MP 1206	SNOW III WEST field experiment report. Volume 1 SR 88-28
CR 81-07	Overconsolidated sediments in the Beaufort Sea (1978, p 24- 29) MP 1255	Cheng, G.
Catalog of Snow Research Projects Catalog of Snow Research Projects (1975, 103p)	Resilient response of two frozen and thawed soils (1979,	Observations of moisture migration in frozen soils during
MP 1129	p 257-271 ₁ MP 1176	thawing [1988, p 308-312] MP 2373 Cheng, K.C.
Cate, D.	Permafrost beneath the Beaufort Sea, near Prudhoe Bay, Alaska (1979, p.1481-1493; MP 1211	Proceedings (1987, 270p) MP 2302
Disturbance and recovery of arctic Alaskan tundra terrain [1987, 63p.] CR 87-11	Alaska (1979, p.1481-1493) MP 1211 Penetration tests in subsea permafrost, Prudhoe Bay, Alaska	Proceedings (1989, 314p) MP 2636
Rating unsurfaced roads-a field manual for measuring	(1979, 45p) CR 79-07	Historical and recent developments in the research of cold
maintenance problems [1987, 34p.] SR 87-15	Effect of freezing and thawing on the permeability and struc- ture of soil [1979, p 73-92] MP 1225	regions heat transfer (1989, p 1-25) MP 2637 Cheng, S.T.
Arctic research of the United States, Vol.2 (1988, 76p) MP 2379	ture of soil [1979, p 73-92] MP 1225 Effect of freeze-thaw cycles on resilient properties of fine-	Compressive and shear strengths of fragmented ice covers—
Arctic research in the United States, Vol.3 (1989, 72p)	grained soils (1979, p 247-276) MP 1226	a laboratory study (1977, 82p.) MP 951
MP 2653 United States arctic research plan biennial revision 1990-	Determining subsea permafrost characteristics with a cone penetrometer—Provision Bay, Alaska [1979, p.3-16]	Childers, J.M.
1991 (1989, 72p) MP 2544	MP 1217	River-ice problems. a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1002

hristensen, P.T.	Thermodynamic deformation of wet snow [1976, 9p.]	Frazil ice measurements in CRREL's flume facility (19 p.427-438) MP
Review of experimental studies of uplifting forces exerted adfrozen ice on marina piles [1985, p 529-542] MP 19	Roof loads resulting from rain-on-snow (1977, 19p.)	Classification of seasonal snow cover crystals [1986, p.5
hristopher, W.G.	Computer routing of unsaturated flow through snow (1977,	70S ₂ MP : Theory of particle coarsening with a log-normal distribu
Ice-cratering experiments Blair Lake, Alaska (1966, Vario		[1987, p 1583-1588] MP 3
pagings; MP 10 hung, J.S.	34 Short-term forecasting of water run-off from snow and ice {1977, p.571-588} MP 1067	Snow metamorphism and classification (1987, p.1-35) MP
Proceedings (1983, 813p.) MP 1:	81 Tracer movement through snow (1977, p 255-262)	Wet precipitation in subfreezing air below a cloud influe
Proceedings [1985, 2 vols.] MP 2		radar backscattering (1987, p 135-144) MP:
Proceedings (1986, 4 vols.) MP 2	Roof loads resulting from rain on snow; results of a physical model (1977, p.482-490) MP 982	History of snow-cover research (1987, p 60-65)
Advances in ice mechanics—1987 [1987, 49p.] MP 2:		Review of the metamorphism and classification of seas
Proceedings of the eighth International Conference on C	ff. Difficulties of measuring the water saturation and porosity of	snow cover crystals (1987, p.3-34) MP
shore Mechanics and Arctic Engineering, 1989. Volud [1989, 476p.] MP 2	me snow [1978, p.189-201] MP 1124 81 Regelation and the deformation of wet snow [1978, p 639-	Snow properties and processes (1987, p.145-150)
International arctic research programs (1989, 74p)	650 ₁ MP 1172	Kinetic friction of snow [1988, p.78-86] MP
SR 89		On the micrometeorology of surface hoar growth on and
U.S. Federal arctic research [1989, p 65-74] MP 2	71 206; MP 1566 Creep rupture at depth in a cold ice sheet [1978, p.733]	mountainous area (1988, p.1-12) MP Snowmelt increase through albedo reduction (1988, 11)
hurch, R.E. ORIGIN AND PALEOCLIMATIC SIGNIFICANCE	140 illa	SR I
LARGE-SCALE PATTERNED GROUND IN T	HE Sintering and compaction of snow containing liquid water	Snow-crystal growth with varying surface temperatures
DONNELLY DOME AREA, ALASKA (1969, 87p.) MP 1		radiation penetration (1989, p 23-29) MP Ski friction and thermal response (1989, p 223-225)
laffey, K.J.	MP 1234	Ski inction and thermal response (1909, p 223-223)
Vector analysis of ice petrographic data [1989, p.129-14]	Proceedings of a Meeting on Modeling of Snow Cover Run-	Does snow have ion chromatographic properties (1)
MP 2	off, 26-28 September 1978, Hanover, New Hampshire [1979, 432p] SR 79-36	p.165-171; MP
uptake of nutrients by plants irrigated with municipal w	as. Estimated snow, ice, and rain load prior to the collapse of the	Snow cover and glacier variations [1989, 111p.]
tewater effluent [1978, p 395-404] MP 1	51 Hartford Civic Center arena roof [1979, 32p]	Air movement in snow due to windpumping [1989, p.2
Engineering aspects of an experimental system for land re- vation of secondary effluent [1978, 26p.] SR 78	10-	213 ₁ MP
lark, C.H.	p.465-468 ₃ MP 1233	Thermal response of downhill skis (1989, 40p) CR
Accuracy and precision of GOES data collection platfo		Cole, D.M.
for temperature measurements (1989, 14p) SR 89 lark, E.F.	Focus on U.S. snow research (1979, p 41-52) MP 1261	Resilient modulus and Poisson's ratio for frozen and the silt and clay subgrade materials (1977, p.229-281)
Survey of road construction and maintenance problems	in Snow and the organization of snow research in the United	Silt and clay subgrade materials [1977, p.223-201] MP
central Alaska (1976, 36p.) SR 76		Effect of freeze-thaw cycles on resilient properties of
larke, D.B. Observations of pack are properties in the Weddell		grained soils (1978, 19p) MP
Observations of pack are properties in the Weddell [1982, p.105-106] MP 1	08 MP 1281	Influence of freezing and thawing on the resilient prop of a silt soil beneath an asphalt pavement (1978, p.
Physical, chemical and biological properties of winter sea		668 ₁ MP
in the Weddell Sea (1982, p 107-109) MP 1 Elemental compositions and concentrations of mic		Technique for measuring radial deformation during rep load triaxial testing (1978, p.426-429) MP
pherules in snow and pack ice from the Weddell Sea (19)	3, curvature [1980, p 291-301] MP 1368	Influence of freezing and thawing on the resilient prop
p.128-131; MP 1	177 Liquid distribution and the dielectric constant of wet snow	of a silt soil beneath an asphalt concrete pavement (1
Relative abundance of diatoms in Weddell Sea pack [1983, p.181-182] MP 1		59p ₁ CR Resilient response of two frozen and thawed soils (!
Morphology and ecology of diatoms in sea ice from the W	ed- systems (1981, 9p) SR 81-06	p.257-271) MP
deil Sea (1984, 41p.) CR 84	-05 Simulation of the enrichment of atmospheric pollutants in	Effect of freeze-thaw cycles on resilient properties of grained soils #1979, p 247-2761 MP
Sea ice structure and biological activity in the antarctic riginal ice zone [1984, p 2087-2095] MP 1		grained soils (1979, p 247-276) MP Bullet penetration in snow (1979, 23p.) SR
lausen, H.B.	snow cover runoff [1981, p.1383-1388] MP 1487	Preparation of polycrystalline ice specimens for labor
Climatic oscillations depicted and predicted by isotope a	na- Overview of seasonal snow metamorphism (1982, p 45-61) MP 1500	experiments (1979, p.153-159) MP
lyses of a Greenland ice core (1971, p.17-22) MP	Configuration of ice in frozen media (1982, p.116-123)	Cyclic loading and fatigue in ice (1981, p.41-53) MP
Oxygen isotope profiles through the Antarctic and Green	and MP 1512	Effect of freezing and thawing on resilient modulus of a g
ice sheets (1972, p.429-434) MP C-14 and other isotope studies on natural ice (1972, p. D'		lar soil exhibiting nonlinear behavior (1981, p.19-26) MP
D92 ₁ MP 1	Geometry and permittivity of snow [1982, p.113-131]	Acoustic emissions from polycrystalline ice (1982, p
Stable isotope profile through the Ross Ice Shelf at L	ttle MP 1985	199 ₃ MP
America V, Antarctica (1977, p.322-325) MP 1 Camp Century survey 1986 (1987, p.281-288)	Proceedings of a workshop on the properties of snow, 8-10 April 1981, Snowbird, Utah (1982, 135p.) SR 82-18	Deformation and failure of ice under constant stress of stant strain-rate (1982, p. 201-219) MP
MP 2	Permeability of a melting snow cover [1982, p 904-908]	Acoustic emissions from polycrystalline ice (1982, 15)
lay, C.S.	MP 1565	CR
Discrete reflections from thin layers of snow and ice [19] p.323-3313 MP 1	4, Growth of faceted crystals in a snow cover [1982, 19p] CR 82-29	Effect of stress application rate on the creep behavior of crystalline ice r1983, p 614-621, MP
lohan, G.M.	Proceedings (1983, 314p) MP 2054	crystalline ice (1983, p 614-621) MP Stress/strain/time relations for ice under uniaxial con
Computer simulation of urban snow removal (1979, p.2)	3- ice crystal morphology and growth rates at low supersatura-	sion [1983, p 207-230] MP
302 ₁ MP 1 ogan, J.	tions and high temperatures (1983, p.2677-2682) MP 1537	Relationship between creep and strength behavior of failure (1983, p. 189-197) MP
Utilization of Unmanned Aerial Vehicles in the ALBE Th	Theory of metamorphism of dry snow (1983, p 5475-5482)	failure (1983, p 189-197) MP Effect of stress application rate on the creep behavior of
(1986, p.249-257) MP 2	663 MP 1603	crystalline ice (1983, p 454-459) MP
Humidity and temperature measurements obtained from unmanned aerial vehicle [1987, p.35-45] MP 2	an Mechanisms for ice bonding in wet snow accretions on power lines (1983, p.25-30) MP 1633	Influence of grain size on the ductility of ice (1984, p. 157) MP
Slant path extinction and visibility measurements from	an Snow particle morphology in the seasonal snow cover (1983,	1573 MP Modeling the resilient behavior of frozen soils using unf
unmanned serial vehicle (1987, p.115-126) MP 2	296 p 602-609 ₃ MP 1688	water content [1984, p.823-834] MP
ehen, S. Application of removal and control methods. Section	Comments on the metamorphism of snow [1983, p.149- 151] MP 1650	Grain size and the compressive strength of ice (1985, p 226) MP
Railways, Section 2: Highways; Section 3: Airports (19	Increased heat flow due to snow compaction the simplistic	Grain growth and the creep behavior of ice (1985, p.
p 671-706; MP 1 olbeck, S.C.	447 approach (1983, p 227-229; MP 1693 Comments on "Theory of metamorphism of dry snow" by	189 ₁ MP
osseck, S.C. Small-scale strain measurements on a glacier surface [19]		System for mounting end caps on ice specimens (1 p 362-365) MP
p: 17-243 ₁ MP	New classification system for the seasonal snow cover (1984,	Grain size and the compressive strength of ice (1985, p.
Water percolation through homogeneous snow (1973, p.2. 2571 MP 1		374) MP
257 ₃ MP 1 Snow and ice [1975, p 435-441, 475-487 ₃ MP		Repeated load triaxial testing of frozen and thawed r1985, p.166-170; MP
Effects of radiation penetration on snowmelt runoff hy	fro- Thermal convection in snow [1985, 61p] CR 85-09	(1985, p.166-170) MP Resilient modulus of freeze-thaw affected granular 300
graphs (1976, p 73-82) MP		pavement design and evaluation Part I. Laboratory
Water flow through veins in ice [1976, 5p.] CR 7: Effects of radiation penetration on snowmelt runoff by		on soils from Winchendon, Massachusetts, test see [1986, 70p.] CR
graphs (1976, 9p) CR 7	-11 [1985, p 726-732] MP 1939	Effect of grain size on the internal fracturing of polycryst
On the use of tensiometers in snow hydrology (1976, p 1	Theory of natural convection in snow (1985, p 10,641-10,-	ice (1986, 71p) CR
140; MP Analysis of water flow in dry snow [1976, p.523-527]	843 649 ₁ MP 1957 What becomes of a winter snowflake [1985, p 312-215 ₁	Resilient modulus of freeze-thaw affected granular soi pavement design and evaluation (1986, 138p)
MP	871 MP 2060	CR
Generation of runoff from subarctic snowpacks (19	76. Theory of microfracture healing in ice (1986, p 89-95) MP 2146	Resilient modulus of freeze-thaw affected granular sor pavement design and evaluation. Part 2. Field valid
P 677-685 ₁ MP Energy balance and runoff from a subarctic snowpack [19		tests at Winchendon, Massachusetts, lest sections (

Cole, D.M. (cont.)	Scattering at mm wavelengths from in situ snow [1986,	Electromagnetic properties of sea ice [1984, p.53-75]
Small-scale projectile penetration in saline ice [1986, p.415-	p.1.6.1-1.6.2 ₁ MP 2141	MP 1776
438 ₁ MP 2201	Cooley, K.R. Proceedings (1990, 318p.) SR 90-01	Mechanical properties of sea ice: a status report [1984, p.135-198] MP 1808
Frost action predictive techniques for roads and airfields. A comprehensive survey of research findings [1986, 45p.]	Proceedings [1990, 318p.] SR 90-01 Coon, M.D.	p.135-198; MP 1898 Evaluation of a biaxial ice stress sensor (1984, p 349-361)
CR 86-18	Remote sensing program required for the AIDJEX model	MP 1836
Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3. Laboratory tests	(1974, p.22-44) MP 1040 Cooper, S.	Preliminary investigation of thermal ice pressures (1984, p.221-229) MP 1788
on soils from Albany County Airport (1987, 36p.) CR \$7-02	New England reservoir management: Land use/vegetation	Authors' response to discussion on: Electromagnetic proper-
Strain-rate and grain-size effects in ice [1987, p.274-280]	mapping in reservoir management (Merrimack River basin)	ties of sea ice (1984, p.95-97) MP 1822
MP 2311	(1974, 30p.) MP 1039 Applications of remote sensing for Corps of Engineers pro-	Tensile strength of multi-year pressure ridge sea ice samples [1985, p 186-193] MP 1856
Saline ice penetration: a joint CRREL-NSWC test program g1987, 34p ₃ SR 87-14	grams in New England (1975, 8p. + 14 figs. and tables)	Structure, salinity and density of multi-year sea ice pressure
Flexure and fracture of macrocrystalline S1 type freshwater	MP 913 Preliminary analysis of water equivalent/snow characteristics	ridges (1985, p.194-198) MP 1857 Summary of the strength and modulus of ice samples from
ice [1988, p 39-46] MP 2318	using LANDSAT digital processing techniques [1977, 16	multi-year pressure ridges (1985, p 93-98) MP 1848
Crack nucleation in polycrystalline ice [1988, p.79-87] MP 2325	leaves; MP 1113 Use of the Landsat data collection system and imagery in	Preliminary examination of the effect of structure on the com-
Strain energy failure criterion for S2 freshwater ice in flexure	reservoir management and operation (1977, c150p)	pressive strength of ice samples from multi-year pressure ridges (1985, p.99-102) MP 1849
(1988, p.206-215) MP 2494 Uniaxial tension/compression tests on ice—preliminary re-	MP 1114 Effect of inundation on vege ition at selected New England	Effect of sample orientation on the compressive strength of
sults (1989, p.37-41) MP 2482	flood control reservoirs (1 78, 13p.) MP 1169	multi-year pressure ridge ice samples (1985, p.465-475) MP 1877
Resilient modulus determination for frost conditions [1989, p.320-333] MP 2569	Snow cover mapping in nouthern Maine using LANDSAT digital processing techniques (1979, p.197-198)	Triaxial compression testing of ice (1985, p.476-488)
Use of the mechanical properties of ice in the development of	MP 1510	MP 1878
predictive models (1989, p.87-99) MP 2687	Corey, M.W.	Sheet ice forces on a conical structure: an experimental study (1985, p.46-54) MP 1915
Cyclic loading of saline ice: initial experimental results [1990, p.265-271] MP 2581	Land treatment processes within CAPDET (Computer-assist- ed procedure for the design and evaluation of wastewater	Kadluk ice stress measurement program (1985, p.88-100)
Collins, C.M.	treatment systems) [1983, 79p.] SR 83-26	MP 1899 Sheet ice forces on a conical structure: an experimental study
Fate and effects of crude oil spilled on permafrost terrain. First year progress report (1976, 18p.) SR 76-15	Cortez, E.R. Antifreeze admixtures for cold weather concreting. Prelimi-	(1985, p 643-655) MP 1906
Ice breakup on the Chena River 1975 and 1976 (1977, 44p)	nary test results (1990, 8p) MP 2742	Experience with a biaxial ice stress sensor (1985, p 252-
CR 77-14	Cosgrove, D.M.	258 ₁ MP 1937 Tensile strength of multi-year pressure ridge sea ice samples
Investigation of slumping failure in an earth dam abutment at Kotzebue, Alaska (1977, 21p.) SR 77-21	Unusual jökulhlaup involving pothol on Black Rapids Glacier, Alaska Range, Alaska, U.S.A. (1990, p.125-126)	(1985, p 375-380) MP 1908
Fate and effects of crude oil spilled on permafrost terrain.	MP 2708	Sea ice and the Fairway Rock icefoot (1985, p 25-32)
Second annual progress report, June 1976 to July 1977 (1977, 46p] SR 77-44	Coulombe, H.N. Word model of the Barrow ecosystem [1970, p 41-43]	MP 2145 Mechanical properties of multi-year sea ice. Phase 2: Test
Fresh water supply for a village surrounded by salt water-	MP 943	results [1985, 81p.] CR \$5-16
Point Hope, Alaska (1978, 18p.) SR 78-07 Effects of winter military operations on cold regions terrain	Synthesis and modeling of the Barrow, Alaska, ecosystem [1970, p.44-49] MP 944	Structure, salinity and density of multi-year sea ice pressure ridges (1985, p.493-497) MP 1965
[1978, 34p.] SR 78-17	Coutermarsh, B.A.	Ice properties in a grounded man-made ice island [1986,
Physical, chemical and biological effects of crude oil spills on	Roof moisture survey: Reserve Center Garage, Grenier Field,	p.135-142 ₁ MP 2032
black spruce forest, interior Alaska (1978, p.305-323) MP 1185	Manchester, N.H. [1981, 18p] SR 81-31 Moisture detection in roofs with cellular plastic insulation—	Confined compressive strength of multi-year pressure ridge sea ice samples (1986, p 365-373) MP 2035
Ice fog suppression using reinforced thin chemical films	West Point, New York, and Manchester, New Hampshire	Comparison of two constitutive theories for compressive
[1978, 23p] CR 78-26 lee fog suppression using thin chemical films [1979, 44p]	(1982, 22p) SR 82-07 Can wet roof insulation be dried out (1983, p 626-639)	deformation of columnar sea ice [1986, p 241-252] MP 2124
MP 1192	MP 1509	Evaluation of the rheological properties of columnar ridge sea
Case study: fresh water supply for Point Hope, Alaska [1979, p.1029-1040] MP 1222	U.S. Air Force roof condition index survey: Ft. Greely, Alaska 1984, 67p SR 84-03	ice [1986, p 55-66] MP 2177
Fate and effects of crude oil spilled on subarctic permafrost	Snow in the construction of ice bridges [1985, 12p.]	Changes in the salinity and porosity of sea-ice samples during shipping and storage (1986, p.371-375) MP 2244
terrain in interior Alaska (1980, 128p.) MP 1310 Snow pads used for pipeline construction in Alaska, 1976	SR 85-18	Modeling the electromagnetic property trends in sea ice and
construction, use and breakup [1980, 28p] CR 80-17	Model studies of ice interaction with the U.S. Army Ribbon Bridge (1986, 18p) CR 86-01	example impulse radar and frequency-domain electromag- netic ice thickness sounding results (1986, p 57-133)
Fate and effects of crude oil spilled on subarctic permafrost terrain in interior Alaska [1980, 67p.] CR 80-29	Contribution of snow to ice bridges (1987, p.133-137)	MP 2197
terrain in interior Alaska [1980, 67p.] CR 80-29 Sediment load and channel characteristics in subarctic upland	MP 2192 Tactical bridging during winter: 1986 Korean bridging exer-	On the profile properties of undeformed first-year sea ice [1986, p.257-330] MP 2199
catchments (1981, p 39-48) MP 1518	cise (1987, 23p.) SR 87-13	Triaxial testing of first-year sea ice r1986, 41p 1
Long-term active layer effects of crude oil spilled in interior Alaska (1983, p 175-179) MP 1656	Factors affecting rates of ice cutting with a chain saw (1989, 14p.) SR 89-24	CR 86-16 Venification tests for a stiff inclusion stress sensor [1987,
Overview of Tanana River monitoring and research studies	Winter bridging exercise on thick ice: Fort McCoy, Wiscon-	p 81-88 ₁ MP 2223
near Fairbanks, Alaska (1984, 98p. + 5 appends) SR 84-37	sin, 1988 (1990, 24p) SR 90-10 Coutts, H.J.	Advances in sea ice mechanics in the USA (1987, p 37-49)
Effects of phase III construction of the Chena Flood Control	Winter air pollution at Fairbanks, Alaska (1981, p 512-528)	Mechanical properties of multi-year sea ice. Phase 1. Ice
Project on the Tanana River near Fairbanks, Alaska—a preliminary analysis (1984, 11p + figs.) MP 1745	MP 1395	structure analysis (1987, 30p) CR 87-03
Erosion analysis of the north bank of the Tanana River, first	Automotive cold-start carbon monoxide emissions and pre- heater evaluation [1981, 37p] SR 81-32	Electromagnetic property trends in sea ice, Part 1 [1987, 45p] CR 87-06
deferred construction area [1984, 8p. + figs.] MP 1748	Least life-cycle costs for insulation in Alaska (1982, 47p)	Mechanical properties of multi-year sea ice (1987, p 121-
Observations during BRIMFROST '83 (1984, 36p)	Low temperature automotive emissions (1983, 2 vols)	153 ₁ MP 2428
SR 84-10 Morphology, hydraulics and sediment transport of an ice-	Low temperature automotive emissions (1983, 2 vols ; MP 1703	Kadluk ice stress measurement program (1987, p.100-107) MP 2298
covered river. Field techniques and initial data (1986,	Cowan, A.M. Concurrent remote sensing of arctic sea ice from submarine	Modeling the electromagnetic property trends in sea ice; Part
37p ₁ CR 86-11 Natural ground temperatures in upland bedrock terrain, in-	and aircraft (1989, 20p) MP 2697	1 (1987, p.207-235) MP 2330 DOD floating ice problems (1987, p 151-154)
terior Alaska (1988, p.56-60) MP 2360	Cox, G.F.N.	MP 2414
Thermal infrared survey of winter trails in the Ft. Wainwright	Salinity variations in sea ice [1974, p.109-122] MP 1023	Mukluk ice stress measurement program (1988, p.457-463) MP 2354
Training Area, Alaska [1990, 16p] SR 90-17 Colloquium on Planetary Water and Polar Processes, 2nd,	Summer conditions in the Prudhoe Bay area, 1953-75 [1981.	Confined compressive strength of multi-year pressure ridge
Hanover, N.H., Oct. 16-18, 1978	p.799-808 ₁ MP 1457 Equations for determining the gas and brine volumes in sea	sea ice samples (1988, p 295-301) MP 2403
Proceedings [1978, 209p] MP 1193 Colloquium on Water in Planetary Regoliths, Hanover,	ice samples (1982, 11p) CR \$2-30	Profile properties of undeformed first-year sea ice (1988, 57p) CR 88-13
N.H., October 5-7, 1976	Bering Strait sea ice and the Fairway Rock icefoot 1982, 40p1 CR 82-31	Numerical simulations of the profile properties of undeformed
Proceedings (1977, 161p) MP 911 Comiso, J.C.	Equations for determining the gas and brine volumes in sea-	first-year sea ice during the growth season (1988, p. 12,449- 12,460) MP 2404
Antarctic sea ice microwave signatures and their correlation	ice samples (1983, p.306-316) MP 2055 Thermal expansion of saline ice (1983, p.425-432)	Mukluk ice stress measurement program (1988, p 11-15)
with in situ ice observations [1984, p 662-672] MP 1668	MP 1768	MP 2618
Passive microwave in situ observations of winter Weddell Sea	Stress measurements in ice (1983, 31p.) CR 83-23	Coyne, P.I. Carbon dioxide dynamics on the Arctic tundra (1971, p.48-
ice (1989, p 10,891-10,905) MP 2655	Electromagnetic properties of sea ice [1984, 32p.; CR 84-02	52 ₁ MP 903
Concurrent remote sensing of arctic sea ice from submarine and aircraft (1989, 20p) MP 2697	Summary of the strength and modulus of ice samples from	CO2 exchange in the Alaskan Arctic tundra meteorological assessment by the aerodynamic method (1972, p.36-39)
Condike, B.J.	multi-year pressure ridges (1984, p.126-133) MP 1679	MP 1375
Rapid infiltration of primary sewage effluent at Fort Devens, Massachusetts (1976, 34p) CR 76-48	Preliminary examination of the effect of structure on the com-	Case for comparison and standardization of carbon dioxide reference gases [1973, p 163-181] MP 964
Treatment of primary sewage effluent by rapid infiltration	pressive strength of ice samples from multi-year pressure ridges (1984, p.140-144) MP 1685	Cragin, J.H.
(1976, 15p) CR 76-49 Cook, R.	Mechanical properties of multi-year sea ice. Phase 1. Test	Vanadium and other elements in Greenland ice cores (1976, 4p 1 CR 76-24
Comments on the characteristics of in situ snow at millimeter	results (1984, 105p.) CR 84-09 Mechanical properties of multi-year sea ice Testing tech-	4p j CR 76-24 Atmospheric trace metals and sulfate in the Greenland Ice
wavelengths [1986, p.317-320] MP 2666	niques (1984, 39p.) CR 84-08	Sheet (1977, p.915-920) MP 949

Interhemispheric comparison of changes in the composition	Winter field testing of U.S. Navy fleet hospital (1988, 10p)	Forecasting river water temperatures (1988, p 180-188)
of atmospheric precipitation during the Late Cenozoic era [1977, p.617-631] MP 1079	MP 2512 Engineering geology studies on the National Petroleum Re-	MP 2500 Computer-generated graphics of river ice conditions (1988,
Vanadium and other elements in Greenland ice cores (1977,	serve in Alaska (1988, p.899-922) MP 2519	p 211-219 ₁ MP 2509
p.98-102 ₃ MP 1092 Seasonal variations of chemical constituents in annual layers	Airfields in Arctic Alaska (1988, p.49-55) MP 2451 Crosby, R.L.	Ice observations on the Allegheny and Monongahela rivers [1988, 43p.] SR 88-25
of Greenland deep ice deposits (1977, p.302-306) MP 1094	Thermal energy and the environment (1975, 3p + 2p. figs)	Airborne radar survey of a brash ice jam in the St. Clair River
Blank corrections for ultratrace atomic absorption analysis	MP 1480 Crowder, W.K.	(1989, 17p.) CR 89-02 Estimation of time to maximum supercooling during dynamic
(1979, 5p.) CR 79-03	Mesoscale deformation of sea ice from satellite imagery	frazil ice formation [1989, 13p] SR 89-26
Increased mercury contamination of distilled and natural water samples caused by oxidizing preservatives (1979,	(1973, 2p) MP 1120	Data reduction of GOES information from DCP networks [1989, 15p.] SR 89-29
p 313-319; MP 1270 Brine zone in the McMurdo Ice Shelf, Antarctica (1982,	Arctic and subarctic environmental analysis utilizing ERTS- 1 imagery. Final report June 1972-Feb 1974 (1974,	Accuracy and precision of GOES data collection platforms
p 166-171; MP 1550	128p ₁ MP 1047 Crowe, A.	for temperature measurements (1989, 14p) SR 89-37 Development of an underwater frazil-ice detector (1990,
Chemical obscurant tests during winter; environmental fate [1982, 9p] SR 82-19	Resilient modulus of freeze-thaw affected granular soils for	p 77-82 ₁ MP 2702
Brine zone in the McMurdo Ice Shelf, Antarctica (1982,	pavement design and evaluation. (1986, 138p) CR 86-13	Dansgaard, W. Climatic oscillations depicted and predicted by isotope ana-
28p.j CR 82-39 Baseline water quality measurements at six Corps of Engi-	Callinane, M.J., Jr.	lyses of a Greenland ice core (1971, p.17-22) MP 998
neers reservoirs, Summer 1981 [1982, 55p] SR 82-30	Land treatment processes within CAPDET (Computer-assist- ed procedure for the design and evaluation of wastewater	Oxygen isotope profiles through the Antarctic and Greenland
Soft drink bubbles (1983, p.71) MP 1736 Chemical fractionation of brine in the McMurdo Ice Shelf,	treatment systems) [1983, 79p.] SR 83-26	ice sheets (1972, p.429-434) MP 997 Stable isotope profile through the Ross Ice Shelf at Little
Antarctica (1983, 16p) CR #3-06	Cummings, N.H. Cold Regions Science and Technology Bibliography (1981,	America V, Antarctica (1977, p.322-325) MP 1095
Chemical obscurant tests during winter. Environmental fate [1983, p 267-272] MP 1760	p 73-75 ₁ MP 1372	Danyluk, L.S. Stabilization of fine-grained soil for road and airfield con-
Baseline scidity of ancient precipitation from the South Pole	Candy, D.F. Pooling of oil under sea ice (1981, p 912-922)	struction (1986, 37p) SR 86-21
[1984, 7p] CR 84-15 Field sampling of snow for chemical obscurants at SNOW-	MP 1459	Dattilo, R.S. Rating system for unsurfaced roads to be used in maintenance
TWO/Smoke Week VI [1984, p 265-270] MP 2096	Cuaningham, L.L. Salmon River ice jams [1984, p 529-533] MP 1796	management (1987, p (2)51-(2)62) MP 2313
Impact of dredging on water quality at Kewaunee Harbor, Wisconsin (1984, 16p.) CR 84-21	Carcio, J.A.	Method for rating unsurfaced roads [1989, p 103-106] MP 2610
Snow chemistry of obscurants released during SNOW-	Visible propagation in falling snow as a function of mass con- centration and crystal type [1983, p 103-111]	Method for rating unsurfaced roads [1989, p 30-40]
TWO/Smoke Week VI [1984, p 409-416] MP 1873 Sample digestion and drying techniques for optimal recovery	MP 1757	MP 2533 Davenport, C.V.
of mercury from soils and sediments (1985, 16p.)	Carrier, J.H. Study on the tensile strength of ice as a function of grain size	Fate and effects of crude oil spilled on subarctic permafrost
TNT, RDX and HMX explosives in soils and sediments.	(1983, 38p) ČR 83-14	terrain in interior Alaska (1980, 128p) MP 1310 Fate and effects of crude oil spilled on subarctic permafrost
Analysis techniques and drying losses (1985, 11p.) CR \$5-15	Cnymon, G.L. Mathematical model to correlate frost heave of pavements	terrain in interior Alaska (1980, 67p) CR 80-29
Chemical fractionation of brine in the McMurdo Ice Shelf,	with laboratory predictions (1980, 49p.) CR 80-10	Davidoff, B. Correlation of Freundlich Kd and n retention parameters with
Antarctica (1986, p.307-313) MP 2239 Scavenging of infrared screener EA 5763 by falling snow	Daly, C.J. Integral transform method for the linearized Boussinesq	soils and elements (1989, p 370-379) MP 2570
[1987, p.13-20] MP 2292	groundwater flow equation [1981, p 875-884]	Davidson, G. Water percolation through homogeneous snow (1973, p.242-
Baseline acidity of precipitation at the South Pole during the last two millennia [1987, p.789-792] MP 2275	MP 1470 Evaluation of procedures for determining selected aquifer	257 ₁ MP 1025
Increased transmission through brass obscurant clouds during	parameters (1982, 104p.) CR #2-41	Davidson, K. MIZEX—a program for mesoscale air-ice-ocean interaction
snowfall (1988, p 489-496) MP 2605 Snow-smoke interaction (1988, p 497-506) MP 2607	Calculation of advective mass transport in heterogeneous media (1983, p 73-89) MP 1697	experiments in Arctic marginal ice zones. 8. A science
Model of smoke concentration reduction due to scavenging	Procedure for calculating groundwater flow lines (1984, 42D) SR 84-09	plan for a winter marginal ice zone experiment in the Fram Strait/Greenland Sea: 1987/89 (1986, 53p)
by snow [1989, p 87-98] MP 2628 Parametric study on transmission through smoke screens pro-	42p ₁ SR 84-09 Daly, S.	SR 86-09
duced in falling snow (1989, p 99-111) MP 2629	Remote water-temperature measurement [1989, 6p] MP 2722	Pean, A.M., Jr. Remote sensing of accumulated frazil and brash ice in the St.
Does snow have ion chromatographic properties (1989, p 165-171) MP 2755	Daly, S.F.	Lawrence River (1977, 19p) CR 77-06 Remote sensing of accumulated frazil and brash ice (1977,
Craig, J.L. Observations during PRIMEROST 183 -1984 36n -	Modeling hydrologic impacts of winter navigation (1981, p 1073-1080) MP 1445	p 693-704) MP 934
Observations during BRIMFROST '83 (1984, 36p) SR 84-10	Prediction of ice growth and circulation in Kachemak Bay,	Investigation of automatic data collection equipment for oceanographic applications (1978, p.1111-1121)
Fox permafrost tunnel a late Quaternary geologic record in central Alaska (1988, p 948-969) MP 2355	Bradley Lake Hydroelectric Project (1982, p (C)1-(C)9) MP 1501	MP 1021 Evaluation of ice-covered water crossings (1980, p.443-
		Evaluation of ice-covered water clossings (1700, p.443.
Crane, R.K.	Force distribution in a fragmented ace cover (1982, p 374-	453 ₁ MP 1346
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwa-	387 ₃ MP 1531	453 ₁ MP 1344 Method for measuring brash ice thickness with impulse rada
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698	387; MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575	453 ₃ MP 1344 Method for measuring brash ice thickness with impulse radai (1981, 10p ₃ SR 81-11 Electromagnetic subsurface measurements (1981, 19p ₃)
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, F.D.	387 ₁ MP 1531 Application of HEC-2 for ice-covered waterways (1982).	453] MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-23
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536	387, MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) Frazil ice (1983, p 218-223) MP 2078	MP 1344 Method for measuring brash ice thickness with impulse radar [1981, 10p] SR 81-11 Electromagnetic subsurface measurements [1981, 19p] SR 81-22 Field investigations of a hanging ice dam [1982, p 475-488] MP 1533
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, F.D. Weddell-Scotta Sea marginal ice zone observations from	387; MP 1531 Application of HEC-2 for ice-covered waterways [1982, p 241-248] MP 1575 Using the DWOPER routing model to simulate river flows with ice [1983, 19p] SR 83-01	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) SR 81-11 Electromagnetic subsurface measurements (1981, 19p) SR 81-23 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, P.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342	387, MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M84-01	MP 1344 Method for measuring brash ice thickness with impulse radar [1981, 10p] SR 81-11 Electromagnetic subsurface measurements [1981, 19p] SR 81-23 Field investigations of a hanging ice dam [1982, p 475-488] MP 1533 Lake water intakes under icing conditions [1983, 7p] CR 83-15 Modeling intake performance under frazil ice conditions
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Craser, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar	387 ₁ MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248 ₁ MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p ₁ SR 83-01 Frazil ice (1983, p 218-223 ₁ MP 2078 Force distribution in a fragmented ice cover (1984, 16p ₁ CR 84-07	MP 1344 Method for measuring brash ice thickness with impulse radal (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-23 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) CR 83-18 Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1797
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W.	387, MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M84-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) SR 81-11 Electromagnetic subsurface measurements (1981, 19p) SR 81-23 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) CR 83-15 Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1793 Interest of laboratory test data (1984, 99p) SR 84-22 SR 84-22 SR 84-22 SR 84-22 SR 88-22
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) Concurrent remote sensing of arctic sea ice from submeand aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) MP 1417	387, Application of HEC-2 for ice-covered waterways 1982, p 241-248, MP 1537 Using the DWOPER routing model to simulate river flows with ice (1983, 19p.) Frazil ice (1983, p 218-223) Force distribution in a fragmented ice cover [1984, 16p.] CR 84-07 Frazil ice dynamics [1984, 46p.] MR 84-01 St. Lawrence River freeze-up forecast [1984, p 177-190, MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p.) Dynamics of frazil ice formation [1984, p 161-172]	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) RR 81-11 Electromagnetic subsurface measurements (1981, 19p) RR 81-23 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) CR 83-15 Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1797 Mine detection using non-sinusoidal radar. Part 1: Spatial
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) MP 1417 Cost of land treatment systems (1979, 135p) MP 1387	387, MP 1531 Application of HEC-2 for ice-covered waterways (1982, 241-248), MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M 84-01 St. Lawrence River freeze-up forecast (1984, p 177-190), MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172), MP 1829	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) SR 81-11 Electromagnetic subsurface measurements (1981, 19p) SR 81-22 Field investigations of a hanging ice dam (1982, p 475-488, MP 1533) Lake water intakes under icing conditions (1983, 7p) CR 83-15 Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) Decato, S.
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crawey, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) Concurrent remote sensing of arctic sea ice from submanad aircraft (1989, 20p) MP 2597 Crites, R.W. Land treatment-present status, future prospects (1978, p 98-102) MP 1417 Cost of land treatment systems (1979, 135p) MP 1387 Problems with rapid infiltration—a post mortem analysis: (1984, 17p. + figs) MP 1944	387, MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190, MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1972	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-23 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) CR 83-15 Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1797 Mine detection using non-sinusoidal radar. Part 1: Spatia analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineeting characteristics of frazil ice accumulations (1986, p 265-278) MP 2390
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, P.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p. 98-102) MP 1417 Cost of land treatment systems (1979, 135p) MP 1387 Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) MP 1944 Technology and costs of wastewater application to forest sys-	387, MP 1531 Application of HEC-2 for ice-covered waterways, 1982, p 241-248, MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 44-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1872 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089	MP 1344 Method for measuring brash ice thickness with impulse radal (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 153 Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) SR 84-22 Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 measoscale sea ice dynamics, post operations report (1984, p 66-69) MP 1251 Deck, D.S.
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) MP 1417 Cost of land treatment systems (1979, 135p) MP 1387 Problems with rapid infilitation—a post mortem analysis (1984, 17p. + figs) MP 1944 Technology and costs of wastewater application to forest systems (1986, p.349-355) MP 2266 Forest land treatment with municipal wastewater in New	387, Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1531 Using the DWOPER routing model to simulate river flows with ice (1983, 19p.) Frazil ice (1983, p 218-223) Force distribution in a fragmented ice cover (1984, 16p.) CR 84-07 Frazil ice dynamics (1984, 46p.) MR 84-01 St. Lawrence River freeze-up forecast (1984, p 177-190), MP 1713 Forceasting water temperature decline and freeze-up in rivers (1984, 17p.) Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) Data acquisition in USACRREL's flume facility (1985)	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 1532 Lake water intakes under icing conditions (1983, p 759-563) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mp 1797 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1988, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winooski Rivers of Vermont during winter 1977-78
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p. 137-145) Crasey, P.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p. 98-102) Cost of land treatment systems (1979, 135p) MP 1347 Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p.420-430) MP 2280	Application of HEC-2 for ice-covered waterways (1982, 2924)-248) Application of HEC-2 for ice-covered waterways (1982, 2924)-248) WP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) Frazil ice (1983, 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) Appl 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) WP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986)	MP 1344 Method for measuring brash ice thickness with impulse radal (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488, MP 153) Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) SR 4239 Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauqueche and Winooski Rivers of Vermont during winter 1977-78, 10p-188.
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) MP 2698 Crasey, P.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) MP 1417 Cost of land treatment systems (1979, 135p) MP 1387 Problems with rapid infilitation—a post mortem analysis (1984, 17p. + figs) MP 1944 Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p 420-430) New approach for sizing rapid infiltration systems (MP 2280) New approach for sizing rapid infiltration systems (MP 2212)	Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1535 Using the DWOPER routing model to simulate river flows with ice (1983, 19p.) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p.) CR 84-07 Frazil ice dynamics (1984, 46p.) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p.) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Lot acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089 USACRREL precise thermistor meter (1985, 34p.) SR 85-26	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p.) Electromagnetic subsurface measurements (1981, 19p.) SR 81-21 Field investigations of a hanging ice dam (1982, p. 475-488) MP 1533 Lake water intakes under icing conditions (1983, p. 475-488) Modeling intake peformance under frazil ice conditions (1984, p. 559-563) Mp 1797 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p.) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p. 265-278) MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p. 66-69) MP 1257 Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winooski Rivers of Vermont during winter 1977-78
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) Cost of land treatment systems (1979, 135p) MP 1347 Cost of land treatment systems (1979, 135p) Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p.420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2212 Crook, L.	Application of HEC-2 for ice-covered waterways, 1982, p 241-248) MP 1531 Application of HEC-2 for ice-covered waterways, 1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1829 USACRREL precise thermistor meter (1985, 34p) MP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) MP 2127 Ice atlas, 1984-1985 Ohio River, Allegheny River, Monongahela River (1986, 185p) SR 86-23	MP 134 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) MM 2139 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechec and Winooski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow stream (1981, p 94-111)
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, F.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) MP 2697 Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) MP 1417 Cost of land treatment systems (1979, 135p) MP 1387 Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) MP 1944 Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p.420-430) New approach for sizing rapid infiltration systems (disease) MP 2280 New approach for sizing rapid infiltration systems (disease) MP 2712	Application of HEC-2 for ice-covered waterways 1982, p 241-248] MP 1535 Using the DWOPER routing model to simulate river flows with ice (1983, 19p.) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p.) CR 84-07 Frazil ice dynamics (1984, 46p.) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190), MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p.) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172), MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) USACRREL precise thermistor meter (1985, 34p.) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) MP 2127 Ice atlas, 1984-1985 Ohio River, Allegheny River, Monon-	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488, MP 133) Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mine detection using non-sinusoidal radar. Part 1: Spatial ranalysis of laboratory test data (1984, 99p) SR 84-22 Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winooski Rivers of Vermont during winter (1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Lee jam problems at Oil City, Pennsylvania (1981, 19p) Port Huton ice control model studies (1982, p 361-373)
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) Cost of land treatment systems (1979, 135p) MP 1347 Cost of land treatment systems (1979, 135p) Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p.340-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) Crook, L. Failure of an ice bridge (1976, 13p) CR 76-29 Crory, F.E. Piles in permafrost for bridge foundations (1967, 41p.)	Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 86-23 River (1986, 185p) SR 86-23 River ice mapping with Landsat and video imagery (1987, p 152-363) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio	MP 134 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1797 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechec and Winooski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow stream (1981, p 94-111) Ice jam problems at Oil City, Pennsylvania (1981, 1991, 1373) Port Huron ice control model studies (1982, p 361-373) MP 1331
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) Cost of land treatment systems (1979, 135p) MP 1417 Cost of land treatment systems (1979, 135p) Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p 420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p 879-882) Crook, L. Failure of an ice bridge (1976, 13p) CR 76-29 Croy, F.E. Piles in permafrost for bridge foundations (1967, 41p) MP 1411 Kotzebue hospital—a case study (1978, p.342-359)	Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, 19p) SR 83-01 Frazil ice dynamics (1984, 246p) MP 2078 Frazil ice dynamics (1984, 46p) M84-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) MP 1829 Ice block stability (1984, p 544-548) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-23 River ice mapping with Landsat and video imagery (1987, p.352-363) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnati (1987, p 70-79) MP 2260 Evolution of frazil ice in rivers and streams research and	MP 1344 Method for measuring brash ice thickness with impulse radae (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488, MP 153) Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) SR 84-12 Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 1390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) MP 1257 Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winosoki Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Lee jam problems at Oil City, Pennsylvania (1981, 19p) Port Huron ice control model studies (1982, p 361-373) MP 1334 Model study of Port Huron ice control structure, wind stress simulation (1982, 27p) CR 82-06
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, F.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) Crites, R.W. Land treatment present status, future prospects (1978, p 98-102) Cost of land treatment systems (1979, 135p) MP 1417 Cost of land treatment systems (1979, 135p) Technology and costs of wastewater application to forest systems (1986, 17p. + figs) MP 1984 Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p.340-350) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) Crook, L. Failure of an ice bridge (1976, 13p) CR 76-29 Croy, F.E. Piles in permafrost for bridge foundations (1967, 41p) MP 1084	Application of HEC-2 for ice-covered waterways, 1982, p 241-248) MP 1531 Application of HEC-2 for ice-covered waterways, 1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 86-23 River ice mapping with Landsat and video imagery (1987, p.352-363) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnati (1987, p 70-79) MP 2260 Evolution of frazil ice in rivers and streams research and control (1987, p 11-16) MP 2303	MP 134 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) MM 1979 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winooski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow stream (1981, p 94-111) Ice jam problems at Oil City, Pennsylvania (1981, 199) Port Huron ice control model studies (1982, p 361-373) MP 1339 Model study of Port Huron ice control structure, wind stress simulation (1982, 27p) Resistance coefficients from velocity profiles in ice-coeffec
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) Cost of land treatment systems (1979, 135p) Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p 420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p 879-882) Crook, L. Failure of an ice bridge (1976, 13p) Croy, F.E. Piles in permafrost for bridge foundations (1967, 41p) MP 1084 Design considerations for airfields in NPRA (1978, p.441-455) MP 1086	Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1531 Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, 19p) SR 83-01 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 86-23 River ice mapping with Landsat and video imagery (1987, p.552-363) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnati (1987, p 70-79) MP 2260 Evolution of frazil ice in rivers and streams research and control (1987, p 11-16) MP 2305	MP 1344 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488, MP 153) Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mine detection using non-sinusoidal radar. Part I: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) MP 1257 Deeke, D.S. Growth rates and characteristics of ice on the Ottauquecher and Winooski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Port Huron ice control model studies (1982, p 361-373) MP 1391 MP 1392 Model study of Port Huron ice control structure, wind stress simulation (1982, 27p) Resistance coefficients from relocity profiles in ice-covere shallow streams (1982, p 236-247) Force measurements and analysis of river ice break up(1982, p 265-278) Force measurements and analysis of river ice break up(1982, p 236-247) Force measurements and analysis of river ice break up(1982, p 236-247) Force measurements and analysis of river ice break up(1982, p 236-247) Force measurements and analysis of river ice break up(1982, p 236-247)
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, F.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submarne and aircraft (1989, 20p) Crites, R.W. Land treatment present status, future prospects (1978, p 98-102) MP 1021 Cost of land treatment systems (1979, 135p) MP 1387 Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) MP 1944 Technology and costs of wastewater application to forest systems (1986, p.349-355) MP 2266 Forest land treatment with municipal wastewater in New England (1986, p.420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) Crook, L. Failure of an ice bridge (1976, 13p) Croy, F.E. Piles in permafrost for bridge foundations (1967, 41p) MP 1084 Design considerations for airfields in NPRA (1978, p.441-485) Design. —4 construction of temporary airfields in the Nation-	Application of HEC-2 for ice-covered waterways (1982, p 241-248) Application of HEC-2 for ice-covered waterways (1982, p 241-248) White c (1983, 19p) Frazil ice (1983, p 218-223) Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forceasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1829 Los block stability (1984, p 544-548) MP 1839 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-448) Ice atlas, 1984-1985 Ohio River, Allegheny River, Monongahela River (1986, 185p) River ice mapping with Landsat and video imagery (1987, p.352-363) Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnati (1987, p.70-79) MP 2260 Evolution of frazil ice in rivers and streams research and control (1987, p.11-16) MP 2303 MP 2303 MP 2303 MP 2303	MP 134 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) MM 1533 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winooski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Ice jam problems at Oil City, Pennsylvania (1981, 19p) Port Huron ice control model studies (1982, p 361-373) MP 1393 Model study of Port Huron ice control structure, wind stress simulation (1982, 27p) Resistance coefficients from velocity profiles in ice-covered shallow streams (1982, p 301-334) Port memory of the stream (1982, p 316-247) Proce measurements and analysis of river ice break up (1982, p 301-3346) MP 1734
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotia Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) Concurrent remote sensing of arctic sea ice from submanne and aircraft (1989, 20p) Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) Cost of land treatment systems (1979, 135p) Problems with rapid infiltration—a post mortem analysis (1984, 17p. + figs) Technology and costs of wastewater application to forest systems (1986, p.349-355) Forest land treatment with municipal wastewater in New England (1986, p.420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) Crook, L. Failure of an ice bridge (1976, 13p) Croy, F.E. Piles in permafrost for bridge foundations (1967, 41p) MP 2121 Kotzebue hospital—a case study (1978, p.342-359) MP 1084 Design considerations for airfields in NPRA (1978, p.441-455) Design considerations for airfields in NPRA (1978, p.441-455) Design construction of temporary airfields in the National Petroleum Reserve—Alaska (1978, p.13-15)	Application of HEC-2 for ice-covered waterways, 1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p) CR 84-07 Frazil ice dynamics (1984, 46p) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190) MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) MP 2089 USACRREL precise thermistor meter (1985, 34p) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 86-23 River ice mapping with Landssat and video imagery (1987, p.552-363) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnati (1987, p 70-79) MP 2260 Evolution of frazil ice in rivers and streams research and control (1987, p 11-16) MP 2303 MP 2303 Frazil ice in rivers and streams (1987, p,19-26) MP 2305 Frazil ice in rivers and streams (1987, p,19-26) MP 2301 Ice atlas 1985-1986: Monongahela River, Allegheny River,	MP 134 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488, MP 153) Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) Mne detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechec and Winooski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Ice jam problems at Oil City, Pennsylvania (1981, 19p) Port Huton ice control model studies (1982, p 361-373) MP 1390 Model study of Port Huron ice control structure, wind stream simulation (1982, 27p) Resistance coefficients from velocity profiles in ice-covered shallow streams (1982, p 236-247) Resistance coefficients from velocity profiles in ice-covered shallow streams (1982, p 236-247) Porce measurements and analysis of river ice break up (1982, p 303-336) Hydraulic model study of Port Huron ice control structure (1982, 59p) CR 82-36
Crane, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, P.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submarne and aircraft (1989, 20p) Crites, R.W. Land treatment: present status, future prospects (1978, p 98-102) MP 1031 Cost of land treatment systems (1979, 135p) MP 1387 Technology and costs of wastewater application to forest systems (1986, p.490-430) MP 2266 Forest land treatment with municipal wastewater in New England (1986, p.420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Crook, L. Falure of an ice bridge (1976, 13p) Croof, L. Falure of an ice bridge foundations (1967, 41p) MP 1084 Design considerations for airfields in NPRA (1978, p.441-458) Design. "construction of temporary airfields in the National Petroleum Reserve—Alaska (1978, p.13-15) MP 1253 Use of piling in frozen ground (1980, 21 p.) MP 1253	Application of HEC-2 for ice-covered waterways 1982, p 241-248) MP 1535 Using the DWOPER routing model to simulate river flows with ice (1983, 19p.) SR 83-01 Frazil ice (1983, 19p.) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p.) CR 84-07 St. Lawrence River freeze-up forecast (1984, p 177-190), MP 1713 Forceasting water temperature decline and freeze-up in rivers (1984, 17p.) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Data acquisition in USACRREL's flume facility (1985, p 1053-1058) USACRREL precise thermistor meter (1985, 34p.) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice company in the CRREL's flume facility (1986, p 427-438) SR 85-26 Frazil ice apping with Landsat and video imagery (1986, p 352-363) Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnatu (1987, p 70-79) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnatu (1987, p 70-79) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnatu (1987, p 70-79) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnatu (1987, p 70-79) MP 2273 Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnatu (1987, p 70-79) MP 2303 Modelling trash rack freezeup by frazil ice (1987, p 101-106) MP 2305 Frazil ice in rivers and streams (1987, p.19-26)	MP 1344 Method for measuring brash ice thickness with impulse radae (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488, MP 153) Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1797 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 9p) SR 84-22 Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 measoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winnoski Rivers of Vermont during winter 1977-72 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Ice jam problems at Oil City, Pennsylvania (1981, 19p) Port Huron ice control model studies (1982, p 361-373) MP 1397 Model study of Port Huron ice control structure, wind stress simulation (1982, 27p) Resistance coefficients from relocity profiles in ice-coveree shallow streams (1982, p 236-247) Force measurements and analysis of river ice break up (1982, p 303-336) Hydraulic model study of Port Huron ice control structure (1982, p 303-336) Hydraulic model study of Port Huron ice control structure, wind stress (1982, p 236-247) Hydraulic model study of Port Huron ice control structure.
Crame, R.K. Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data (1990, p 137-145) Crasey, F.D. Weddell-Scotta Sea marginal ice zone observations from space, October 1984 (1986, p.3920-3924) MP 1536 Crawford, J. Glaciological investigations using the synthetic aperture radar imaging system (1987, p.11-19) MP 2342 Concurrent remote sensing of arctic sea ice from submarne and aircraft (1989, 20p.) MP 2697 Crites, R.W. Land treatment present status, future prospects (1978, p 98-102) MP 1021 Cost of land treatment systems (1979, 135p.) MP 1387 Technology and costs of wastewater application to forest systems (1986, p.430-355) Forest land treatment with municipal wastewater in New England (1986, p.420-430) New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) Crook, L. Failure of an ice bridge [1976, 13p.] Croy, F.E. Piles in permafrost for bridge foundations (1967, 41p.) MP 1084 Design considerations for airfields in NPRA (1978, p.441-455) Design. "A construction of temporary airfields in the National Petroleum Reserve—Alaska (1978, p.13-15) MP 1253 Use of piling in frozen ground (1980, 21 p.) MP 1253	Application of HEC-2 for ice-covered waterways (1982, p 241-248) MP 1575 Using the DWOPER routing model to simulate river flows with ice (1983, 19p.) SR 83-01 Frazil ice (1983, p 218-223) MP 2078 Force distribution in a fragmented ice cover (1984, 16p.) CR 84-07 Frazil ice dynamics (1984, 46p.) M8 4-01 St. Lawrence River freeze-up forecast (1984, p 177-190), MP 1713 Forecasting water temperature decline and freeze-up in rivers (1984, 17p.) CR 84-19 Dynamics of frazil ice formation (1984, p 161-172) MP 1829 Ice block stability (1984, p 544-548) MP 1972 Loe block stability (1984, p 544-548) MP 1033-1058) W2ACRREL's flume facility (1985, p 1053-1058) W2ACRREL precise thermistor meter (1985, 34p.) SR 85-26 Frazil ice measurements in CRREL's flume facility (1986, p 427-438) MP 2089 Loe atlas, 1984-1985 Ohio River, Allegheny River, Monongahela River (1986, 185p.) SR 86-23 River ice mapping with Landsat and video imagery (1987, p.352-363) Analysis of 112 years of ice conditions observed on the Ohio River at Cincinnati (1987, p 70-79) MP 2260 Evolution of frazil ice in rivers and streams research and control (1987, p 11-16) MP 2303 Mp 2305 Frazil ice in rivers and streams (1987, p.19-26) MP 2301 MP 2305 Frazil ice in rivers and streams (1987, p.19-26) MP 2301 MP 2305 Frazil ice in rivers and streams (1987, p.19-26) MP 2301 MP 2305 Frazil ice in rivers and streams (1987, p.19-26) MP 2301 MP 2305 Frazil ice in rivers and streams (1987, p.19-26) MP 2301	MP 134 Method for measuring brash ice thickness with impulse radar (1981, 10p) Electromagnetic subsurface measurements (1981, 19p) SR 81-21 Field investigations of a hanging ice dam (1982, p 475-488) MP 1533 Lake water intakes under icing conditions (1983, 7p) Modeling intake peformance under frazil ice conditions (1984, p 559-563) MP 1539 Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data (1984, 99p) Field techniques for obtaining engineering characteristics of frazil ice accumulations (1986, p 265-278) MP 2390 Decato, S. MIZEX 84 mesoscale sea ice dynamics, post operations report (1984, p 66-69) Deck, D.S. Growth rates and characteristics of ice on the Ottauquechee and Winooski Rivers of Vermont during winter 1977-78 (1978, 30p) Analysis of velocity profiles under ice in shallow streams (1981, p 94-111) Ice jam problems at Oil City, Pennsylvania (1981, 19p) SR 81-09 Port Huron ice control model studies (1982, p 361-373) MP 1393 Model study of Port Huron ice control structure, wind streas simulation (1982, 27p) Resistance coefficientics from velocity profiles in ice-covere shallow streams (1982, p 203-324) Ferformance of the Allegheny River ice control structure (1982, 59p) Performance of the Allegheny River ice control structure.

Deck, D.S. (cont.) Controlling river ice to alleviate ice jam flooding (1984, p 69-	River-ice mounds on Alaska's North Slope [1989, p.288-290] MP 2563	Internal structure, composition and properties of brackish ice from the Bay of Bothnia (1990, p.5-15) MP 2725
76 ₃ MP 1885	Demont, W.	Dika, W.S.
DeCeff, G.W. Data reduction of GOES information from DCP networks	Controlled river ice cover breakup; part 1. Hudson River field experiments (1986, p.281-291) MP 2391	Summer conditions in the Prudhoe Bay area, 1953-75 (1981, p.799-808) MP 1457
[1989, 15p.] SR 89-29	Controlled river ice cover breakup; part 2. Theory and	DiMerco R.
Dehn, W.F. Islands of grounded sea ice [1976, 24p] CR 76-04	numerical model studies [1986, p.293-305] MP 2392 Study of dynamic ice breakup on the Connecticut River near	Ice strength estimates from submarine topsounder data [1989, p.425-426] MP 2691
Islands of grounder sea ice [1976, p.35-50] MP 987	Windsor, Vermont (1987, p.163-177) MP 2400	DiMillio, A.
Deleney, A.J. Airborne resistivity and magnetometer survey in northern	Options for management of dynamic ice breakup on the Con- necticut River near Windsor, Vermont 1988, 16p 1	Frost action predictive techniques, an overview of research results [1986, p.147-161] MP 2267
Maine for obtaining information on bedrock geology	ČÍŘ 88-01	Dingeldein, J.E.
[1976, 199.] CR 76-37 Selected examples of radiohm resistivity surveys for geotech-	Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont [1988]	Winter earthwork construction in Upper Michigan (1977,
nical exploration (1977, 16p.) SR 77-01	p.221-233 ₁ MP 2510	59p. ₁ SR 77-40 Dingman, S.L.
Preliminary evaluation of new LF radiowave and magnetic induction resistivity units over permafrost terrain g1977,	Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p 245-258) MP 2449	Hydrology and climatology of the Caribou-Poker Creeks Re-
p.39-42 ₁ MP 925	Dempoey, B.J.	search Watershed, Alaska (1982, 34p) CR 82-26 Dittemore, H.R.
Interaction of a surface wave with a dielectric slab discontinuity (1978, 10p.) CR 78-08	Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement 1978,	Effect of seasonal soil conditions on the reliability of the M15
Shallow electromagnetic geophysical investigations of perma-	p.403-437 ₁ MP 1209	land mine (1984, 35p) SR 84-18 Dec. W.W., III
frost (1978, p.501-507) MP 1101 Electrical ground impedance measurements in the United	Asphalt concrete for cold regions; a comparative laboratory study and analysis of mixtures containing soft and hard	Historical bank recession at selected sites along Corps of En-
States between 200 and 415 kHz [1978, 92p.] MP 1221	grades of asphalt cement (1980, 55p) CR 88-05	gineers reservoirs (1983, 103p.) SR 83-30
Electromagnetic geophysical survey at an interior Alaska per-	Dempsey, J.P. Fracture toughness of model ice [1986, p.365-376]	Upper Delaware River ice control—a case study (1986, p 760-770) MP 2005
mafrost exposure (1979, 7p; SR 79-14	MP 2125	Bank conditions and erosion along selected reservoirs (1987,
Detection of Arctic water supplies with geophysical techniques [1979, 30p] CR 79-15	Flexure and fracture of macrocrystalline S1 type freshwater ice [1988, p.39-46] MP 2318	p.143-154 ₁ MP 2196 Deerflinger, D.F.
Effects of seasonal changes and ground ice on electromagnetic surveys of permafrost (1979, 24p.) CR 79-23	Experimental determination of the fracture toughness of urea	Tundra lakes as a source of fresh water: Kipnuk, Alaska
ic surveys of permafrost (1979, 24p.) CR 79-23 Delineation and engineering characteristics of permafrost	model ice (1988, p.289-297) MP 2348 Fracture of S2 columnar freshwater ice: floating double can-	(1979, 16p.) SR 79-30 Domack, E.W.
beneath the Beaufort Sea (1979, p.93-115) MP 1287	tilever beam tests [1988, p.152-161] MP 2493	Pebble fabric in an sce-rafted diamicton (1985, p.577-591)
Low-frequency surface impedance measurements at some gla- cial areas in the United States [1980, p.1-9] MP 1280	Fracture experiments on freshwater and urea model ice [1988, 152p.] MP 2502	MP 1959 Donaldson, R.J.P.
HF to VHF radio frequency polarization studies in sea ice at Pt. Barrow, Alaska (1980, p.225-245) MP 1324	Fracture toughness of columnar freshwater ice from large	Removal of atmospheric ice from broadcast towers using low-
Pt. Barrow, Alaska [1980, p.225-245] MP 1324 Delineation and engineering characteristics of permafroat	scale DCB tests (1989, p.7-20) MP 2545 Deneke, F.J.	frequency, high-amplitude vibrations (1988, 6p.) MP 2538
beneath the Beaufort Sea [1981, p.125-157] MP 1428	Upland aspen/birch and black spruce stands and their litter	Drapier-Arsenault, L.
Hyperbolic reflections on Beaufort Sea seismic records [1981, 16p.] CR 81-02	and soil properties in interior Alaska (1976, p.33-44) MP 867	Ice dynamics in the Canadian Archipelago and adjacent Archipelago and Archipelago
VHF electrical properties of frozen ground near Point Barrow, Alaska [1981, 18p.] CR 81-13	Fate and effects of crude oil spilled on permafrost terrain.	tic basin as determined by ERTS-1 observations (1975, p.853-877) MP 1505
Delineation and engineering characteristics of permafrost	First year progress report (1976, 18p) SR 76-15 DenHartog, S.L.	Drew, A.R.
beneath the Beaufort Sea (1981, p.137-156) MP 1600	Cantilever beam tests on reinforced ice (1976, 12p)	Ice flow leading to the deep core hole at Dye 3, Greenland [1984, p.185-190] MP 1824
Measurement of ground dielectric properties using wide-angle reflection and refraction (1982, 11p.) CR 82-86	CR 76-87 Failure of an ice bridge (1976, 13p.) CR 76-29	Dudley, T.
Laboratory measurements of soil electric properties between 0.1 and 5 GHz [1982, 12p.] CR 82-10	Air photo interpretation of a small ice jam (1977, p.705-	CRREL roof moisture survey, Pease AFB Buildings 33, 116, 122 and 205 (1977, 10p.) SR 77-02
Dielectric properties of thawed active layers overlying perma-	719 ₃ MP 935	Infrared detective: thermograms and roof moisture (1977,
frost using radar at VHF (1982, p.618-626) MP 1547	Aerial photointerpretation of a small ice jam (1977, 17p) SR 77-32	p.41-44 ₁ MP 961 Roof moisture survey: ten State of New Hampshire buildings
Improving electric grounding in frozen materials (1982, 12p.) SR 82-13	Firm quake (a rare and poorly explained phenomenon) (1982, p.173-174) MP 1571	(1977, 29p.) CR 77-31
Electrical properties of frozen ground at VHF near Point Barrow, Alaska (1982, p.485-492) MP 1572	p.173-174) MP 1571 Aircraft operations in the Arctic (1987, p.271-272)	CRREL roof moisture survey, Building 208 Rock Island Arse- nal (1977, 6p.) SR 77-43
Radar profiling of buried reflectors and the groundwater table	MP 2422	Dugan, J.
(1983, 16p.) CR 83-11 Field dielectric measurements of frozen silt using VHF pulses	Thermosyphon for horizontal applications (1988, p.319- 321) MP 2444	lce strength estimates from submarine topsounder data [1989, p.425-426] MP 2691
(1984, p.29-37) MP 1774	Democr, W.W.	Duggen, G.
Dielectric measurements of frozen silt using time domain re- flectometry (1984, p 39-46) MP 1775	"Pack ice and icebergs"—report to POAC 79 on problems of the seasonal sea ice zone: an overview (1979, p.320-337)	Methodology used in generation of snow load case histories
Conductive backfill for improving electrical grounding in	MP 1320 Dennis, J.G.	(1977, p.163-174) MP 1143 Dukeshire, D.E.
frozen soils (1984, 19p) SR 84-17 Large-size coaxial waveguide time domain reflectometry unit	Tussock replacement as a means of stabilizing fire breaks in	Influence of insulation upon frost penetration beneath pave-
for field use (1984, p.428-431) MP 2048	tundra vegetation [1981, p.188-189] MP 1804	ments (1,76, 41p) SR 76-06 Damont, N.
Radar investigations above the trans-Alaska pipeline near Fairbanks (1984, 15p.) CR 84-27	Denoth, A. Study of water drainage from columns of snow [1979, 19p]	Catalog of Snow Research Projects (1975, 103p.)
Mapping resistive seabed features using DC methods [1985,	CR 79-01	Dunber, M.
p.136-147; MP 1918 Dielectric studies of permafrost using cross-borehole VHF	D'Erame, P.A. CBR operations in cold weather: a bibliography, Vol.1 (1989,	MIZEX-a program for mesoscale air-ice-ocean interaction
pulse propagation (1985, p.3-5) MP 1951	88p.j MP 2574	experiments in Arctic marginal ice zones. 2. A science plan for a summer Marginal Ice Zone Experiment in the
Galvanic methods for mapping resistive seabed features [1985, p. 91-92] MP 1955	U.S. Federal arctic research [1989, p 65-74] MP 2671	Fram Strait/Greenland Sea: 1984 [1983, 47p.]
Model studies of surface noise interference in ground-probing	Diceff, G.	SR 83-12 Dunn. I.S.
radar (1985, 23p.) CR 85-19 Short-pulse radar investigations of freshwater ice sheets and	Pooling of oil under sea ice [1981, p.912-922] MP 1459	Wastewater stabilization pond linings [1978, 116p.]
brash ice (1986, 10p) CR 86-06	Dieckmann, G.	SR 78-28 Dunne, T.
Morphology, hydraulies and sediment transport of an ice- covered river. Field techniques and initial data [1986,	Sea ice: a habitat for the foraminifer Neogloboquadrins ps- chyderms? [1990, p 86-92] MP 2732	Generation of runoff from subarctic snowpacks (1976,
37p) CR 86-11	Dieckmann, G.S.	P.677-685; MP 883 Energy balance and runoff from a subarctic snowpack (1976,
Preparation and description of a research geophysical bore- hole site containing massive ground ice near Fairbanks.	Development of sea ice in the Weddell Sea (1989, p 92-96)	29p ₁ CR 76-27
Alaska (1987, 15p) SR 87-07 Airborne river-ice thickness profiling with helicopter-borne	MP 2615 Diener, C.J.	Durell, G.
UHF short-pulse radar (1987, p.330-340) MP 2312	Seven-year performance of CRREL slow-rate land treatment	Mechanical properties of multi-year sea ice. Phase 2: Test results (1985, 81p.) CR 85-16
Field observations of mine detection in snow using UHF short-pulse radar [1987, 24p] SR 87-19	prototypes (1981, 25p.) SR 81-12 Development of a rational design procedure for overland flow	Repeated load triaxial testing of frozen and thawed soils r1985, p.166-170; MP 2068
Borehole investigations of the electrical properties of frozen	systems (1982, 29p) CR 82-02	Resilient modulus of freeze-thaw affected granular soils for
silt [1988, p.910-915] MP 2364 Seasonal variations in resistivity and temperature in discon-	Pilot-scale evaluation of the nutrient film technique for was- tewater treatment [1982, 349.] SR 82-27	pavement design and evaluation Part 1. Laboratory tests on soils from Winchendon, Massachusetts, test sections
tinuous permafrost (1988, p 927-932) MP 2365	Assessment of the treatability of toxic organics by overland	(1986, 70p) CR 86-86
D.C. resistivity along the coast at Prudhoe Bay, Alaska [1988, p.988-993] MP 2366	flow (1983, 47p) CR 83-63 Nitrogen removal in cold regions trickling filter systems	Triaxial testing of first-year sea ice (1986, 41p.)
Investigations of dielectric properties of some frozen materi-	(1986, 39p) SR 86-02	Resilient modulus of freeze-thaw effected granular soils for
als using cross-borehole radiowave pulse transmissions (1989, 18p.) CR 89-04	Initial assessment of the 600-gallon-per-liour Reverse Osmo- sis Water Purification Unit Field water supply on the win-	pavement design and evaluation. Part 3 Laboratory tests on soils from Albany County Airport (1987, 36p.)
Water detection in the coastal plains of the Arctic National	ter battlefield (1986, 6p) SR 86-20	CR 87-02
Wildlife Refuge using helicopter-borne short pulse radar (1989, 25p) CR 89-07	Digby-Argas, S.A. Internal structure, composition and properties of brackish ice	Geotechnical investigation of surficial soils to support hard mobile launcher (HML) studies frozen strength characteri-
Coastal subsea permafrost and bedrock observations using de resistivity [1989, 13p] CR 89-13	from the Bay of Bothnia during the BEPERS-88 experiment	zation of WES-CRREL NHAS test sites in Montana
	(1989, p 1318-1333); MP 2763	(1988, var. p ₁ MP 2617

Durell, G.F.	Fabric installation to minimize reflection cracking on taxi-	
Resilient modulus determination for frost conditions (1989, p.320-333) MP 2569	ways at Thule airbase, Greenland (1981, 26p.) SR \$1-10	Comparative model tests in ice of a Canadian Coast Guard F class icebreaker [1989, p.1/1-1/18] MP 275
Durham, W.B. Mechanisms of crack growth in quartz (1975, p.4837-4844)	Pothole primer—a public administrator's guide to under- standing and managing the pothole problem [1981, 24p.]	Comparative model tests in ice of a Canadian Coast Guard B class icebreaker [1990, p.31-52] MP 276
MP \$55	SR 81-21	Eppler, D.T.
Duthinh, D. Wave-induced bergy bit motion near a floating oil production	Potholes: the problem and solutions (1982, p 160-162) MP 1504	Scientific challenges at the poles [1987, p.23-26] MP 222
platform (1990, p.205-215) MP 2580	Full-depth and granular base course design for frost areas	Epps, J.W.
Dutts, P.K. Some recent developments in vibrating wire rock mechanics	[1983, p.27-39] MP 1492 Strategies for winter maintenance of pavements and roadways	Land treatment processes within CAPDET (Computer-assis
instrumentation (1985, 12p) MP 1968	(1984, p.155-167) MP 1964	ed procedure for the design and evaluation of wastewate treatment systems) [1983, 79p.] SR 83-2
Calibration measurements of rock stress by vibrating wire stressmeter at high temperatures [1987, p.43-58]	Comparison of three compactors used in pothole repair [1984, 14p.] SR 84-31	Epstein, S.
MP 2447	Engineering surveys along the Trans-Alaska Pipeline (1986,	On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet [1979, p 185-192]
CRREL Hopkinson bar apparatus [1987, 29p.] SR 87-24	85p. ₁ SR 86-28	MP 127
Hopkinson pressure bar apparatus: a tool for rapid assessment	Summary of proper cold weather pavement repair methods [1987, p.1013-1027] MP 2235	Eranti, E. Dynamic ice-structure interaction analysis for narrow vertice
of material properties at high strain rates (1988, p 885- 903 ₁ MP 2517	Rating system for unsurfaced roads to be used in maintenance	structures (1981, p.472-479) MP 145
Influence of low temperature thermal cycling on tensile	management (1987, p.(2)51-(2)62) MP 2313 Rating unsurfaced roads—a field manual for measuring	Erbiech, F.H. Effects of inundation on six varieties of turfgrass (1982)
strength of fiber composites [1988, p.14]-147] MP 2435	maintenance problems [1987, 34p.] SR 87-15	25p j SR 82-1
Acoustic emissions from composites at decreasing tempera-	Unique new cold weather testing facility (1988, p.745-750) MP 2542	Erickson, M. Resilient modulus of freeze-thaw affected granular soils for
tures (1988, p.1090-1095) MP 2436 Performance of laminated composites in cold (1988, p.269-	Rating unsurfaced roads [1988, p 66-69] MP 2541	pavement design and evaluation. (1986, 138p)
281 ₃ MP 2433	Development of the unsurfaced roads rating methodology [1988, 13p] SR 88-83	CR 86-1 Each, D.
Behavior of materials at cold regions temperatures. Part 1: Program rationale and test plan (1988, 68p)	(1988, 13p.) SR 88-95 Cost effectiveness of proper pothole patching (1988, p.170-	Yukon River breakup 1976 (1977, p.592-596) MP 96
SR 88-09	174 ₁ MP 2553	Survey of methods for classifying frost susceptibility (1984, p 104-141) MP 176
On the design of polymeric composite structures for cold regions applications (1988, p 435-458) MP 2395	Response of pavement to freeze-thaw cycles: Lebanon, New Hampshire, Regional Airport (1989, 31p.) SR 89-02	Esch, D.C.
Structural fiber composite materials for cold regions (1988,	Unique new cold weather testing facility (1989, p 335-342)	Effect of color and texture on the surface temperature of asphalt concrete pavements (1983, p.57-61) MP 165
p.124-134j MP 2405 Response of advanced composite space materials to thermal	MP 2468 Method for rating unsurfaced roads (1989, p.103-106)	asphalt concrete pavements (1983, p.57-61) MP 165 Frost heave forces on piling (1985, 2p) MP 173
cycling (1988, p.506-517) MP 2478	MP 2610	Frost jacking forces on H and pipe piles embedded in Fai
Vibrating wire technology for settled dust monitoring (1988, p.71-82) MP 2516	Method for rating unsurfaced roads [1989, p 30-40] MP 2533	banks silt (1985, p.125-133) MP 193 Ettema, R.
Fiber composite materials in an arctic environment [1989,	Ebersole, J.F.	Frazil ice formation (1984, 44p) CR 84-1
p.216-225 ₁ MP 2559	Utilization of the snow field test series results for development	Unconventional power sources for ice control at locks an dams [1989, p.107-126] MP 257
Fractographic analysis of graphite-epoxy composites subject- ed to low temperature thermal cycling (1989, p.429-435)	of a snow obscuration primer (1983, p.209-217) MP 1692	Ettles, C.M.M.
MP 2554 Dyer, I.	Snow-Two/Smoke Week VI field experiment plan [1984,	Parameters affecting the kinetic friction of ice (1987, p.552-
MIZEX—a program for mesoscale air-ice-ocean interaction	#5p. ₁ SR 84-19 Helicopter snow obscuration sub-test [1984, p 359-376 ₁	561 ₂ MP 225 Evans, R.J.
experiments in Arctic marginal ice zones. 2. A science plan for a summer Marginal Ice Zone Experiment in the	MP 2094	Small-scale strain measurements on a glacier surface (1971)
Fram Strait/Greenland Sea: 1984 (1983, 47p.)	Explosive obscuration sub-test results at the SNOW-TWO field experiment (1984, p.347-354) MP 1872	p.237-243 ₁ MP 99 Everett, K.R.
SR 83-12 Marginal ice zones: a description of air-ice-ocean interactive	Edwardo, H.A.	Effects of low-pressure wheeled vehicles on plant commun
processes, models and planned experiments (1984, p.133-	Spatial analysis in recreation resource management for the Berlin Lake Reservoir Project (1984, p 209-219)	ties and soils at Prudhoe Bay, Alaska (1977, 49p.) SR 77-1
146 ₁ MP 1673 Engle, T.C.	MP 2064	Geoecological mapping scheme for Alaskan coastal tunde
Development of a geographic information system for the Say-	Ohio River main stem study: the role of geographic informa- tion systems and remote sensing in flood damage assess-	[1978, p.359-365] MP 189 Effects of crude and diesel oil spill on plant communities a
lorville River Basin, Iowa [1987, p 265-269] MP 2549	ments [1984, p.265-281] MP 2063	Prudehoe Bay, Alaska, and the derivation of oil spill ser
Interfacing geographic information system data with real-time	Edwards, A.P. Guide to the use of 14N and 15N in environmental research	sitivity maps (1978, p.242-259) MP 118 Fate of crude and refined oils in North Slope soils (1978,
hydrologic forecasting models (1989, p.857-861) MP 2527	(1978, 77p.) SR 78-18	p.339-347 ₁ MP 110
Earickson, J.	Use of 15N to study nitrogen transformations in land treat- ment g1979, 32p.; SR 79-31	Tundra disturbances and recovery following the 1949 exploratory drilling, Fish Creek, Northern Alaska (1978,
Potential solution to ice jam flooding: Salmon River, Idaho [1986, p.15-25] MP 2131	ment (1979, 32p.) SR 79-31 Dynamics of NH4 and NO3 in cropped soils irrigated with	81p 3 CR 78-2 Geobotanical atlas of the Prudhoe Bay region, Alaska (1980,
Earle, E.N.	wastewater (1980, 20p.) SR 86-27	69p) CR 86-1
4th report of working group on testing methods in ice (1984, p.1-41) MP 1886	Eff, K.S. Storm drainage design considerations in cold regions (1978.	Coestal tundra at Barrow (1980, p.1-29) MP 135
Eaton, R.	p 474-489 ₇ MP 1068	Distribution and properties of road dust along the norther portion of the Haul Road (1980, p.101-128)
State of the art of pavement response monitoring systems for roads and airfields [1989, 401p] SR 89-23	Surface drainage design for airfields and heliports in arctic and subarctic regions [1981, 56p.] SR 81-22	MP 135 Tundra and analogous soils (1981, p.139-179)
Technology transfer (1990, p 25) MP 2721	Egnn, W.G.	MP 140
Eaten, R.A.	Meteorological variation of atmospheric optical properties in an antarctic storm [1916, p.1155-1165] MP 2099	Some recent trends in the physical and chemical characterization and mapping of tundra soils, Arctic Slope of Alask
Influence of insulation upon frost penetration beneath pave- ments (1976, 41p.) SR 76-66	Egelhofer, K.Z.	(1982, p.264-280) MP 155
Pavement recycling using a heavy bulldozer mounted pulver-	Computer modeling of atmospheric ice accretion and aerody- namic loading of transmission lines (1987, p 103-109)	Landsat-assisted environmental mapping in the Arctic National Wildlife Refuge, Alaska (1982, 59p. + 2 maps)
iter (1977, 12p. + appends.) SR 77-30 Repetitive loading tests on membrane enveloped road sec-	MP 2279	CR 12-3
tions during freeze thaw (1977, p.171-197) MP 962	Eicken, H.	Observations on ice-cored mounds at Sukakpak Mountair south central Brooks Range, Alaska [1983, p.91-96]
Temperature effects in compacting an asphalt concrete over- lay [1978, p.146-158] MP 1883	Development of sea see in the Weddell Sea (1989, p.92-96) MP 2615	MP 165
Effects of subgrade preparation upon full depth pavement	Quantification of sea-ice textures through automated digital	Sensitivity of plant communities and soil flora to seawate spills, Prudhoe Bay, Alaska [1983, 35p.; CR 83-2
performance in cold regions (1978, p 459-473) MP 1007	image analysis (1990, p 28-32) MP 2727 Sea ice: a habitat for the foraminifer Neogloboquadrina pa-	Reconnaissance observations of long-term natural vegetatio
Repetitive loading tests on membrane-enveloped road sec-	chyderma? (1990, p 86-92) MP 2732	recovery in the Cape Thompson region, Alaska, and additions to the checklist of flora (1985, 75p.) CR 85-1
tions during freeze-thaw cycles (1978, 16p.) CR 78-12	Elechi, C. Imaging radar observations of frozen Arctic lakes (1976).	Falter, C.M.
Repetitive loading tests on membrane enveloped road sec-	p 169-175; MP 1284	Limnological investigations: Lake Koocanusa, Montani Part 4 Factors controlling primary productivity (1982)
tions during freeze-thaw cycles (1978, p 1277-1288) MP 1158	Elgawhery, S.M.	106p ; SR 82-1.
Full-depth pavement considerations in seasonal frost areas	Evaluation of nitrification inhibitors in cold regions land treatment of wastewater Part 1 Nitrapyrin (1979, 25p.)	Fanole, F.P. Mars soil-water analyzer: instrument description and statu
(1979, 24p.) MP 1188 Nondestructive testing of in-service highway pavement in	SR 79-18	(1977 p.149-158) MP 91
Maine (1979, 22p) CR 79-06	Ellingwood, B. Ground snow loads for structural design [1983, p 950-964]	Faring, 1.16.
New Hampshire field studies of membrane encapsulated soil layers with additives [1980, 46p] SR 80-33	MP 1734	Phase change heat transfer program for microcomputer (1988, p.645-650) MP 238
Field cooling rates of asphalt concrete overlays at low temper-	Probability models for annual extreme water-equivalent ground snow [1984, p.1153-1159] MP 1823	Farmer, L.D.
atures (1980, 11p ₂ CR 80-30 Structural evaluation of porous pavement test sections at	Elliett, D.	Wind-generated polynyas off the coasts of the Bering Securislands (1990, p 126-132) MP 2734
Walden Pond State Reservation, Concord, Massachusetts	Ross Ice Shelf Project environmental impact statement July, 1974 (1978, p.7-36) MP 1075	Farmer, W.M.
[1980, 43p] SR 80-39 Pothole primer; a public administrator's guide to understand-	Emmett, W.W.	Snow-Two/Smoke Week VI field experiment plan (1984, 85p 1 SR 84-1)
ing and managing the pothole problem (1981, 24p)	Detection of coarse sediment movement using radio transmit-	Use and application of PRESTO in Snow-III West (1986,

	A 1. 1. 1. 1. 1	Main CM
Farmer, W.M. (cont.) SNOW III WEST field experiment report. Volume 1	Acoustic emissions during creep of frozen soils [1982, p.194- 206] MP 1495	Flato, G.M. Effect of ice pressure on marginal ice zone dynamics (1989).
(1988, 170p.) SR 88-28	Comparative analysis of the USSR construction codes and the	p 514-521; MP 2522
Parametric study on transmission through smoke screens pro-	US Army technical manual for design of foundations on	Cavitating fluid sea ice model (1990, p.239-242)
duced in falling snow (1989, p.99-111) MP 2629	permafrost [1982, 20p] CR 82-14	MP 2738
Fareski, O. Evaluation of methods for calculating soil thermal conductivi-	Deformation and failure of frozen soils and ice at constant and steadily increasing stresses [1982, p 419-428]	Foley, B.T. Assessment of the treatability of toxic organics by overland
ty [1972, 90p.] CR 82-08	MP 1553	flow (1983, 47p) CR 83-03
Farouki, O.T.	Thermal patterns in ice under dynamic loading (1983, p 240- 243) MP 1742	Impact of slow-rate land treatment on groundwater quality:
Thermal properties of soils (1981, 136p) M 81-01	243 ₁ MP 1742 Comparison of U.S.S.R. codes and U.S. Army manual for	toxic organics [1984, 36p] CR 84-30 Suitability of polyvinyl chloride pipe for monitoring TNT,
Farr, R.W. Portable hot water ice drill (1986, p 549-564) MP 2202	design of foundations on permafrost [1983, p.3-24]	RDX, HMX and DNT in groundwater [1985, 27p]
Farrell, D.	MP 1682	SR 45-12
Ice penetration tests [1984, p 209-240] MP 1996	Thermodynamic model of creep at constant stresses and constant strain rates (1983, 18p.) CR 83-33	Sample digestion and drying techniques for optimal recovery of mercury from soils and sediments (1985, 16p.)
Ice penetration tests (1985, p.223-236) MP 2014	Creep model for constant stress and constant strain rate	SR 85-16
Winter field fortifications (1986, 50p) SR 86-25	(1984, p.1009-1012) MP 1766	TNT, RDX and HMX explosives in soils and sediments.
CRREL Hopkinson bar apparatus [1987, 29p.] SR 87-24	Thermodynamic model of creep at constant stress and con- stant strain rate [1984, p 143-161] MP 1771	Analysis techniques and drying losses (1985, 11p.) CR 85-15
Hopkinson pressure bar apparatus: a tool for rapid assessment	Tertify creep model for frozen sands (discussion) (1984,	Foley, E.S.
of material properties at high strain rates (1988, p.885- 903, MP 2517	p.1373-1378 ₁ MP 1810	Five-year performance of CRREL land treatment test cells;
903 ₃ MP 2517 Acoustic emissions from composites at decreasing tempera-	Creep strength, strain rate, temperature and unfrozen water	water quality plant yields and nutrient uptake 1978. 24p 1 SR 78-26
tures (1988, p.1090-1095) MP 2430	relationship in frozen soil (1925, p.29-36) MP 1928 Shape of creep curves in frozen soils and polycrystalline ice	Foltyn, E.P.
Performance of laminated composites in cold (1988, p 269- 281) MP 2433	(1987, p 623-629) MP 2329	St. Lawrence Rive: freeze-up forecast (1984, p.177-190)
281 ₁ MP 2433 Response of advanced composite space materials to thermal	Some peculiarities of creep behavior of frozen silt (1989,	MP 1713
cycling (1988, p.506-517) MP 2478	p.721-724; MP 2601	Forecasting water temperature decline and freeze-up in rivers (1984, 17p.) CR 84-19
Farrell, D.R.	Fisk, D. Snow calorimetric measurement at SNOW-ONE [1982.	St. Lawrence River freeze-up forecast (1986, p 467-481)
Bullet penetration in snow (1979, 23p.) SR 79-25 Test of snow fortifications (1979, 15p.) SR 79-33	p.133-138 ₁ MP 1986	MP 2120
Test of snow fortifications (1979, 15p) SR 79-33 Snow fortifications as protection against shaped charge an-	Snow characterization at SNOW-ONE-B (1983, p.155-	Salmon River ice jam control studies: interim report (1990, 8p) SR 90-06
titank projectiles (1930, 19p.) SR 80-11	195 ₁ MP 1847 Secondary stress within the structural frame of DYE-3: 1978-	Forest, T.W.
Fancher, M.	1983 [1984, 44p] SR 84-26	Ice nucleation activity of antarctic marine microorganisms
In-situ thermoconductivity measurements (1986, p.13-14) MP 2137	Fisk, D.J.	(1985, p 126-128) MP 2217
Fehler, M.	Performance of overland flow land treatment in cold climates	Forland, K-A. Laboratory investigation of the kinetic friction coefficient of
Observations of volcanic tremor at Mount St. Helens volcano	(1978, p 61-70) MP 1152 Free water measurements of a snowpack (1983, p.173-176)	ice (1984, p.19-28) MP 1825
[1984, p.3476-3484] MP 1770	MP 1758	Kinetic friction coefficient of ice (1985, 40p) CR 85-06
Fellers, G. Concentration and flux of wind-blown snow (1986, 16p.)	Progress in methods of measuring the free water content of	Laboratory and field studies of ice friction coefficient (1986.
SR 86-11	snow (1983, p 48-51) MP 1649	p.389-400 ₁ MP 2126 Fountain, A.G.
Information systems planning study (1987, 48p.)	100 MHz dielectric constant measurements of snow cover: dependence on environmental and snow pack parameters	Break-up dates for the Yukon River; Pt. I. Rampart to White-
SR 87-23	(1985, p 829-834) MP 1913	horse, 1896-1978 (1979, c50 leaves) MP 1317
Ferrick, M.G. Experimental investigation of potential icing of the space	Method of measuring liquid water mass fraction of snow by	Break-up dates for the Yukon River; Pt.2. Alakanuk to Tana- na. 1883-1978 (1979, c50 leaves) MP 1318
shuttle external tank [1982, 305p.] CR 82-25	alcohol solution (1986, p.538-541) MP 2245 Alcohol calcrimetry for measuring the liquid water fraction of	na, 1883-1978 [1979, c50 leaves] MP 1318 Fowler, M.G.
Fluid dynamic analysis of volcanic treesor (1982, 12p.)	snow (1937 p.163-166) MP 2261	Results of the US contribution to the Joint US/USSR Bering
CR 82-32 Source mechanism of volcanic tremor (1982, p.8675-8683)	Intercompari on of snow cover liquid water measurement	Sea Experiment (1974, 197p.) MP 1032
MP 1576	techniques (1987, p.167-172) MP 2262	Frank, M.
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387)	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement tech-	Desicing of radomes and 'ack walls using pneumatic devices
MP 1576 On zero-inertia and kinematic waves [1982, p.1381-1387] MP 2053	techniques (1987, p.167-172) MP 2262	De-icing of radomes and 'nck walls using pneumatic devices (1977, p 467-478) MP 1064 Laboratory experiments on lock wall deicing using pneumatic
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with applica-	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formalde-	Desicing of radomes and 'kek walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) Unsteady river flow beneath an ice cover (1983, p 254-260)	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958	De-icing of radomes and 'tek walls using pneumatic devices (1977, p 467-478) MP 1864 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) Unsteady river flow beneath an ice cover (1983, p 254-260) MP 2079	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formalde-	Desicing of radomes and 'kek walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251)	Desicing of radomes and 'sek walls using pneumatic devices [1977, p 467-478] MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices [1977, p 53-68] MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Sezs [1977, p,32-41] MP 1163 Sea ice ridging over the Alaskan continental shelf [1979]
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) Observations of volcanic tremor at Mount St. Helens volcano	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foom (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1508 Operation of the CRREL prototype air transportable seletter (1980, 73p; SR 30-10	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 454-478). MP 1644 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). MP 1163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.). CR 79-68
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-97 Unsteady river flow beneath an ice cover (1983, p. 254-266) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) Mp 2711 Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) MP 1770	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1506 Operation of the CRREL prototype air transportable 378 80-10 Time constraints on measuring building R-values (1980,	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 467-478). MP 1664 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seas (1977, p.32-41). MP 1163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 1979, 1979).
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387; MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260; MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984,	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flenders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1506 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 454-748). MP 1644 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). MP 1163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-487). MP 1246 Prankeastein, G.E.
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Observations of volcanic tremor at Mount St. Helens volcano (1984, p. 3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) MP 1833 Analysis of river wave types (1985, p. 209-220)	techniques [1987, p.167-172] MP 2262 Comparison of snow cover liquid water measurement techniques [1987, p.1833-1836] MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam [1977, p.478-487] Maintaining buildings in the Arctic [1977, p.244-251] MP 1508 Operation of the CRREL prototype air transportable shelter [1980, 73p] Time constraints on measuring building R-values [1980, 30p] Measuring building R-values for large areas [1981, p. 137-138] MP 1388	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 467-478). MP 1644 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). MP 1163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) CR 79-08 Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897). MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various)
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260, MP 2679) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) Analysis of river wave types (1985, p 209-220) MP 1875	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleaders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1506 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15 Measuring building R-values for large areas (1981, p 137-138) Mindow performance in extreme cold (1981, p 396-408)	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478). MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seas (1977, p.32-41). MP 1163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.). CR 79-08 Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897). MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings). MP 1034
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p.254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 1711 Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) MP 1833 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, 17p.) CR 85-12	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flenders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foom (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p. 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p.) SR 80-10 Time constraints on measuring building R-values (1980, 30p.) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) MP 1388 Window performance in extreme cold (1981, p. 396-408) MP 1393	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 467-478). MP 1644 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). MP 1163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) CR 79-08 Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897). MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various)
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260, MP 2679) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-389) Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) Analysis of river wave types (1985, p 209-220) MP 1893 Analysis of river wave types (1985, p.96-110) MP 2174	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleaders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1506 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15 Measuring building R-values for large areas (1981, p 137-138) Mindow performance in extreme cold (1981, p 396-408)	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska [1966, Various pagings) MP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Observations of volcanic tremor at Mount St. Helens volcano (1984, p. 359-368) Apr 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) Analysis of river wave types (1985, p. 209-220) Analysis of river wave types (1985, p. 209-220) Hudson River ice ranagement (1985, p.96-110) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flenders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foom (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p. 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) Measuring building R-values for large areas (1981, p. 137-138) Window performance in extreme cold (1981, p. 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable Arc-	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 454-748). MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). Sea ice ridging over the Alaskan continental shelf (1979, 24p.). Sea ice ridging over the Alaskan continental shelf (1979-88). Sea ice ridging over the Alaskan continental shelf (1979-9485-487). Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings). Use of explosives in removing ice jams (1970, 10p.). MP 1034 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15). MP 1002
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Mp 1710 Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, 17p) Controlled nver ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2391	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15 Measuring building R-values for large areas (1981, p 137-138) Window performance in extreme cold (1981, p 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen for	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska [1966, Various pagings) MP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-9. Unsteady river flow beneath an ice cover (1983, p. 254-260, MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-389) Modeling rapidly varied flow in tailwaters (1984, p. 271-389) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) Analysis of river wave types (1985, p. 209-220) MP 1873 Analysis of river wave types (1985, p. 209-220) Hudson River ice raanagement (1985, p. 96-110) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled river ice cover breakup; part 2 Interval and the cover breakup; part 2 Interval and provided studies (1986, p. 293-105) MP 2392	techniques [1987, p.167-172] MP 2262 Comparison of snow cover liquid water measurement techniques [1987, p.1833-1836] MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam [1977, p.478-487] MP 958 Maintaining buildings in the Arctic [1977, p.244-251] MP 1508 Operation of the CRREL prototype air transportable shelter [1980, 73p] SR 80-10 Time constraints on measuring building R-values [1980, 30p] CR 80-15 Measuring building R-values for large areas [1981, p.137-138] Window performance in extreme cold [1981, p.396-408] MP 1393 Cold regions testing of an air-transportable shelter [1981, 20p] Designing with wood for a lightweight air-transportable cretic shelter; how the materials were tested and chosen for design [1982, p.385-397] Least life-cycle costs for insulation in Alaska [1982, 47p]	Desicing of radomes and 'xck walls using preumatic devices (1977, p 454-748). MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). Sea ice ridging over the Alaskan continental shelf (1979, 24p.). Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897). MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings). MP 1034 Use of explosives in removing ice jams (1970, 10p.). MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15). MP 1002 Third International Symposium on Ice Problems (1975, 627p.). MP 845 Ice removal from the walls of navigation locks (1976, p. 1487).
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Observations of volcanic tremor at Mount St. Helens volcano (1984, p. 3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) Analysis of river wave types (1985, p. 209-220) MP 1833 Analysis of river wave types (1985, p. 290-220) Hudson River ice rasnagement (1985, p. 96-110) Controlled niver ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled niver ice cover breakup, part 2. Theory and numerical model studies (1986, p. 293-305) MP 2392 River wave response to the friction-inertia balance (1987)	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15 Measuring building R-values for large areas (1981, p 137-138) Window performance in extreme cold (1981, p 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Cold regions testing of an air-transportable shelter, how the materials were tested and chosen for design (1982, p.385-397) Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 978 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seas (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 163 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1836-4897; MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) Third International Symposium on Ice Problems (1975, 627p.) MP 845 Ice removal from the walls of navigation locks (1976, p 1487-1499) MP 888
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) MP 1711 Observations of volcanic tremor at Mount St. Helens volcano (1984, p. 3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) MP 1873 Analysis of river wave types (1985, p. 209-220) MP 1873 Analysis of river wave types (1985, p. 209-220) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-29) MP 2174 Controlled river ice cover breakup; part 2 Theory and numerical model studies (1986, p. 293-305) MP 2392 River wave response to the friction-inertia balance (1987, p. 764-769) MP 2237	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleaders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 30-10 Time constraints on measuring building R-values (1980, 30p) Measuring building R-values for large areas (1981, p 137-138) Measuring building R-values (1981, p 137-138) Window performance in extreme cold (1981, p 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) Window performance in extreme cold (1982, 21p)	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seas (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) Third International Symposium on Ice Problems (1975, 627p.) MP 385 Ice removal from the walls of navigation locks (1976, p. 1487-1495) Investigation of ice clogged channels in the St. Marys River
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) Unsteady river flow beneath an ice cover (1983, p.234-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271- 289) Modeling rapidly varied flow in tailwaters (1984, p.271- 289) MP 1710 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 River wave response to the friction-inertia balance (1987, p.764-769) Study of dynamic ice breakup on the Connecticut River near Windson, Vermont (1987, p.163-177) MP 2400	techniques [1987, p.167-172] MP 2262 Comparison of snow cover liquid water measurement techniques [1987, p.1833-1836] MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam [1977, p.478-487] MP 958 Maintaining buildings in the Arctic [1977, p.244-251] MP 1508 Operation of the CRREL prototype air transportable shelter [1980, 73p] SR 89-19 Measuring building R-values for large areas [1980, 30p] Measuring building R-values for large areas [1981, p.137-138] Window performance in extreme cold [1981, p.396-408] MP 1393 Cold regions testing of an air-transportable shelter [1981, 20p] Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen for design [1982, p.385-397] Least life-cycle costs for insulation in Alaska [1982, 21p] CR 82-28	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Frankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) Third International Symposium on Ice Problems (1975, 627p.) Ice removal from the walls of navigation locks (1976, p 1 487-1499) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p 157-179)
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Mp 1710 Observations of volcanic tremor at Mount St. Helens volcano (1984, p. 3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) MP 1833 Analysis of river wave types (1985, p. 209-220) MP 1875 Analysis of river wave types (1985, p. 209-220) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled river ice cover breakup; part 2. Theory and numerical model studies (1986, p. 293-305) River wave response to the friction-inertia balance (1987, p. 764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p. 163-177) MP 2400 Obtions for management of dynamic ice breakup on the Con-	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleaders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 30-10 Time constraints on measuring building R-values (1980, 30p) CR 30-15 Measuring building R-values for large areas (1981, p 137-138) MP 1388 Window performance in extreme cold (1981, p 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen of design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 11p) CR 84-01	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.8853-4197) MP 1240 Prankensteia, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1002 Third International Symposium on Ice Problems (1975, 627p.) MP 845 Ice removal from the walls of navigation locks (1976, p.187-1496) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 1140
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387) MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) Unsteady river flow beneath an ice cover (1983, p.234-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271- 289) Modeling rapidly varied flow in tailwaters (1984, p.271- 289) MP 1710 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 River wave response to the friction-inertia balance (1987, p.764-769) Study of dynamic ice breakup on the Connecticut River near Windson, Vermont (1987, p.163-177) MP 2400	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) MP 1393 Window performance in extreme cold (1981, p.396-408, MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable rectic shelter; how the materials were tested and chosen for design (1982, p.385-397) CR 81-16 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 84-01 Measuring thermal performance of building envelopes, nine	Desicing of radomes and 'xck walls using pneumatic devices (1977, p 46-748). MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68). MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41). Sea ice ridging over the Alaskan continental shelf (1979, 24p.). Sea ice ridging over the Alaskan continental shelf (1979-08). Sea ice ridging over the Alaskan continental shelf (1979-08). Pramkenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings). Use of explosives in removing ice jams (1970, 10p.). MP 1034 Use of explosives in removing ice jams (1970, 10p.). MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15). MP 1002 Third International Symposium on Ice Problems (1975, 627p.). MP 845 Ice removal from the walls of navigation locks (1976, p 1487-1499). Investigation of ice clogged channels in the St. Marys River (1978, 73p.). MP 1170 Report of panel on testing in ice (1978, p 157-179). MP 1140 Experience gained by use of extensive ice laboratory facilities
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-266) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-389) Observations of volcanic tremor at Mount St. Helens volcano (1984, p. 3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) MP 1873 Analysis of river wave types (1985, p. 209-220) Analysis of river wave types (1985, p. 209-220) MP 1873 Analysis of river wave types (1985, p. 209-210) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled river ice cover breakup, part 2. Theory and numerical model studies (1986, p. 293-305) MP 2392 River wave response to the friction-inertia balance (1987, p. 764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p. 163-177) MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 16p) Development of a dynamic ice breakup control method for	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleaders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p 244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1981, p 137-138) Measuring building R-values for large areas (1981, p 137-138) MP 1398 Window performance in extreme cold (1981, p 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 11p) CR 84-01 Measuring thermal performance of building envelopes, nine case studies (1985, 36p) CR 85-07	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4197) MP 1021 Prankenstela, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1021 Third International Symposium on Ice Problems (1975, 627p.) MP 845 Ice removal from the walls of navigation locks (1976, p. 1487-1499) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1361
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-8-7 Unsteady river flow beneath an ice cover (1983, p. 254-260, MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Mp 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) Analysis of river wave types (1985, p. 209-220) MP 1833 Analysis of river wave types (1985, p. 209-220) Hudson River ice rasnagement (1985, p. 96-110) Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled river ice cover breakup, part 2. Theory and numerical model studies (1986, p. 293-305) River wave response to the friction-inertia balance (1987, p. 764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p. 163-177) Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 16p) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p)	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) MP 1393 Window performance in extreme cold (1981, p.396-408, MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable rectic shelter; how the materials were tested and chosen for design (1982, p.385-397) CR 81-16 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 84-01 Measuring thermal performance of building envelopes, nine	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1034 Sea ice ridging over the Alaskan continental shelf (1979, 4885-4897) MP 1048 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1022 Third International Symposium on Ice Problems (1975, 627p.) Iter removal from the walls of navigation locks (1976, p.1487-1496) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) Report of panel on testing in ice (1978, p.157-179) Expenence gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.931-103) MP 1301 Methods of ice control (1983, p.204-215) MP 1402 Investigation of ice control (1983, p.204-215) MP 1404 Expenence gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.931-103) MP 1301 Methods of ice control (1983, p.204-215)
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in its letters volcano (1984, p.346-3484) Observations of volcanic tremor at Mount St. Helens volcano (1984, p.359-368) MP 1873 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1873 Analysis of river wave types (1985, p.209-220) MP 1873 Analysis of river wave types (1985, p.209-220) MP 1873 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) Controlled river ice cover breakup, part 2. Theory and numerical model studies (1986, p.293-305) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) MP 2310	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Fleanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1506 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 90-10 Time constraints on measuring building R-values (1981, p. 137-138) Measuring building R-values (1981, p. 137-138) MP 1938 Window performance in extreme cold (1981, p. 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Cold regions testing of an air-transportable shelter (1981, 20p) Cold regions testing of an air-transportable Arctic shelter, how the materials were tested and chosen for design (1982, p.385-397) Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-28 Toward in-situ building R-value measurement (1984, 13p) CR 84-01 Measuring thermal performance of building envelopes, nine case studies (1985, 36p) Heat flow sensors on walls—what can we learn (1985, p.140-149) Measured and expected R-values of 19 building envelopes	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4197) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) MP 1021 Third International Symposium on Ice Problems (1975, 627p.) MP 845 Ice removal from the walls of navigation locks (1976, p 1487-1499) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p 93-103) Methods of ice control (1983, p 204-215) MP 2441
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p.254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 1711 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Controlled niver ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 237 Controlled niver ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) MP 2392 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177, MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, p.221-233) Perturbation solution of the flood problem Discussion and MP 2530	techniques [1987, p.167-172] MP 2262 Comparison of snow cover liquid water measurement techniques [1987, p.1833-1836] MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam [1977, p.478-487] MP 958 Maintaining buildings in the Arctic [1977, p.244-251] MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p] SR 89-10 Time constraints on measuring building R-values [1980, 30p] Measuring building R-values for large areas [1981, p.137-138] Window performance in extreme cold [1981, p.396-408] MP 1398 Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen for design [1982, p.385-397] Least life-cycle costs for insulation in Alaska [1982, 47p] CR 82-27 Window performance in extreme cold [1982, 21p] Toward in-situ building R-value measurement [1984, 11p] Measuring thermal performance of building envelopes, nine case studies [1985, 36p] Heat flow-sensors on walls—what can we learn [1985, p.140-149] Measured and expected R-values of 19 building envelopes [1985, p.49-57] MP 2842	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) MP 1064 Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.885-4197) MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1002 Third International Symposium on Ice Problems (1975, 627p.) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) Report of panel on testing in ice (1978, p.157-179) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1140 Methods of ice control (1983, p. 204-215) MP 1642 Ice engineering for civil work: baseline study (1983, 91p.) MP 2441 Methods of ice control for winter navigation in inland waters
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in itelwaters (1984, p.271-289) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) Analysis of river wave types (1985, p.209-220) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) Controlled river ice cover breakup; part 2. Theory and numerical model studies (1986, p.293-305) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177) MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Paranic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Paranic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Paranic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Dynamic ice breakup control for the Connecticut River near	techniques (1987, p.167-172) MP 2283 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) MP 1393 Window performance in extreme cold (1981, p.396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable Arctic shelter; how the materials were tested and chosen for design (1982, p.385-397) MP 1588 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) Heat flow sensors on walls—what can we learn (1985, p.140-149) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) Heat flow sensors on walls—what can we learn (1985, p.140-149) Measured and expected R-values of 19 building envelopes (1985, p.49-57) Confidence in heat flux transducer measurements of buildings	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) MP 1034 Use of explosives in removing ice jams (1970, 10p.) River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) Third International Symposium on Ice Problems (1975, 627p.) International Symposium on Ice Problems (1975, 627p.) MP 245 Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 1170 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) Methods of ice control (1983, p.204-215) Methods of ice control for winter navigation in inland waters (1934, p.329-337) Methods of tex control for winter navigation in inland waters (1934, p.329-337) Methods of tex control for winter navigation in inland waters (1934, p.329-337) Methods of tex control for winter navigation in inland waters (1934, p.329-337)
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260, MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-389) Modeling rapidly varied flow in tailwaters (1984, p. 271-389) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) MP 1873 Analysis of river wave types (1985, p. 209-220) MP 1873 Analysis of river wave types (1985, p. 209-220) MP 2871 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled river ice cover breakup, part 2. Theory and numerical model studies (1986, p. 293-305) River wave response to the friction-inertia balance (1987, p. 764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p. 163-177) MP 2480 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, p. 221-223) Perturbation solution of the flood problem Discussion and author's reply (1988, p. 346-349) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p. 245-258) MP 2459 MP 2459 MP 2459 MP 2459 MP 2450	techniques (1987, p.167-172) MP 2283 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 96-15 Measuring building R-values for large areas (1981, p.137-138) Mindow performance in extreme cold (1981, p.396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable cretic shelter, how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) MP 2390 Heat flow sensors on walls—what can we learn (1985, p.10-149) Measured and expected R-values of 19 building envelopes (1985, p.49-57) MP 2042 Measured and expected R-values of 19 building envelopes (1985, p.49-57) MP 2115 Confidence in heat flux transducer measurements of buildings (1985, p.515-511) Megastructures for mobilization (1986, p.10-11)	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.885-4197) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1002 Third International Symposium on Ice Problems (1975, 627p.) MP 845 Ice removal from the walls of navigation locks (1976, p. i487-1496) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1441 Methods of ice control (1983, p. 204-215) MP 1442 Methods of ice control for winter navigation in inland waters (1934, p.319-337) MP 1831 Le cover research—present state and future needs (1981, p.198-204)
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-260) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varying flow in ice-covered rivers (1984, p. 359-368) Application of the flow of the f	techniques (1987, p.167-172) MP 2283 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 958 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p. 137-138) MP 1393 Cold regions building R-values for large areas (1981, p. 137-138) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable Arctic shelter; how the materials were tested and chosen for design (1982, p.385-397) MP 1598 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 85-07 Heat flow sensors on walls—what can we learn (1984, 13p) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) Heat flow sensors on walls—what can we learn (1985, p. 140-149) Measured and expected R-values of 19 building envelopes (1985, p. 49-57) Confidence in heat flux transducer measurements of building (1985, p. 515-531) MP 2153 MP 2153	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) MP 1021 Third International Symposium on Ice Problems (1975, 627p.) MP 345 Ice removal from the walls of navigation locks (1976, p (487-1496)) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p 157-179) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p 93-101) Methods of ice control (1983, p 204-215) MP 1301 Methods of ice control (1983, p 204-215) MP 2441 Methods of ice control for winter navigation in inland waters (1984, p 319-337) MP 2331 I.e cover research—present state and future needs (1986, p 34-399) Corrs of engineers seek ice solutions (1987, p 5-7)
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p.254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 2710 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-210) MP 2174 Controlled river ice cavar breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2192 River wave response to the friction-inertia balance (1987, p.764-769) MP 2237 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177, MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Perturbation solution of the flood problem Discussion and author's reply (1988, p.346-349) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.231-258) MP 2498 Vector analysis of ice petrographic data (1989, p.129-141)	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1506 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 90-10 Time constraints on measuring building R-values (1981, p. 137-138) Window performance in extreme cold (1981, p. 136-138) Window performance in extreme cold (1981, p. 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter, how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 83-07 Heat flow sensors on walls—what can we learn (1985, p. 140-149) Measuring thermal performance of building envelopes (1985, p.49-57) Confidence in heat flux transducer measurements of building (1985, p. 149-57) Confidence in heat flux transducer measurements of building (1985, p. 155-531) MP 2290 Megastructures for mobilization (1986, p.10-11) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) Third International Symposium on Ice Problems (1975, 627p.) MP 345 Ice termoval from the walls of navigation locks (1976, p. i487-1495) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 1170 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) Methods of ice control (1983, p.204-215) Methods of ice control (1983, p.204-215) Methods of ice control (1983, p.204-215) Methods of ice control for winter navigation in inland waters (1934, p.323-337) Methods of engineers seek ice solutions (1987, p.5-7) MP 2004 Corps of engineers seek ice solutions (1987, p.5-7)
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 1711 Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p 209-220) MP 1875 Analysis of river wave types (1985, p 209-220) MP 1875 Analysis of river wave types (1985, p.96-110) MP 2174 Controlled niver ice cover breakup, part 1. Hudson River field experiments (1986, p.281-29) MP 237 Controlled niver ice cover breakup; part 2 Theory and numerical model studies (1986, p. 293-305) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) MP 237 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177, MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, p.221-223) Perturbation solution of the flood problem Discussion and author's reply (1988, p.346-349) MP 2536 Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.245-258) MP 2439 Vector analysis of ice petrographic data (1989, p.129-141) Vector analysis of ice petrographic data (1989, p.129-141) Vector analysis of ice petrographic data (1989, p.129-141) Vector analysis of ice petrographic decrease prover regulation (1989, 149) CR 89-12	techniques (1987, p.167-172) MP 2283 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 MP 1508 MR 1508 MR 2884-15 MR 2884-15 MR 2884-15 MR 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable rectic shelter; how the materials were tested and chosen for design (1982, p.385-397) Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) MCR 82-38 Toward in-situ building R-value measurement (1984, 13p) MCR 82-38 Toward in-situ building R-value measurement (1985, p 140-149) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) Heat flow sensors on walls—what can we learn (1985, p 140-149) Measured and expected R-values of 19 building envelopes (1985, p 49-57) Confidence in heat flux transducer measurements of buildings (1985, p 515-531) MP 2290 Megastructures for mobilization (1986, p 10-11) In-situ assessment of two retrofit insulations (1986, p 32-44) MP 2172	Desicing of radomes and 'sck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) MP 245 Ice removal from the walls of navigation locks (1976, p (487-1496)) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p 157-179) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p 93-101) Methods of ice control (1983, p 204-215) MP 1301 Methods of ice control (1983, p 204-215) MP 2441 Methods of ice control for winter navigation in inland waters (1984, p 319-337) MP 2331 I.e cover research—present state and future needs (1986, p 384-399) Corrs of engineers seek ice solutions (1987, p 5-7)
MP 1576 On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p.254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 2710 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-210) MP 2174 Controlled river ice cavar breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2192 River wave response to the friction-inertia balance (1987, p.764-769) MP 2237 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177, MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Perturbation solution of the flood problem Discussion and author's reply (1988, p.346-349) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.231-258) MP 2498 Vector analysis of ice petrographic data (1989, p.129-141)	techniques [1987, p.167-172] MP 2262 Comparison of snow cover liquid water measurement techniques [1987, p.1833-1836] MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam [1977, p.478-487] MP 958 Maintaining buildings in the Arctic [1977, p.244-251] MP 1508 Operation of the CRREL prototype air transportable shelter [1980, 73p] SR 89-10 Time constraints on measuring building R-values [1980, 30p] Measuring building R-values for large areas [1981, p.137-138] Window performance in extreme cold [1981, p.396-408] MP 1398 Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981, 20p] Cold regions testing of an air-transportable shelter [1981,	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) Third International Symposium on Ice Problems (1975, 527p.) MP 288 Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 2100 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) Methods of ice control (1983, p.204-215) Methods of ice control (1983, p.204-215) Methods of ice control for winter navigation in inland waters (1934, p.329-337) Methods of the control for winter navigation in inland waters (1934, p.329-337) Methods of ece control for winter navigation in inland waters (1934, p.329-337) MP 2441 Methods of ece control for winter navigation in inland waters (1934, p.329-337) MP 2462 Rebuilding infrastructure for pleasure boating (1980, p.188-201) MP 2464 Franklina, C.H.
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in its covered rivers (1984, p.359-368) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1873 Analysis of river wave types (1985, p.209-220) MP 1873 Analysis of river wave types (1985, p.209-220) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-1291) Controlled river ice cover breakup; part 2 Theory and numerical model studies (1986, p. 293-305) River wave response to the friction-inertia balance (1987, p.764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup by inver near Windsor, Vermont (1988, 169) Pramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Pramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Pramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Pramic ice breakup control of dynamic ice breakup by river regulation (1989, 189, 129-141) Pramework for control of dynamic ice breakup by river regulation (1989, p.79-92) Preklia, W.	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) MP 1393 Window performance in extreme cold (1981, p.396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable rectic shelter; how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) Heat flow sensors on walls—what can we learn (1985, p.160-149) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) CR 85-07 Heat flow sensors on walls—what can we learn (1985, p.160-149) Measured and expected R-values of 19 building envelopes (1985, p.49-57) MP 2042 Measured and expected R-values of 19 building envelopes (1985, p.515-531) MP 2290 Measured insulation improvement potential for ten U.S. MP 2172 Procedure for measuring building R-values with thermography and heat flux sensors (1987, 29p) SR 87-06 Measured insulation improvement potential for ten U.S.	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seza (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1063 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1064 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1065 MP 1075 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1075 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1075 MP 1076 MP 1076 MP 1077 Heren the walls of navigation locks (1976, p. 1487-1496) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) MP 1170 Report of panel on testing in ice (1978, p.157-179) MP 1180 Expenence gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1301 Methods of ice control [1983, p. 204-215) MP 1404 Methods of ice control [1983, p. 204-215) MP 1404 Methods of ice control for winter navigation in inland water (1934, p.319-337) MP 1831 Le cover research—present state and future needs (1986, p.334-399) Corps of engineers seek ice solutions (1987, p.5-7) MP 2219 Rebuilding infrastructure for pleasure boating (1989, p.188-201) Pranklia, C.H. Preumatically de-iced ice detector—final report, phase 2, part
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p. 254-266) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 271-389) Modeling rapidly varied flow in tailwaters (1984, p. 271-289) Modeling rapidly varied flow in tailwaters (1984, p. 376-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p. 359-368) Analysis of river wave types (1985, p. 209-220) MP 1873 Analysis of river wave types (1985, p. 209-220) MP 1875 Analysis of river wave types (1985, p. 209-220) MP 2174 Controlled niver ice cover breakup, part 1. Hudson River field experiments (1986, p. 281-291) Controlled niver ice cover breakup; part 2 Theory and numerical model studies (1986, p. 293-305) RP 2392 River wave response to the friction-inertia balance (1987, p. 764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p. 163-177) MP 2200 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, p. 212-23) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, p. 212-23) Dynamic ice breakup control fer the Connecticut River near Windsor, Vermont (1988, p. 213-249) Dynamic ice breakup control fer the Connecticut River near Windsor, Vermont (1988, p. 245-258) MP 2350 Dynamic ice breakup control fer the Connecticut River near Windsor, Vermont (1988, p. 245-258) MP 2354 Framework for control of dynamic ice breakup by river regulation (1989, p. 79-92) Framework for control of dynamic ice breakup by river regulation (1989, p. 79-92) Framework for control of dynamic ice breakup by river regulation (1989, p. 79-92) Framework for control of dynamic ice breakup by river regulation (1989, p. 79-92)	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) Window performance in extreme cold (1981, p. 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable Arctic shelter; how the materials were tested and chosen for design (1982, p.385-397) Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) Measuring thermal performance of building envelopes (1985, p.49-57) Heat flow sensors on walls—what can we learn (1985, p. 140-149) Measured and expected R-values of 19 building envelopes (1985, p.49-57) Confidence in heat flux transducer measurements of buildings (1985, p.515-531) Mp 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) Measured insulation improvement potential for ten U.S. Army buildings (1987, p. 202-220) Measured insulation improvement potential for ten U.S. Army buildings (1987, p. 202-220) Measured insulation improvement potential for ten U.S. Army buildings (1987, p. 202-220) Measured insulation improvement potential for ten U.S. Army buildings (1987, p. 202-220)	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) Characterization of the surface roughness and floe geometry of the sea ice over the continental shelives of the Beaufort and Chukchi Seza (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) CR 79-08 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) MP 1240 Prankenstela, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) MP 1021 Third International Symposium on Ice Problems (1975, 527p.) MP 345 Ice removal from the walls of navigation locks (1976, p 1487-1499) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) MP 1021 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p 93-103) MP 1301 Methods of ice control (1983, p 204-215) MP 1404 Ice engineering for civil work: baseline study (1983, 919-1931 I.e cover research—present state and future needs (1986, p 34-399) Corps of engineers seek ice solutions (1987, p 5-7) Rebuilding infrastructure for pleasure boating (1989, p 188-201) MP 2446 Pranklia, C.H. Pneumatically de-iced ice detector—final report, phase 2, part 1 (1986, 9p + appends)
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in tailwaters (1984, p.271-289) Modeling rapidly varied flow in its covered rivers (1984, p.359-368) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1873 Analysis of river wave types (1985, p.209-220) MP 1873 Analysis of river wave types (1985, p.209-220) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-1291) Controlled river ice cover breakup; part 2 Theory and numerical model studies (1986, p. 293-305) River wave response to the friction-inertia balance (1987, p.764-769) Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) CR 88-01 Development of a dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 169) Development of a dynamic ice breakup by inver near Windsor, Vermont (1988, 169) Pramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Pramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Pramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, 169) Pramic ice breakup control of dynamic ice breakup by river regulation (1989, 189, 129-141) Pramework for control of dynamic ice breakup by river regulation (1989, p.79-92) Preklia, W.	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) MP 1393 Window performance in extreme cold (1981, p.396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable rectic shelter; how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) Heat flow sensors on walls—what can we learn (1985, p.160-149) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) CR 85-07 Heat flow sensors on walls—what can we learn (1985, p.160-149) Measured and expected R-values of 19 building envelopes (1985, p.49-57) MP 2042 Measured and expected R-values of 19 building envelopes (1985, p.515-531) MP 2290 Measured insulation improvement potential for ten U.S. MP 2172 Procedure for measuring building R-values with thermography and heat flux sensors (1987, 29p) SR 87-06 Measured insulation improvement potential for ten U.S.	Desicing of radomes and 'sck walls using pneumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seza (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1063 Sea ice ridging over the Alaskan continental shelf (1979, 24p.) MP 1064 Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) MP 1240 Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) MP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) MP 1062 Third International Symposium on Ice Problems (1975, 627p.) MP 485 Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 1140 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) MP 1301 Methods of ice control (1983, p. 204-215) Ice engineering for civil work: baseline study (1983, 91p.) MP 1244 Methods of ice control for winter navigation in infant series (1984, p.319-337) I.e cover research—present state and future needs (1986, p. 384-399) Corps of engineers seek ice solutions (1987, p.5-7) RP 2249 Rebuilding infrastructure for pleasure boating (1989, p. 188-201) Pranklia, C.H. Pneumatically de-iced ice detector—final report, phase 2, part 1 (1986, 9p. + appends) MP 2249 Frederking, R. Standardired testing methods for measuring mechanical prop-
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p.254-260, MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 2710 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-210) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 Controlled river ice cover breakup; part 2 Theory and numerical model studies (1986, p.293-305) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) MP 2375 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177, MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 16p) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p) Development of adynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p) Dramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.221-233) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.281-288) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.281-288) Pramework for control of dynamic ice breakup by river regulation (1989, p.79-92) Framework for control of dynamic ice breakup by river regulation (1989, p.79-92) Phella, W Chemical, physical and structural properties of estuarine ice in Great Bay, New Hampshire (1987, p.833-840) MP 2251	techniques (1987, p.167-172) MP 2262 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) SR 80-10 Time constraints on measuring building R-values (1980, 30p) CR 80-15 Measuring building R-values for large areas (1981, p.137-138) Window performance in extreme cold (1981, p. 396-408) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter; how the materials were tested and chosen for design (1982, p.385-397) Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-01 Measuring thermal performance of building envelopes, mine case studies (1985, 36p) CR 82-39 Heat flow sensors on walls—what can we learn (1985, p. 140-149) Measured and expected R-values of 19 building envelopes (1985, p.49-57) Confidence in heat flux transducer measurements of buildings (1985, p. 515-531) Mcgastructures for mobilization (1986, p.10-11) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44) MP 2153 In-situ assessment of two retrofit insulations (1986, p.32-44)	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p 1-15) Third International Symposium on Ice Problems (1975, 627p) International Symposium on Ice Problems (1975, 627p) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p 157-179) Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p 9)-1031 Methods of ice control (1983, p 204-215) Methods of ice control for winter navigation in inland waters (1984, p 329-337) I.e. cover research—present state and future needs (1986, p 184-199) Corps of engineers seek ice solutions (1987, p 5-7, MP 2219) Rebuilding infrastructure for pleasure boating (1980, p) 183-201; MP 2249 Frenklin, C.H. Pneumatically de-iced ice detector—final report, phase 2, part 1 (1986, 9p + appends) Frederking, R. Standardized testing methods for measuring mechanical properties of tee (1981, p 245-254) MP 1956
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p 254-260) MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 1711 Observations of volcanic tremor at Mount St. Helens volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p 209-220) MP 1875 Analysis of river wave types (1985, p 209-220) MP 1875 Analysis of river wave types (1985, p.96-110) MP 2174 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 237 Controlled river ice cover breakup; part 2 Theory and numerical model studies (1986, p. 293-305) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) MP 237 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 16p) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p) CR 88-01 Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.2421-223) MP 2536 Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.245-258) MP 2449 Vector analysis of ice petrographic data (1989, p.129-141) Framework for control of dynamic ice breakup by river regulation (1989, p.79-92) Fish, A.M. Acoustic and pressuremeter methods for investigation of the	techniques (1987, p.167-172) MP 2283 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring buildings in the Arctic (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p. 137-138) MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) CR 81-16 Designing with wood for a lightweight air-transportable Arctic shelter; how the materials were tested and chosen for design (1982, p.385-397) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward sin-situ building R-value measurement (1985, p.149-19) Measuring thermal performance of building envelopes, nine case studies (1985, 36p) CR 85-07 Heat flow sensors on walls—what can we learn (1985, p.160-149) Measured and expected R-values of 19 building envelopes, nine case studies (1985, 36p) MP 2042 Measured and expected R-values of 19 building envelopes (1985, p.49-57) Confidence in heat flux transducer measurements of buildings (1985, p.515-531) MP 2015 Confidence in heat flux transducer measurements of buildings (1985, p.515-531) MP 2115 In-situ assessment of two retrofit insulations (1986, p.10-11) In-situ assessment of two retrofit insulations (1986, p.10-11) MP 2172 Procedure for measuring building R-values with thermography and heat flux sensors (1987, 29p) SR 87-06 MP 2327 Composite buildings for military bases (1988, 25p) CR 88-04	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.885-4897) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) WP 1034 Use of explosives in removing ice jams (1970, 10p.) MP 1021 River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) Third International Symposium on Ice Problems (1975, 627p.) Ice termoval from the walls of navigation locks (1976, p. 1487-1495) Investigation of ice clogged channels in the St. Marys River (1978, 73p.) Report of panel on testing in ice (1978, p.157-179) MP 1100 Experience gained by use of extensive ice laboratory facilities in solving ice problems (1980, p.93-103) Methods of ice control (1983, p.204-215) MP 1401 Methods of ice control (1983, p.204-215) Methods of ice control (1983, p.204-215) Methods of ice control for winter navigation in inland waters (1934, p.319-337) Methods of ce control for winter navigation in inland waters (1934, p.319-337) MP 2441 Methods of ice control for winter navigation in inland waters (1934, p.319-337) MP 2441 Methods of ice control for winter navigation in inland waters (1934, p.319-337) MP 2441 Methods of ice control for winter navigation in inland waters (1934, p.319-337) MP 2445 Prawklia, C.H. Pneumatically de-iced ice detector—final report, phase 2, part (1986, p.9 + appends) MP 2446 Prawklia, C.H. Pneumatically de-iced ice detector—final report, phase 2, part (1986, p.9 + appends) MP 2459 MP 2464 MP 1556 4th report of working group on testing methods in ice (1934, p.44)
On zero-inertia and kinematic waves (1982, p.1381-1387, MP 2653 Analysis of diffusion wave flow routing model with application to flow in tailwaters (1983, 31p.) CR 83-07 Unsteady river flow beneath an ice cover (1983, p.254-260, MP 2679 Modeling rapidly varied flow in tailwaters (1984, p.271-289) MP 2710 Observations of volcanic tremor at Mount St. Helenas volcano (1984, p.3476-3484) MP 1770 Analysis of rapidly varying flow in ice-covered rivers (1984, p.359-368) MP 1833 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-220) MP 1875 Analysis of river wave types (1985, p.209-210) MP 1875 Controlled river ice cover breakup, part 1. Hudson River field experiments (1986, p.281-291) MP 2174 Controlled river ice cover breakup; part 2 Theory and numerical model studies (1986, p.293-305) MP 2392 River wave response to the friction-inertia balance (1987, p.764-769) MP 2375 Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p.163-177, MP 2400 Options for management of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1988, 16p) Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p) Development of adynamic ice breakup control method for the Connecticut River near Windsor, Vermont (1988, 16p) Dramic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.221-233) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.281-288) Dynamic ice breakup control for the Connecticut River near Windsor, Vermont (1988, p.281-288) Pramework for control of dynamic ice breakup by river regulation (1989, p.79-92) Framework for control of dynamic ice breakup by river regulation (1989, p.79-92) Phella, W Chemical, physical and structural properties of estuarine ice in Great Bay, New Hampshire (1987, p.833-840) MP 2251	techniques (1987, p.167-172) MP 2283 Comparison of snow cover liquid water measurement techniques (1987, p.1833-1836) MP 2283 Flanders, S.N. Reinsulating old wood frame buildings with urea-formaldehyde foam (1977, p.478-487) MP 958 Maintaining buildings in the Arctic (1977, p.244-251) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) MP 1508 Operation of the CRREL prototype air transportable shelter (1980, 73p) CR 80-15 Measuring building R-values for large areas (1981, p. 137-138) MP 1393 Window performance in extreme cold (1981, p. 396-408, MP 1393 Cold regions testing of an air-transportable shelter (1981, 20p) Designing with wood for a lightweight air-transportable rectic shelter; how the materials were tested and chosen for design (1982, p.385-397) MP 1558 Least life-cycle costs for insulation in Alaska (1982, 47p) CR 82-27 Window performance in extreme cold (1982, 21p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) CR 82-38 Toward in-situ building R-value measurement (1984, 13p) MP 2042 Measuring thermal performance of building envelopes, nine case studies (1985, 36p) CR 85-00 Heat flow sensors on walls—what can we learn (1985, p. 10-149) Measured and expected R-values of 19 building envelopes, 1985, p. 49-57; MP 2115 Confidence in heat flux transducer measurements of buildings (1985, p. 515-531) MP 2290 Measured insulation improvement potential for ten U.S. Army buildings (1987, p. 202-220) SR 87-06 Measured insulation improvement potential for ten U.S. Army buildings (1987, p. 202-220) Composite buildings for military bases (1988, 25p) CR 88-04 Passive tracer gas measurement of air exchange in a large multi-celled building in Alaska (1989, p. 43)-444	Desicing of radomes and 'xck walls using preumatic devices (1977, p 467-478) Laboratory experiments on lock wall deicing using pneumatic devices (1977, p 53-68) MP 974 Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort and Chukchi Seaz (1977, p.32-41) Sea ice ridging over the Alaskan continental shelf (1979, 24p.) Sea ice ridging over the Alaskan continental shelf (1979, p.885-4197) Prankenstein, G.E. Ice-cratering experiments Blair Lake, Alaska (1966, Various pagings) Use of explosives in removing ice jams (1970, 10p.) River-ice problems: a state-of-the-art survey and assessment of research needs (1974, p.1-15) Third International Symposium on Ice Problems (1975, 627p.) Ice removal from the walls of navigation locks (1976, p. 1487, 1499) Ince temoval from the walls of navigation locks (1976, p. 1487, 1499) Report of panel on testing in ice (1978, p. 157-179) Report of panel on testing in ice (1978, p. 157-179) MP 1140 Experence gained by use of extensive ice laboratory facilities in solving ice problems (1980, p. 93-103) Methods of ice control (1983, p. 204-215) MP 1642 Ice engineering for civil work: baseline study (1983, 91p., MP 2441) Methods of ice control for winter navigation in inland waters (1984, p. 319-337) Le cover research—present state and future needs (1986, p. 184-399) Corps of engineers seek ice solutions (1987, p. 5-7) Rebuilding infrastructure for pleasure boating (1989, p. 188-201) Rebuilding infrastructure for pleasure boating (1989, p. 188-201) Pranklia, C.H. Pneumatically de-iced ice detector—final report, phase 2, part 1 (1986, 9p. + appends) MP 2495 MP 2496 Standardized testing methods for measuring mechanical properties of ice (1981, p. 245-254) Mt 1954 Atheronet of working group on testing methods in ice (1984, MP 1556) Atheronet of working group on testing methods in ince (1984, MP 1556)

Carles In the	A	the state of the s
Freitag, D.R.	Arctic and subarctic environmental analysis [1972, p 28-30] MP 1119	Benchmark design and installation: a synthesis of existin information (1987, 73p) SR 87-1
Application of ice engineering and research to Great Lakes problems (1972, p.131-138) MP 1615	Arctic and subarctic environmental analyses using ERTS-1	Ice atlas 1985-1986: Monongahela River, Allegheny Rive
Cold Regions Research and Engineering Laboratory (1978,	imagery. Progress report Dec. 72-June 73 (1973, 75p.)	Ohio River, Illinois River, Kankakee River (1987, 367p)
p.4-6 ₁ MP 1251	MP 1003	SR 87-2
Priodmen, I.	Baseline data on tidal flushing in Cook Inlet, Alaska (1973, 11p ₁ MP 1523	lce conditions along the Ohio River as observed on Landsi images, 1972-1985 [1988, 162p] SR 88-0
Report on ice fall from clear sky in Georgia October 26, 1959 [1960, 31p. plus photographs] MP 1017	Arctic and subarctic environmental analyses utilizing ERTS-	Techniques for measuring reservoir bank erosion (1988,
Frommer, H.	t imagery (1973, 5p) MP 1611	27p) SR #8-0
C-14 and other isotope studies on natural see (1972, p.D70-	Arctic and subarctic environmental analyses utilizing ERTS-	Ice conditions along the Allegheny and Monongahela River
D92 ₁ MP 1052	1 imagery. Bimonthly progress report, 23 Aug 23 Oct.	as observed on Landsat images, 1972-1985 [1988, 106p.]
Falk, M.A.	1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-	SR 88-0 Ice observations on the Allegheny and Monongahela river
Regional climatic trends in northern New England (1988, p.64-71) MP 2748	1 imagery. Bimonthly progress report, 23 Oct 23 Dec.	[1988, 43p.] SR 88-2
p.64-71 ₃ MP 2748 Fungcharoen, S.	1973 (1973, 6p.) MP 1031	Field assessment of fisheries habitat-enhancement structure
Characterization of the surface roughness and floe geometry	Arctic and subarctic environmental analysis utilizing ERTS-	in Bingo Brook, Vermont, after the Spring 1989 ice ru
of the sea ice over the continental shelves of the Beaufort	l imagery. Final report June 1972-Feb. 1974 (1974,	(1989, 12p) MP 274
and Chukchi Seas [1977, p.32-41] MP 1163	128p j MP 1047 New England reservoir management: Land use/vegetation	Ice conditions along the Illinois Waterway as observed o Landsat images, 1972-1985 [1989, 112p] CR 89-2
Gaffney, E.S.	mapping in reservoir management (Merrimack River basin)	Ganthier, B.
Techniques for gas gun studies of shock wave attenuation in snow (1988, p.657-660) MP 2543	(1974, 30p.) MP 1039	Extraction of topography from side-looking satellite system
Gegreen, F.	Applications of remote sensing for Corps of Engineers pro-	-a case study with SPOT simulation data (1983, p 535-
Cutting ice with high pressure water jets (1973, 22p)	grams in New England (1975, 8p. + 14 figs. and tables) MP 913	550 ₃ MP 169
MP 1001	Circulation and sediment distribution in Cook Inlet, Alaska	Gauthier, J.F.
Gegnen, J.G.	[1976, p 205-227] MP 895	Integration of Landsat land cover data into the Saginaw Rive Basin geographic information system for hydrologic mode
Ice force measurements on a bridge pier in a small river	Baseline data on the oceanography of Cook Inlet, Alaska	ing (1984, 19p) SR 84-0
(1989, p.1419-1427) MP 2764	[1976, 84p.] CR 76-25	Gavrilo, V.P.
Gagnen, J.J. Deicing a satellite communication antenna (1980, 14p.)	Skylab imagery: Application to reservoir management in New England (1976, 51p.) SR 76-07	Standardized testing methods for measuring mechanical prop
SR \$0-18	England (1976, 51p) SR 76-07 Environmental analyses in the Kootenai River region, Mon-	erties of ice (1981, p 245-254) MP 155
Computer-generated graphics of river ice conditions (1988,	tana (1976, 53p) SR 76-13	4th report of working group on testing methods in ice (1984, p.1-41) MP 188
p.211-219 ₃ MP 2509	Effect of inundation on vegetation at selected New England	Gaydos, L.
Ice observations on the Allegheny and Monongahela rivers 1988, 430.3	flood control reservoirs (1978, 13p) MP 1169	Landsat-assisted environmental mapping in the Arctic Ni
[1988, 43p.] SR 88-25 Thermal stabilization of permafrost with thermosyphons	Shoreline changes along the outer shore of Cape Cod from	tional Wildlife Refuge, Alaska (1982, 59p. + 2 maps)
(1990, p.323-328) MP 2583	Long Point to Monomoy Point (1978, 49p) CR 78-17	CR 82-3
Garda, N.B.	Estuarine processes and intertidal habitats in Grays Harbor,	Gerard, R.
Ice penetration tests (1984, p 209-240) MP 1996	Washington: a demonstration of remote sensing techniques	lce-related flood frequency analysis application of analytic estimates (1984, p 85-101) MP 171
fce penetration tests [1985, p.223-236] MP 2014	(1978, 79p) CR 78-18	Ice jam research needs (1984, p.181-193) MP 181
Gardiner, J.	River channel characteristics at selected ice jam sites in Ver-	Ice regime reconnaissance, Yukon River, Yukon (1984,
Development of a geographic information system for the Say-	mont (1978, 52p) CR 78-25 Historical shoreline changes along the outer coast of Cape	p.1059-1073 ₁ MP 240
lorville River Basin, Iowa (1987, p.265-269) MP 2549	Cod (1979, p.69-90) MP 1502	Gerard, S.
Garfield, D.E.	Analysis of circulation patterns in Grays Harbor, Washington,	Rating system for unsurfaced roads to be used in maintenance
Resurvey of the "Byrd" Station, Antarctica, drill hole [1976,	using remote sensing techniques (1980, p 289-323)	management (1987, p (2)51-(2)62) MP 231
p.29-34 ₁ MP 846	MP 1283	Rating unsurfaced roads—a field manual for measurin maintenance problems £1987, 34p ₁ SR 87-1
Development of large ice saws [1976, 14p] CR 76-47	Environmental analysis of the Upper Susitna River Basin using Landsat imagery [1980, 41p] CR 80-04	Rating unsurfaced roads (1988, p 66-69) MP 254
Haines-Fairbanks pipeline: design, construction and opera-	using Landsat imagery [1980, 41p] CR 80-04 Coastal environment, bathymetry, and physical oceanogra-	Impact of wet snow on visible, infrared and millimeter way
tion [1977, 20p.] SR 77-04 Permafrost excavating attachment for heavy buildozers	phy along the Beaufort, Chukchi and Bering Seas (1980,	attenuation (1988, p.523-535) MP 260
(1977, p.144-151) MP 955	357p3 SR #0-05	Parametric study on transmission through smoke screens pro
Pavement recycling using a heavy buildozer mounted pulver-	Historical shoreline changes as determined from aerial pho-	duced in falling snow (1989, p 99-111) MP 262
izer (1977, 12p. + appends.) SR 77-30	tointerpretation (1980, p.167-170) MP 1503	Millimeter-wave performance during mixed precipitatio {1989, p.113-120} MP 263
Canol Pipeline Project: a historical review [1977, 32p]	Inlet current measured with Seasat-1 synthetic aperture radar §1980, p 35-37; MP 1443	Method for rating unsurfaced roads (1989, p 103-106)
SR 77-34	Inlet current measured with Seasat-1 synthetic aperture radar	MP 261
1977 CRREL-USGS permafrost program Beaufort Sea, Alas- ka, operational report (1977, 19p.) SR 77-41	(1980, p 35-37) MP 1481	Snow-surface temperature analysis (1989, p.109-116)
Waterproofing strain gages for low ambient temperatures	Ice distribution and winter surface circulation patterns, Ka-	MP 275
(1978, 20p.) SR 78-15	chemak Bay, Alaska (1981, p.995-1001) MP 1442	Method for rating unsurfaced roads (1989, p.30-40) MP 253
Penetration tests in subsea permafrost, Prudhoe Bay, Alaska	Ice distribution and winter surface circulation patterns, Ka- chemak Bay, Alaska (1981, 43p) CR 81-22	Cold regions weather data systems (1989, p 139-145)
(1979, 45p) CR 79-07	Shoreline conditions and bank recession along the U.S. shore-	MP 256
Determining subsea permafrost characteristics with a cone penetrometer—Prudhoe Bay, Alaska [1979, p 3-16]	lines of the St. Marys, St. Clair, Detroit and St. Lawrence	Gerdel, R.W.
MP 1217	rivers (1982, 75p) CR 82-11	CHARACTERISTICS OF THE COLD REGIONS (1969)
Movement study of the trans-Alaska pipeline at selected sites	Ice distribution and winter surface circulation patterns, Ka-	51p.; M I-
(1981, 32p.) CR 81-04	chemak Bay, Alaska (1982, p 421-435) MP 1569	Gervin, J.C.
Portable hot water see drill (1986, p 549-564) MP 2202	Reservoir bank erosion caused and influenced by ice cover [1982, 26p] SR 82-31	Landsat-4 thematic mapper (TM) for cold environment [1983, p 179-186] MP 165
Exothermic cutting of frozen materials (1987, p 181-183) MP 2264	Historical bank recession at selected sites along Corps of En-	Gilkey, A.K.
Gerrison, D.L.	gineers reservoirs (1983, 103p) SR #3-30	Geobotanical studies on the Taku Glacier anomaly (1954)
Physical mechanism for establishing algal populations in frazil	Overview of Tanana River monitoring and research studies	p 224-239; MP 121
ice (1983, p.363-365) MP 1717	near Fairbanks, Alaska (1984, 98p + 5 appends) SR 84-37	Giorinetto, M.B.
Sea ice microbial communities in Antarctica (1986, p 243-	Relationships among bank recession, vegetation, soils, sedi-	Baseline acidity of ancient precipitation from the South Pol [1984, 7p] CR 84-1
250 ₃ MP 2026	ments and permafrost on the Tanana River near Fairbanks,	Baseline acidity of precipitation at the South Pole during th
Gertner, K.E. Mathematical model to predict frost heave (1977, p.92-	Alaska (1984, 59p) MP 1746	last two millennia (1987, p 789-792) MP 227
109 ₁ MP 1131	Bank recession and channel changes in the area near the	Glen, J.W.
Geskin, D.A.	North Pole and floodway sill groits, Tanana River, Alaska [1984, 98p] MP 1747	Physics of ice (1974, 81p) M 11-C2
Utilization of sewage sludge for terrain stabilization in cold	Relationships among bank recession, vegetation, soils, sedi-	Mechanics of ice (1975, 43p) M II-C2
regions (1977, 45p.) SR 77-37	ments and permafrost on the Tanana River near Fairbanks,	Gloersen, P. Besselte of the US acceptant on the faint US IT ISSE Besiden
Performance of overland flow land treatment in cold climates	Alaska (1984, 53p) SR #4-21	Results of the US contribution to the Joint US/USSR Berin Sea Experiment (1974, 197p) MP 103
(1978, p.61-70) MP 1152 Utilization of sewage sludge for terrain stabilization in cold	Reservoir bank erosion caused by ice [1984, p 203-214] MP 1787	Integrated approach to the remote sensing of floating ic
regions, Part 2 (1979, 36p) SR 79-28	Use of remote sensing for the U.S. Army Corps of Engineers	(1977, p 445-487) MP 106
Utilization of sewage sludge for terrain stabilization in cold	dredging program (1985, p.1141-1150) MP 1890	Godfrey, R.
regions. Pt. 3 (1979, 33p) SR 79-34	Ice conditions on the Ohio and Illinois rivers, 1972-1985	Fabric installation to minimize reflection cracking on tax
Revegetation at two construction sites in New Hampshire and	(1985, p.856-861 ₁ MP 1914	ways at Thule airbase, Greenland (1981, 26p) SR 81-1
Alaska (1980, 21p) CR 80-03	Vertically stable benchmarks, a synthesis of existing informa-	Godfrey, R.N.
Chena River Lakes Project revegetation study-three-year summary [1981, 59p] CR 81-18	tion (1985, p 179-188) MP 2069 Hudson Piter to management (1985, p 96-110)	Engineering surveys along the Teans-Alaska Pipeline (1986.
Sewage sludge aids revegetation (1982, p 198-301)	Hudson River ice management (1985, p.96-110) MP 2174	85p. ₁ SR 86-2
MP 1735	Potential of remote sensing in the Corps of Engineers dredg-	Goff, M.A.
Gaskin, P.N.	ing program (1985, 42p) SR 85-20	Investigation of the snow adjacent to Dye-2, Greenlan
Survey of methods for classifying frost susceptibility (1984,	Ice atlas, 1984-1985, Ohio River, Allegheny River, Monon-	(1981, 23p) SR 81-0
p.104-141; MP 1707 Gatte, L.W.	gahela River (1986, 185p) SR 86-23 Bank conditions and crosson along selected reservoirs (1987,	Goff, R.D. Proceedings (1987, 4 vols) MP 218
Arctic and Subarctic environmental analyses utilizing ERTS-	p.143-154 ₁ MP 2196	Gogineni, S.
1 imagery, bimonthly progress report, 23 June - 23 Aug	River ice mapping with Landsat and video imagery (1987,	Radar backscatter measurements over saline ice (1990)
1972 (1972, Jp) MP 991	p 352-3631 MP 2273	p.603-615 ₁ MP 274

Gogineal, S.P. Radar backscattering from artificially grown sea ice (1989).	Meteorological instrumentation for characterizing atmospheric icing (1987, p 23-30) MP 2276	Chemical fractionation of brine in the McMurdo Ice Shelf, Antarctica (1983, 16p) CR 83-66
p.259-264 ₁ MP 2667 Gigita, M.	Temperature and structure dependence of the flexural strength and modulus of freshwater model ice (1988,	Baseline acidity of ancient precipitation from the South Pole (1984, 7p.) CR 84-15
Mean characteristics of asymmetric flows: application to flow	43p) CR \$8-06	On small-scale horizontal variations of salinity in first-year
Asymmetric plane flow with application to ice jams (1983,	Update on portable hot-water sea ice drilling (1989, p.175- 178 ₁ MP 2479	sea ice (1984, p.6505-6514) MP 1761 Flexural strengths of freshwater model ice (1984, p.73-82)
p.1540-1556; MP 1645 Golden, K.M.	Sea ice ridging in the Ross Sea, Antarctica, as compared with sites in the Arctic (1989, p.4984-4988) MP 2490	MP 1826
Modeling of anisotropic electromagnetic reflection from sea	Gow, A.J.	Quiet freezing of lakes and the concept of orientation textures in lake ice sheets [1984, p.137-149] MP 1828
ice [1980, p.247-294] MP 1325 Modeling of anisotropic electromagnetic reflection from sea	Gas inclusions in the Antarctic ice sheet and their glaciologi- cal significance (1975, p.5101-5108) MP 847	Crystalline structure of urea ice sheets used in modeling in the CRREL test basin [1984, p 241-253] MP 1835
ice (1980, 15p.) CR 80-23 Sea ice studies in the Weddell Sea aboard USCGC Polar Sea	Islands of grounded sea ice [1976, 24p.] CR 76-04 Compressibility characteristics of compacted snow [1976,	Crystalline structure of urea ice sheets used in modeling ex-
(1980, p 84-96) MP 1431	47p] CR 76-21	periments in the CRREL test basin (1984, 48p) CR 84-24
Modeling of anisotropic electromagnetic reflections from sea- ice [1981, p.8107-8116] MP 1469	Dynamics of near-shore ice (1976, p.9-34) MP 1380 Islands of grounded sea ice (1976, p.35-50) MP 987	Sea ice properties (1984, p 82-83) MP 2136 Physical properties of sea ice in the Greenland Sea (1985,
Physical and structural characteristics of Weddell Sea pack ice [1987, 70p.] CR 87-14	Some characteristics of grounded floebergs near Prudhoe Bay,	p.177-188 ₁ MP 1903
Goldstein, N.	Alaska (1976, p 169-172) MP 1118 Some characteristics of grounded floebergs near Prudhoe Bay,	Simulated sea ice used for correlating the electrical properties of the ice with its structural and salinity characteristics
Pavement icing detector—final report (1987, 26p. + append.) MP 2263	Alaska (1976, 10p) CR 76-34 Rheological implications of the internal structure and crystal	(1985, p.76-82) MP 1910 Laboratory studies of acoustic scattering from the underside
Gooth, G.	fabrics of the West Antarctic ice sheet as revealed by deep	of sea ice [1985, p 87-91] MP 1912
Ice jam problems at Oil City, Pennsylvania (1981, 19p.; SR 81-09	core drilling at Byrd Station (1976, 25p.) CR 76-35 Rheological implications of the internal structure and crystal	Pressure ridge morphology and physical properties of sea ice in the Greenland Sea (1985, p 214-223) MP 1935
Ottauquechee River—analysis of freeze-up processes [1982, p.2-37] MP 1738	fabrics of the West Antarctic ice sheet as revealed by deep core drilling at Byrd Station (1976, p.1665-1677)	Structure of ice in the central part of the Ross Ice Shelf, Antarctica (1985, p 39-44) MP 2110
Performance of the Allegheny River ice control structure,	MP 1382 Growth history of lake ice in relation to its stratigraphic,	Orientation textures in ice sheets of quietly frozen lakes
1983 [1984, 15p] SR 84-13 Construction and calibration of the Ottauquechee River	crystalline and mechanical structure (1977, 24p.)	(1986, p 247-258) MP 2118 Crystal structure of Fram Strait sea ace (1986, p.20-29)
model (1985, 10p.) SR 85-13 Geech, G.E.	CR 77-01 Flexural strength of ice on temperate lakes (1977, p 247-	MP 2221 Chemical fractionation of brine in the McMurdo Ice Shelf,
Salmon River ice jam control studies: interim report [1990,	256 ₁ MP 1063 Studies of the movement of coastal sea ice near Prudhoe Bay,	Antarctica (1986, p 307-313) MP 2239
\$p.; SR 90-06 Goodman, D.J.	Alaska, U.S A. (1977, p 533-546) MP 1066	Optical characterization of sea ice structure using polarized light techniques (1986, p 264-271) MP 2257
4th report of working group on testing methods in ice [1984, p.1-41] MP 1886	Nearshore ice motion near Prudhoe Bay, Alaska (1977, p.23- 31 ₂ MP 1162	Microwave dielectric, structural, and salinity properties of simulated sea ice (1986, p.832-839) MP 2188
Goodwin, C.	Dielectric constant and reflection coefficient of the snow sur- face and near-surface internal layers in the McMurdo Ice	Acoustical reflection and scattering from the underside of
Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p 709-715) MP 857	Shelf (1977, p.137-138) MP 1011	laboratory grown sea ice: measurements and predictions (1986, p.1486-1494) MP 2222
Goodwia, C.W.	Subsurface measurements of the Ross Ice Shelf, McMurdo- Sound, Antarctica (1977, p.146-148) MP 1013	Structure and dielectric properties at 4 8 and 9,5 GHz of saline ice (1986, p.14,281-14,303; MP 2182
Potential responses of permafrost to climatic warming (1984, p.92-105) MP 1710	Internal structure of fast ice near Narwahl Island, Beaufort Sea, Alaska [1977, 8p.] CR 77-29	Annealing recrystallization in laboratory and naturally de-
Gordon, A.L. Antarctic sea ice microwave signatures and their correlation	Effect of freezing and thawing on the permeability and struc-	formed ice (1987, p.(C1)271-(C1)276; MP 2230 Restraints on thin section analysis of grain growth in un-
with in situ ice observations [1984, p.662-672]	Flexural strength of ice on temperate lakes-comparative	strained polycrystalline ice (1987, p.(C1)277-(C1)281, MP 2231
Gordon, B.E.	tests of large cantilever and simply supported beams (1978, 14p.) CR 78-09	Crystal structure and salinity of sea ice in Hebron Fiord and
Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690	Preferred crystal orientations in the fast ice along the margins of the Arctic Ocean [1978, 24p] CR 78-13	vicinity, Labrador (1987, 18p) CR 87-04 Physical properties of sea ice discharged from Fram Strait
Attenuation and backscatter for snow and sleet at 96, 140, and	Creep rupture at depth in a cold ice sheet (1978, p.733)	(1987, p.436-439) MP 2204
225 GHz (1984, p.41-52) MP 1864 Gordon, R.B.	MP 1168 Ultrasonic measurements on deep ice cores from Antarctica	Physical properties of summer ses ice in the Fram Strait [1987, p 6787-6803] MP 2240
Measurement of the resistance of imperfectly elastic rock to	(1978, p.48-50) MP 1202 Ultrasonic velocity investigations of crystal anisotropy in	Chemical, physical and structural properties of estuarine ice in Great Bay, New Hampshire (1987, p.833-840)
the propagation of tensile cracks (1985, p.7827-7836) MP 2052	deep ice cores from Antarctica (1979, 16p)	MP 2251 Physical properties of summer sea ice in the From Strait, June-
Microstructure and the resistance of rock to tensile fracture (1985, p.11,533-11,546) MP 2157	CR 79-10 Effect of freezing and thawing on the permeability and struc-	July 1984 (1987, 81p) CR 87-16
Goald, L.D. System for mounting end caps on ice specimens (1985,	ture of soil (1979, p.73-92) MP 1225 On the origin of stratified debris in ice cores from the bottom	Baseline acidity of precipitation at the South Pole during the last two millennia (1987, p 789-792) MP 2275
p.362-365 ₁ MP 2016	of the Antarctic ice sheet (1979, p 185-192) MP 1272	Physical and structural characteristics of Weddell Sea pack ice (1987, 70p) CR 87-14
Uniaxial tension/compression tests on ice-preliminary results [1989, p.37-41] MP 2482	Ultrasonic velocity investigations of crystal anisotropy in	Microwave and structural properties of saline ice 11987,
Goveni, J.W. Morphological investigations of first-year sea ice pressure	deep ice cores from Antarctica (1979, p 4865-4874) MP 1239	Temperature and structure dependence of the flexural
ridge sails (1981, p 1-12) MP 1465	Crystal alignments in the fast ice of Arctic Alaska [1979, 21p] CR 79-22	strength and modulus of freshwater model see (1988, 43p.) CR 88-06
Physical and structural characteristics of sea ice in McMurdo Sound (1981, p 94-95) MP 1542	Subsurface measurements of McMurdo Ice Shelf (1979, p.79-80) MP 1338	Correlation function study for sea ice [1988, p.14,055-14,- 063] MP 2511
Physical and structural characteristics of antarctic sea ice (1982, p 113-117) MP 1548	Relationship of ultrasonic velocities to c-axis fabrics and	Emerging meteorite crystalline structure of the enclosing ice
Baseline water quality measurements at six Corps of Engi-	relaxation characteristics of ice cores from Byrd Station, Antarctica (1979, p.147-153) MP 1282	(1989, p 87-91) MP 2503 Structure and temperature dependence of the flexural proper-
Ice growth on Post Pond, 1973-1982 (1983, 25p)	Margin of the Greenland see sheet at Isua (1979, p.155-165) MP 1281	ties of laboratory freshwater ice sheets (1989, p.249-270) MP 2452
Field measurements of combined icing and wind loads on	Crystal alignments in the fast see of Arctic Alaska (1980.	Radar backscattering from artificially grown sea ice (1989,
wires (1983, p.205-215) MP 1637	Time-priority studies of deep ice cores (1980, p 91-102)	High frequency acoustical properties of saline ice (1989, p.9-
Surface roughness of Ross Sea pack ice (1983, p 123-124) MP 1764	MP 1308 Planetary and extraplanetary event records in polar ice caps	23 ₁ MP 2606 US global ice core research program West Antarctica and
Method of detecting voids in rubbled ice (1984, p. 183-188) MP 1772	(1980, p. 18-27) MP 1461 Sea ice studies in the Weddell Sea aboard USCGC Polar Sea	beyond (1989, 32p) MP 2709
Structure of first-year pressure ridge sails in the Prudhoe Bay region (1984, p 115-135) MP 1837	(1980, p 84-96) MP 1431	Internal structure composition and properties of brackish ice from the Bay of Bothnia during the BEPERS-88 experiment
Combined icing and wind loads on a simulated power line test	Ground-truth observations of ice-covered North Slope lakes images by radar (1981, 17p) CR 81-19	[1989, p 1318-1333] MP 2763 Dominion Range ice core, Queen Maud Mountains, Antarc-
span (1984, p.173-182) MP 2114 Analysis of selected ice accretion measurements on a wire at	Nitrogenous chemical composition of antarctic ice and snow (1981, p.79-81) MP 1541	tica—general site and core characteristics with implications (1990, p.11-16) MP 2707
Mt. Washington (1985, p. 34-43) MP 2173 Computer interfacing of meteorological sensors in a severe	Physical and structural characteristics of sea ice in McMurdo	Internal structure, composition and properties of brackish see
weather and high RFI environment (1985, p 205-211)	Sound (1981, p.94-95) MP 1542 Physical and structural characteristics of antarctic sea ice	from the Bay of Bothnia (1990, p.5-15) MP 2725 Acoustical and morphological properties of undeformed sea
MP 2175 Comparison of winter climatic data for three New Hampshire	[1982, p 113-117] MP 1548 June zone in the McMurdo Ice Shelf, Antarctica [1982,	rcc laboratory and field results (1990, p.67-75) MP 2730
sites (1986, 78p) SR 86-05 Reliable, inexpensive radio telemetry system for the transfer	p.166-171 ₁ MP 1550	Radar backscatter measurements over salme ice 11990,
of meteorological and atmospheric data from mountain-top	Nitrate fluctuations in antarctic snow and firm potential sources and mechanisms of formation (1982, p.243-248)	Sea ice in the polar regions (1990, p 47-122) MP 2750
Conductor twisting resistance effects on ice build-up and ice	MP 1551 Brine zone in the McMurdo Ice Shelf, Antarctica (1982)	Graham, J. Effects of temperature and species on TNT injury to plants
shedding [1986, 8p + figs] MP 2108 Icing and wind loading on a simulated power line [1926,	28p j CR 82.39 South Pole ice core drilling, 1981-1982 (1982, p.89-91)	(1935, 7p) SR 88-16
p 23-27 ₁ MP 2206	MP 1621	Graham, J.M. Five-year performance of CRREL land treatment test cells,
Portable hot water ice drill [1986, p 549-564] MP 2202 Portable hot-water ice drill [1987, p 57-64] MP 2236	fcc growth on Post Pond, 1973-1982 [1983, 25p] CR 83-04	water quality plant yields and nutrient uptake (1978, 247) SR 78-26

Plant growth on a gravel soil: greenhouse studies [1981, 8p.]	Dominion Range ice core, Queen Maud Mountains, Antarc-	Ice control at navigation locks (1981, p.1088-1095)
SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irri-	tica—general site and core characteristics with implications [1990, p.11-16] MP 2707	MP 1448 Application of a block copolymer solution to ice-prone struc-
gated with wastewater (1981, 19p.) CR 81-06	Gret, R.A.	tures (1983, p.155-158) MP 1636
Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p.) SR 81-12	Comparative testing system of the applicability for various thermal scanning systems for detecting heat losses in build-	Methods of ice control (1983, p.204-215; MP 1642
Effects of low temperatures on the growth and unfrozen water	ings (1978, p.B71-B90) MP 1212	Aerostat icing problems [1983, 29p.] SR 83-23 Methods to reduce ice accumulation on miter gate recess
content of an aquatic plant (1984, Sp.) CR 84-14 Grant, C.L.	Groves, J.A. Analysis of flexible pavement resilient surface deformations	walls (1989, 5p.) MP 2723
Reverse phase HPLC method for analysis of TNT, RDX,	using the Chevron layered elastic analysis computer pro-	Reduced winter leakage in gates with J-seals (1989, 39.3
HMX and 2,4-DNT in munitions wastewater (1984, 95p.)	gram (1975, 13 leaves) MP 1264	MP 2724 Hannel, W.
CR 84-29 Reversed-phase high-performance liquid chromatographic	Gundestrup, N. Ice flow leading to the deep core hole at Dye 3, Greenland	Utilization of sewage sludge for terrain stabilization in cold
determination of nitroorganics in munitions wastewater	[1984, p.185-190] MP 1824	tegions (1977, 45p.) SR 77-37
[1986, p.170-175] MP 2049 Interlaboratory evaluation of high-performance liquid	Gundestrop, N.S. Camp Century survey 1986 [1987, p.281-288]	Hanseom, J.T. Break-up of the Yukon River at the Haul Road Bridge: 1979
chromotographic determination of nitroorganics in muni-	MP 2331	(1979, 22p. + Figs.) MP 1315
tion plant wastewater (1986, p.176-182) MP 2050 Comparison of extraction techniques for munitions residues	Goodeng, C.	Hensen, B.L.
in soil (1967, p.1326-1331) MP 2350	Terrain analysis from space shuttle photographs of Tibet [1986, p 400-409] MP 2097	C-14 and other isotope studies on notaral ice (1972, p.D70- D92) MP 1052
Critical comparison of moving average and cumulative sum- mation control charts for trace analysis data (1987, 57p.)	Geymon, G.L.	Camp Century survey 1986 (1987, p.281-288)
SR 87-21	Galerkin finite element analog of frost heave (1976, p.111- 113) MP 998	MP 2331 Hansen, G.M.
Preliminary development of a fiber optic sensor for TNT (1988, 169.) SR 88-04	Mathematical model to predict frost heave (1977, p.92-	FIRE IN THE NORTHERN ENVIRONMENT-A SYM-
Comparison of EPA and USATHAMA detection capability	109 ₃ MP 1131	POSIUM (1971, 275p.) MP 878
estimators (1988, p.405-418) MP 2455	Finite element model of transient heat conduction with iso- thermal phase change (two and three dimensional) (1977,	Hardenberg, M. Corps of Engineers land treatment of wastewater research
Production of octanol-water partition coefficients of organo- phosphosetes: Evaluation of structure-function relation- phosphose 240 at 12	167p-3 SR 77-38	program: an annotated bibliography (1983, 82p.)
300 apr 11	Frost heave in an instrumented soil column [1900, p.211- 221] MP 1331	SR 83-49
Comparisons of low concentration measurement capability estimates in trace analysis: method detection limit and certi-	One-dimensional frost heave model based upon simultaneous	Here, H.E. Five-year performance of CRREL land treatment test cells;
fied reporting limit (1909, 21p.) SR 89-20	heat and water flux (1980, p.253-262) MP 1333	water quality plant yields and nutrient uptake 1978.
Liquid chromatographic method for determination of extract-	Some approaches to modeling phase change in freezing soils [1981, p.137-145] MP 1437	24p.; SR 78-36
able nitrearemetic and nitramine residues in soil (1989, p.890-899) MP 2586	Results from a mathematical model of frost heave (1981, p.2-	Use of 15N to study nitrogen transformations in land trept- ment (1979, 32p.) SR 79-31
Grave, N.A.	6 ₁ MP 1483 Brokabilistis deterministis analysis of any dispusional in	Overland flow: removal of taxic volatile organics [1961,
Physical and thermal disturbance and protection of perma- frost (1979, 42p.) SR 79-05	Probabilistic-deterministic analysis of one-dimensional ice segregation in a freezing soil column (1981, p.127-140-	16p. ₁ SR 81-01 Seven-year performance of CRREL slow-rate land treatment
Surface disturbance and protection during economic develop-	MP 1534	prototypes (1961, 25p.) SR 81-12
ment of the North [1981, 38p.] MP 1467 Gray, C.	Sensitivity of a frost heave model to the method of numerical simulation (1982, p.1-10) MP 1567	Harle, J.C.
Disinfection of wastewater by microwaves (1980, 15p.)	Field tests of a frost-heave model (1983, p.409-414)	Relationships between estimated mean annual air and perma- frost temperatures in North-Central Alaska (1983, p.462-
SR 90-01	MP 1657 Comparison of two-dimensional domain and boundary inte-	447; 34P 1698
Greaterest, A. Comparative testing system of the applicability for various	gral geothermal models with embankment freeze-thaw field	Harr, M.E. Probabilistic-deterministic analysis of one-dimensional ice
thermal scanning systems for detecting heat losses in build-	data (1983, p.509-513) MP 1659 Two-dimensional model of coupled heat and mousture trans-	segregation in a freezing soil column (1981, p.127-140)
ings (1978, p.B71-B90) MP 1212 Roof moisture survey: Reserve Center Garage, Grenier Field,	port in frost heaving soils [1964, p.91-96] MP 1678	MP 1534
Menchester, N.H. (1981, 18p.) SR 81-31	Simple model of ice segregation using an analytic function to	Harrington, B. Site-specific meteorology (1989, p.13-15) MP 2641
Examination of a blistered built-up roof: O'Neill Building.	model heat and soil-water flow (1984, p.99-104) MP 2104	Hourly meteocological data for SNOW IV (1909, p.159-
Hanson Air Force Base (1981 17a). CD 91.71	,dr 2100	think were maken and the 240 - to fixe the bish-
Honocom Air Force Bose (1983, 12p.) SR 83-21 Con wet roof insulation be dried out (1983, p.626-639)	Two-dimensional model of coupled heat and moisture trans-	250 ₃ 36P 3647
Con wet roof insulation be dried out (1983, p.626-639) MP 1509		250j 34P 2647 Harrington, M.
Con wet roof insulation be dried out [1983, p.626-639]	Two-dimensional model of coupled heat and moisture trans- port in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-	250; MP 2667 Harrington, M. Vapor drive maps of the U.S.A. (1964, 7p. + graphs) MP 2041
Con wet roof insulation be dried out (1983, p.626-639; MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the	Two-dimensional model of coupled heat and moisture trans- port in frost-heaving soils [1984, p.336-343] MP 1765	250j 34P 2647 Harrington, M. Vapor drive maps of the U.S.A. (1966, 7p. + grapho) 34P 2041 Herrin, R.W.
Con wet roof insolation be dried out (1983, p.626-639; MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1709	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1924 Hass, W.M. Upper Michigan (1977,	250; MP 3647 Harrington, M. Vapor drive maps of the U.S.A. (1964, 7p. + graphs) MP 2041 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of materiates
Con wet roof insulation be dried out (1983, p.626-639; MP 1509) Comparison of actial to on-the-roof infrared moisture surveys (1983, p.55-105) MP 1709 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.106-119) MP 2337 Wetting of polystyrene and urethane roof insulations in the	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 599.] SR 77-60	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. (1966, 7p. + graphs) MP 2041 Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) SR 83-26
Can wet roof insulation be dried out (1983, p.626-639; MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1709 Wetting of pulystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1987, p.106-119) MP 2337	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) Increasing the effectiveness of soil compaction at bell presented to the present of the prese	250j MP 2647 Harrington, M. Vapor drive maps of the U.S.A. (1964, 7p. + graphs) MP 2041 Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1943, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) WP 1709 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1988, p.421-430) MP 2011 Greekey, H.P.	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] SR 78-25 Construction of an embunkment with frozen soil [1990]	250] MP 3647 Harrington, M. Vopor drive maps of the U.S.A. (1964, 7p. + graphs) MP 2041 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) SR 83-36 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017
Con wet roof insolation be dried out (1983, p.626-639; MP 1999 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1799 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2337 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2011 Groeley, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-62 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] SR 78-25 Construction of an embankment with frozen soil [1990, 105p.] SR 80-21 Improved techniques for construction of snow roads and sir-	250; MP 3647 Harrington, M. Vapor drive maps of the U.S.A. (1986, 7p. + grapho) MP 2041 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wasternater treatment systems) (1943, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographo) MP 1017 Harrison, W.D.
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1709 WP 1709 WP 1709 WP 1709 WP 1709 WP 1709 WP 2307 P.106-119 WE 2307 WE 241-4309 MP 2613 Greeley, H.P. Utilization of Unmanned Actial Vehicles in the ALBE Thrust (1986, p.249-257) Humility and temperature measurements obtained from an	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 599.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 589.) Construction of an embankment with frozen soil (290, 105p.) Improved techniques for construction of soow roads and air-strips (1988, 799.) SR 80-21	250] MP 3647 Harrington, M. Vopor drive maps of the U.S.A. (1964, 7p. + graphs) MP 2041 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) SR 83-36 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1709 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2337 Wetting of polystyrene and urethane roof insolations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2011 Grosley, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1966, p.249-257) MP 2663 Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 54p.] Construction of an embankment with frozen soil [1990, 105p.] SR 80-21 Improved techniques for construction of snow roods and air-strips [1988, 97p.] SR 80-18 Definition of research needs to address airport parament des-	250j MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1964, 7p. + grapho] MP 3041 Harris, R.W. Land treatment processes within CAPDET (Computer-assistate of procedure for the design and evaluation of wastewater treatment systems) [1963, 79p.] SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 [1960, 31p. plus photographo] MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permefront, Trudhoe Bay, Alaska [1978, p.92-99] MP 1305 Harrison, W.L.
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1709 WP 1709 WP 1709 WP 1709 WP 1709 WP 1709 WP 2307 P.106-119 WE 2307 WE 241-4309 MP 2613 Greeley, H.P. Utilization of Unmanned Actial Vehicles in the ALBE Thrust (1986, p.249-257) Humility and temperature measurements obtained from an	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil (1990, 105p.) SR 80-21 Improved techniques for construction of snow roads and air-strips (1988, 79p.) SR 80-18 Definition of research needs to address airport parentent destress in cold regions (1989, 142p.) Improving snow roads and airstrips in Antarctica (1989, 1	250] MP 2667 Harrington, M. Vapor drive maps of the U.S.A. (1966, 7p. + graphs) MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Prudhee Bay, Alaska (1978, p.92-98) MP 1305 Harrison, W.L. Shallow saow performance of wheeled vehicles (1976, p.599-
Can wet roof insolation be dried out (1983, p.626-639; MP 1989) Comparison of actial to on-the-roof infrared motuter surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) Grosley, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2993 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Information systems planning study (1987, 488)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 54p.] Construction of an embankment with frozen soil [1990, 105p.] SR 80-21 Improved techniques for construction of snow roods and air-strips [1988, 97p.] SR 80-18 Definition of research needs to address sirport parament distress in cold regions [1999, 142p.] Improving snow roods and airstrips in Antactica [1989, 18p.] SR 89-22	250j MP 3667 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-ansisted procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 [1960, 31p. plos photographs] MP 1017 Harrison, W.D. Chemistry of intersticial water from subsea permofrost, Prudhoet Bay, Alaska [1978, p.92-98] MP 1305 Harrison, W.L. Skallow snow performance of wheeled vehicles [1974, p.589-614] Proceedings of the International Society for Terrain-Vehicle
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.106-119) Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1988, p.421-420) Groubey, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.31-126) MP 2295	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-69 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) SR 78-25 Construction of an emboultment with frozen soil (1990, 105p.) SR 89-21 Improved techniques for construction of snow roads and airstrips (1988, 99p.) SR 89-21 Improving snow roads and airstrips in Antarctica (1999, 142p.) Improving snow roads and airstrips in Antarctica (1999, 14p.) 18p.) Hols, A.B. Cost-effective use of municipal wastewater treatment ponds	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. (1964, 7p. + graphs) MP 2041 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017 Harrison, W.D. Chemistry of intersitial water from subsen permofrost, Prudhoe Bay, Alaska (1978, p.92-98) Harrison, W.L. Shallow sansw performance of wheeled vehicles (1976, p.599-614) Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Traction Mechanics, Alta,
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) MP 1709 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2337 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2011 Grooky, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1966, p.249-257) MP 2643 Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Groon, C.E. Wheeled versus tracked vehicle snow mobility test program	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] Biercasing the effectiveness of soil compaction at below-freezing temperatures [1978, 54p.] Construction of an embankment with frozen soil [1990, 105p.] SR 89-21 Improved techniques for construction of snow roods and air-strips [1988, 97p.] Definition of research needs to address sirport parament distress in cold regions [1989, 142p.] Empeoving snow roods and airstrips in Antaetica [1989, 18p.] Hals, A.B. Cost-effective use of municipal wastewater treatment poods [1979, p.177-200] MP 1413	250j MP 2667 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Prodhoet Bay, Alaska [1978, p.92-99] MP 1305 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Soow Tractom Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1911, 71p.] SR 81-16 Snow reessurements in relation to whicle performance
Con wet roof insulation be dried out (1983, p.626-639, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) We ting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) We ting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2011 Greekey, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 2093 Slant path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) MP 2293 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 1991, 1992)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-69 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) SR 78-25 Construction of an emboultment with frozen soil (1990, 105p.) SR 89-21 Improved techniques for construction of snow roads and airstrips (1988, 99p.) SR 89-21 Improving snow roads and airstrips in Antarctica (1999, 142p.) Improving snow roads and airstrips in Antarctica (1999, 14p.) 18p.) Hols, A.B. Cost-effective use of municipal wastewater treatment ponds	250j MP 2667 Harrington, M. Vapor drive maps of the U.S.A. (1966, 7p. + graphs) MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-estimated procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Prudhoe Bay, Alaska (1978, p.92-99) MP 1305 Harrison, W.L. Skallow snow performance of wheeled vehicles (1976, p.589-614) Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alta, Utah, Jan, 29-Feb. 2, 1979 (1981, 71p.) Sow resessements in relation to vehicle performance (1981, p.13-24)
Con wet roof insulation be dried out (1983, p.626-539, MP 1599 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2013 Grouley, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1986, p.429-257) MP 263 Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 2295 Sinnt path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Wetting for the program (1989, 19p.)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] SR 78-25 Construction of an embankment with frozen soil [1990, 105p.] SR 80-21 Improved techniques for construction of snow roods and sinstrips [1988, 97p.] SR 80-18 Definition of research needs to address sirport parament distress in cold regions [1999, 142p.] CR 89-10 Improving snow roods and airstrips in Antactica [1989, 18p.] SR 89-22 Hols, A.B. Cost-effective use of municipal wastewater treatment poods [1979, p.177-200] MP 1413 Cost of land treatment systems [1979, 135p.] Holl, D.K.	250; MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] MP 2061 Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 [1980, 31p. plus photographs] MP 1017 Harrison, W.D. Chemistry of intersitial water from subsen permofrost, Prudhee Bay, Alaska [1978, p.92-98] MP 1105 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.899-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alice Utah, Jan. 29-Feb. 2, 1959 [1981, 71p.] Snow recasurements in relation to vehicle performance [1981, p.13-24] Prediction methods [1981, p.39-46] MP 1673
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) Grookey, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2093 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296 Information systems planning study (1987, 48p.) Groom, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groom, G. Widdife hobitst mapping in Lac qui Parle, Minnesota (1984, p.205-208) MP 2085	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1915, p.18-25) MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) SR 78-25 Construction of an embankment with frozen soil (1990, 105p.) SR 80-21 Improved techniques for construction of snow roads and air-strips (1918, 99p.) SR 80-18 Definition of research needs to address airport parament distress in cold regions (1919, 142p.) CR 80-18 Improving snow roads and airstrips in Antarctica (1989, 18p.) Hals, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) MP 1413 Cost of Itand treatment systems (1979, 135p.) MP 1387 Hall, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-58)	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] MP 2041 Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 (1980, 31p. plos photographs) MP 1017 Harrison, W.D. Chemistry of intersitial water from subson permofrost, Produce Bay, Alaska [1978, p.92-98] MP 1105 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Snow Tractom Mechanics, Alta, Link, Jan. 29-Feb. 2, 1979 [1981, 71p.] SR 81-16 Snow recasurements in relation to vehicle performance (1981, p.13-24) Prediction methods [1981, p.39-46] MP 1473
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and wrethone roof insulations in the loboratory and on a protected membrane roof (1987, p.106-119) Wetting of polystyrene and wrethone roof insulations in the loboratory and on a protected membrane roof (1987, p.106-119) Wetting of polystyrene and wrethone roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) Groekey, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) MP 2295 Groem, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groun, G. Widdife hobitat mapping in Lac qui Paric, Minnesota (1984, p.205-208) Groema, H.	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] SR 78-25 Construction of an embankment with frozen soil [1990, 105p.] SR 80-18 Improved techniques for construction of snow roads and air-strips [1988, 97p.] SR 80-18 Definition of research needs to address sirport parament distress in cold regions [1999, 142p.] CR 89-10 Improving snow roads and airstrips in Antarctica [1999, 18p.] SR 89-22 Hals, A.B. Cost-effective use of municipal wastewater treatment ponds [1979, p.177-200] MP 1413 Cost of land treatment systems [1979, 135p.] MP 1413 Cost of land treatment systems [1979, 135p.] MP 1413 SR 78-10 SR 78-10 SR 78-10	250j MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1966, 7p. + graphs] MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 [1960, 31p. plus photographs] MP 1017 Harrison, W.D. Chemistry of intersitial water from subsen permissor, Prudhee Bay, Alaska [1978, p.92-98] MP 1105 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Seow Tractom Mechanics, Alte. Utah, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow recasurements in relation to vehicle performance [1981, p.13-24] Prediction methods [1981, p.39-46] MP 1673 Prediction methods [1981, p.47-48] Analysis of vehicle tests and performance productions [1981, p.51-67] MP 1677
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2337 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-420) Greekey, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned actial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned actial vehicle (1987, p.15-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Green, G. Widdite hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-208) Groonen, H. WMO solid precipitation measurement intercomparison at Sleepers Rever Research Watershed (1987, p.1-7)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil (1990, 105p.) SR 80-21 Improved techniques for construction of snow roads and air-strips (1988, 79p.) SR 80-21 Improving snow roads and airstrips in Antarctica (1989, 18p.) Improving snow roads and airstrips in Antarctica (1989, 18p.) Late. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 135p.) MP 1431 Cost of land treatment systems (1979, 135p.) MP 1431 MP 1125 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-58) MP 1125 1977 tundra fire at Kokolik River, Alaska (1978, 11p.) Eandsat digital analysis of the initial recovery of the Kokolik	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of waterouser treatment systems) [1983, 79p.] Report on ice fall from clear sky in Georgie October 26, 1999 [1960, 31p. plos photographs] Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Pruduce Bay, Alaska [1978, p.92-98] MP 1007 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.599-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow recasserements in relation to vehicle performance [1981, p.13-24] Prediction methods [1981, p.39-46] MP 1475 Field investigations [1981, p.47-48] Analysis of vehicle tests and performance predictions [1981, p.51-67] Shallow snow test results [1981, p.69-71] MP 1478
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and wrethone roof insulations in the loboratory and on a protected membrane roof (1987, p.106-119) Wetting of polystyrene and wrethone roof insulations in the loboratory and on a protected membrane roof (1987, p.106-119) MP 2303 Greeky, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) MP 2633 Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groun, G. Widdife hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-208) Groun, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7; MP 2996	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] SR 78-25 Construction of an embankment with frozen soil [1990, 105p.] SR 80-18 Improved techniques for construction of snow roads and air-strips [1988, 97p.] SR 80-18 Definition of research needs to address sirport parament distress in cold regions [1999, 142p.] CR 89-10 Improving snow roads and airstrips in Antarctica [1999, 18p.] SR 89-22 Hals, A.B. Cost-effective use of municipal wastewater treatment ponds [1979, p.177-200] MP 1413 Cost of land treatment systems [1979, 135p.] MP 1413 Cost of land treatment systems [1979, 135p.] MP 1413 SR 78-10 SR 78-10 SR 78-10	250j MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1966, 7p. + graphs] MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 [1960, 31p. plus photographs] MP 1017 Harrison, W.D. Chemistry of intersitial water from subsen permissor, Prudhee Bay, Alaska [1978, p.92-98] MP 1105 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Seow Tractom Mechanics, Alte. Utah, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow recasurements in relation to vehicle performance [1981, p.13-24] Prediction methods [1981, p.39-46] MP 1673 Prediction methods [1981, p.47-48] Analysis of vehicle tests and performance productions [1981, p.51-67] MP 1677
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2337 Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-420) Greekey, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned actial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned actial vehicle (1987, p.15-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Green, G. Widdite hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-208) Groona, H. WMO solid precipitation measurement intercomparison at Sleepers Rever Research Watershed (1987, p.1-7)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MR 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil (1980, 1990, 105p.) SR 89-21 Improved techniques for construction of snow roads and sinstrips (1988, 99p.) SR 89-21 Improved techniques for construction of snow roads and sinstrips (1988, 99p.) SR 89-21 Improving snow roads and airstrips in Antarctica (1989, 1920, 193p.) Hols, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 135p.) Hold, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-55) MP 1125 SR 78-10 Landsat digital analysis of the unital recovery of the Kokolik River tundra fire area, Alaska (1979, 15p.) MP 1638 LANDSAT digital analysis of the initial recovery of burned tundra at Kokolik River, Alaska (1979, 15p.) MP 1638 LANDSAT digital analysis of the initial recovery of burned tundra at Kokolik River, Alaska (1979, 15p.) Landsat digital analysis of the initial recovery of burned tundra at Kokolik River, Alaska (1979, 15p.)	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wateroster treatment systems) [1983, 79p.] Report on ice fall from clear sky in Georgie October 26, 1999 (1960, 31p. plos photographs) MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permoleos, Prudhoe Bay, Alaska [1978, p.92-98] Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.599-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] SR 81-85 Snow recasserements in relation to vehicle performance [1981, p.13-24] Prediction methods [1981, p.39-46] MP 1475 Field investigations [1981, p.47-48] Analysis of vehicle tests and performance predictions [1981, p.51-67] Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance evaluations of the performance of the performance (1981, 21p.) Measurement of snow surfaces and tire performance evaluations of the perfo
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) Grooley, H.P. Utilization of Unmouned Aerial Vehicles in the ALBE Thrust (1986, p.429-257) Humidity and temperature measurements obtained from an unmouned acrial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmouned acrial vehicle (1987, p.15-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groonn, G. Widdlic hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-206) Groonn, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7) MP 2396 Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) SR 79-88	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] MP 1926 Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] SR 78-25 Construction of an emboultment with frozen soil [1990, 105p.] SR 98-21 Improved techniques for construction of snow roods and air-strips [1918, 99p.] SR 98-18 Definition of research needs to address airport parament datters in cold regions [1929, 142p.] SR 98-18 Improving snow roads and airstrips in Antarctica [1949, 18p.] SR 98-22 Hols, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems [1979, 135p.] MP 1107 Hold, D.K. 1977 tundra fire in the Kokolik River area of Alaska [1978, p.54-58] Improved for in the Kokolik River area of Alaska [1978, p.54-58] Landsat digital analysis of the initial recovery of the Kokolik River tundra fire area, Alaska [1979, 15p.] Landsat digital analysis of the initial recovery of birned tundra at Kokolik River, Alaska [1979, p.25-272] MP 1391	250j MP 2667 Harrington, M. Vapor drive maps of the U.S.A. (1986, 7p. + graphs) MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wasternater treatment systems) (1983, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017 Harrison, W.D. Chemistry of intersitial water from subsea permofrost, Produce Bay, Alaska (1978, p.92-99) MP 108 Harrison, W.L. Skallow snow performance of wheeled vehicles (1976, p.589-614) Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Traction Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 (1981, 71p.) Snow recassurements in relation to whicle performance (1981, p.13-24) Prediction methods (1981, p.39-44) Prediction methods (1981, p.39-44) Analysis of vehicle tests and performance productions (1981, p.51-67) Shallow snow test results (1981, p.69-71) Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance evaluation (1982, 7p.) MP 1516
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2337 Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1918, p.421-430) MP 2011 Grosley, H.P. Utilization of Ummoned Aerial Vehicles in the ALBE Thrust (1996, p.249-257) MP 2013 Humidity and temperature measurements obtained from an unmoned aerial vehicle (1997, p.35-45) MP 2013 Slant path extinction and visibility measurements from an unmonned aerial vehicle (1997, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmonned aerial vehicle (1997, p.115-126) MP 2294 Grosn, C.E. Whoeld versus tracked vehicle snow mobility test program (1999, 1992) MP 2115 Grosn, G. Widdlie hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-208) Grosnan, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7) MP 2396 Grosnberg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Grelechny, L.L.	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MR 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil (1980, 105p.) SR 89-21 Improved techniques for construction of snow roads and sirsting (1988, 99p.) SR 89-21 Improved techniques for construction of snow roads and sirsting (1988, 99p.) SR 89-18 Definition of research needs to address airport pavement detress in cold regions (1989, 142p.) Improving snow roads and airstrips in Antarctica (1989, 18p.) Hols, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 135p.) MP 1403 Hold, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.545-58) MP 1125 1977 tundra fire at Kokolik River, Alaska (1978, 11p.) Landsat digital analysis of the unital recovery of the Kokolik River tundra fire area, Alaska (1979, 15p.) MP 1638 LANDSAT digital analysis of the initial recovery of barned tundra at Kokolik River, Alaska (1979, p.263-272) MP 1991 Hamilton, T.D. Fos permafrost tunnel 2 late Onaternary geologic record in	250] MP 2647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wateroster treatment systems) [1983, 79p.) Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plos photographs) MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Prudhoe Bay, Alaska [1978, p.92-98] Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Traction Mechanics, Alas, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow rocassurements in relation to vehicle performance [1981, p.13-24] Prediction methods [1981, p.39-46] MP 1478 Analysis of vehicle tests and performance predictions [1981, p.51-67] Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance (1981, 21p.) Measurement of snow surfaces and tire performance evalua-
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethone roof insulations in the loboratory and on a protected membrane roof (1918, p.421-430) Grookey, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1966, p.249-257) MP 293 Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 293 Sant path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) Information systems plonning study (1987, 48p.) Groon, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groon, G. Widdlie hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-206) Groonman, H. WhO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7) MP 2996 Groonburg, M. Design procedures for underground heat sink systems (1979, 1840, in var. pagns.) Groonburg, L.L. Geophysical sarvey of subglacial geology around the deepdrilling site at Dye J. Greenland (1985, p.105-110)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils [1984, p.336-343] MP 1765 Partial verification of a thaw settlement model [1985, p.18-25] Hans, W.M. Winter earthwork construction in Upper Michigan [1977, 59p.] SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures [1978, 58p.] Construction of an emboultment with frozen soil [1990, 105p.] SR 78-25 Construction of an emboultment with frozen soil [1990, 105p.] SR 78-21 Improved techniques for construction of snow roods and air-strips [1918, 99p.] SR 88-18 Definition of research needs to address airport parament dattress in cold regions [1929, 142p.] CR 89-10 Improving snow roods and airstrips in Antarctica [1919, 18p.] SR 78-22 Hols, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems [1979, 135p.] MP 1187 Holl, D.K. 1977 tundra fire in the Kokolik River area of Alaska [1978, p.54-58] Landsat digital analysis of the initial recovery of the Kokolik River tundra fire area, Alaska [1979, 15p.] Landsat digital analysis of the initial recovery of burned tundra at Kokolik River, Alaska [1979, 15p.] Hamilton, T.D. For permafront tunnel a late Quaternary geologic record in central Alaska [1932, p.948-96) MP 2355	250j MP 2667 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] MP 2061 Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plus photographs) MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Prodheer Bay, Alaska [1978, p.92-99] MP 1105 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] MP 1306 Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alta, Utak, Jan, 29-Feb, 2, 1979 [1981, 71p.] SR 81-16 Snow recassurements in relation to whicle performance [1981, p.13-24) MP 1473 Prediction methods [1981, p.39-44] MP 1473 Analysis of vehicle tests and performance productions [1981, p.51-67] MP 1476 Shallow snow test results [1981, p.69-71] MP 1476 Shallow snow model for predicting whicle performance [1981, 21p.] Messorement of snow surfaces and tire performance [1981, 21p.] Messorement of snow surfaces and tire performance [1981, 21p.] Snowpack peofile analysis using extracted this sections [1982, 15p.] Winter tire tests. 1980-81 [1985, p.135-151]
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) We ting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) We ting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1988, p.421-430) MP 2013 Grookp, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) MP 203-14-200, MP 209-257 Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path estinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2295 Information systems planning study (1987, 48p.) Groon, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groon, G. Widdife hobitst mapping in Lac qui Parie, Minnesota (1984, p.205-208) Groona, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7) MP 2996 Groonberg, M. Design procedures for underground heat sink systems (1979, 136p, in var. pagns.) SR 79-08 Groonberg, L.L. Geophysical sarvey of subglacial geology around the deep-drilling site at Dye 3, Greenland (1985, p.105-110) MP 1941	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MR 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-60 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil (1980, 105p.) SR 89-21 Improved techniques for construction of snow roads and sirsting (1988, 99p.) SR 89-21 Improved techniques for construction of snow roads and sirsting (1988, 99p.) SR 89-18 Definition of research needs to address airport pavement detress in cold regions (1989, 142p.) Improving snow roads and airstrips in Antarctica (1989, 18p.) Hols, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 135p.) MP 1403 Hold, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.545-58) MP 1125 1977 tundra fire at Kokolik River, Alaska (1978, 11p.) Landsat digital analysis of the unital recovery of the Kokolik River tundra fire area, Alaska (1979, 15p.) MP 1638 LANDSAT digital analysis of the initial recovery of barned tundra at Kokolik River, Alaska (1979, p.263-272) MP 1991 Hamilton, T.D. Fos permafrost tunnel 2 late Onaternary geologic record in	250j MP 2647 Harrington, M. Vapor drive maps of the U.S.A. (1986, 7p. + graphs) Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1980, 31p. ploss photographs) Harrison, W.D. Chemistry of intersitial water from subson permofrost, Produce Bay, Alaka, (1978, p.92-98) MP 1007 Harrison, W.L. Skallow snow performance of wheeled vehicles (1976, p.589-614) Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alon, Utah, Jan, 28-Feb. 2, 1959 (1981, 71p.) Sam reassurements in relation to vehicle performance (1981, p.13-24) Prediction methods (1981, p.39-46) MP 1475 Field investigations (1981, p.47-48) Analysis of vehicle tests and performance predictions (1981, p.51-67) Shallow snow model for predicting vehicle performance (1981, 21p.) Meassurement of snow surfaces and tire performance evaluation (1982, 2p.) Som spack profile analysis using extracted thin sections (1982, 15p.) Winter tire tests 1990-81 (1985, p.135-151) MP 2005 Hart, M.M.
Con wet roof insulation be dried out (1983, p.626-539, MP 1599 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2393 Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1918, p.421-430) MP 2011 Growley, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1966, p.249-257) MP 2013 Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2003 Sant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2003 Grown C.E. Whoeled versus tracked vehicle snow mobility test program (1989, 1992) MP 2015 Grown, G. Widdlie labitat mapping in Lac qui Parle, Minnesota (1984, p.205-206) Growns, H. WhO solid precipitation measurement intercomparison at Sloepers River Research Watershed (1987, p.1-7) MP 2096 Grounberg, M. Design procedures for underground heat sink systems (1979, 1849, in var. pagna.) Grescher, L.L. Gesphysical savey of subglacial geology around the deerdrilling site at Dye J, Greenland (1985, p.105-110) MP 1941 Growfell, T.C. Optical properties of ice and snow in the polar oceans.	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MR 1924 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 599,) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 589,) SR 78-25 Construction of an embankment with frozen soil (1990, 1059,) Improved techniques for construction of snow roads and sistings (1988, 999,) Definition of research needs to address sirport parament distress in cold regions (1989, 1429,) Emproving snow roads and airstrips in Antarctica (1989, 1891) Isp.; SR 89-22 Hals, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 1359,) MP 1413 Cost of land treatment systems (1979, 1359,) MP 1413 Hall, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-58) 1977 tundra fire at Kokolik River, Alaska (1978, 118) SR 78-10 Landsat digital analysis of the unital recovery of the Kokolik River tundra fire area, Alaska (1979, 159,) MP 1091 Hamilton, T.D. For permafrost tunnel 2 late Onaternary geologic record in central Alaska (1988, p.948-949) MP 2355 Hammer, C.U. Stable inclose profile through the Ross Ice Shelf at Little Arcerica V, Analarctica (1977, p.322-325) MP 1995	250] MP 2647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wateroster treatment systems) [1983, 79p.) Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plos photographs) Harrison, W.D. Chemistry of interstitial water from subsen permofront. Prudhoe Bay, Alaska [1978, p.92-98] Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-414] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tractom Mechanics, Alas, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow rocassurements in relation to vehicle performance [1981, p.13-24] Producion methods [1981, p.39-46] MP 1478 Analysis of vehicle tests and performance predictions [1981, p.51-67] Shallow snow model for predicting vehicle performance [1981, 21p.] Mcassurement of snow surfaces and tire performance evaluation [1982, 25p.] Mcassurement of snow surfaces and tire performance evaluation [1982, 25p.] Mcassurement of snow surfaces and tire performance evaluation [1982, 25p.] Snowpack profile analysis using extracted fins sections [1982, 15p.] Winter tire tests 1980-81 [1985, p.135-151] MP 2045 Heat transfer over a vertical melting plate [1977, 12p.]
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1993, p.95-105) Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1988, p.421-430) Grooley, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296 Information systems planning study (1987, 48p.) Groon, C.E. Wheteled versus tracked vehicle snow mobility test program (1992, 19p.) Groon, G. Widdic hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-200) MP 2085 Groonen, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7; MP 2396 Groonburg, M. Design procedures for underground heat sink systems (1979, 1349, in var. pagna.) Greekcher, L.L. Geophysical survey of subglacial geology around the deepding site at Dye J. Greenland (1985, p.105-110) MP 1941 Grendell, T.C. Optical properties of see and snow in the polar oceans. I Othervations (1984, p.232-241) MP 2355	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil (1986, 1989, 105p.) SR 78-22 Improved techniques for construction of snow roads and aircitrips (1988, 79p.) SR 80-21 Improved techniques for construction of snow roads and aircitrips (1988, 79p.) SR 80-21 Improved techniques for construction of snow roads and aircitrips (1988, 79p.) SR 80-21 Improved techniques for construction of snow roads and aircitrips (1988, 79p.) SR 80-21 Improved techniques for construction of snow roads and aircitrips (1988, 79p.) SR 80-21 Improved techniques for construction of snow roads and aircitrips (1989, 189.) Improved techniques for construction of snow roads and aircitrips (1988, 79p.) MP 1429 Language (1989, 1989, 142p.) SR 80-21 Improved techniques for construction of snow roads and aircitrips (1989, 189.) MP 1430 CR 89-18 Language (1989, 1989, 1999, 1999, 1999, 1999, 1999) Hamilton, T.D. For permafrost tunnel 2 late Onaternary geologic record in central Alaska (1989, p.983-969) MP 2355 Hammer, C.U. Stable trotope profile through the Ross Ice Shelf at Little America V, Antarctica (1977, p.)22-1251 MP 1095 Hammore, R.	250j MP 2647 Harrington, M. Vapor drive maps of the U.S.A. (1986, 7p. + graphs) Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) (1983, 79p.) Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plos photographs) Harrison, W.D. Chemistry of intersitial water from subson permofrost, Prudhoe Bay, Alaska (1978, p.92-98) Harrison, W.L. Skallow snow performance of wheeled vehicles (1976, p.589-614) Proceedings of the International Society for Termin-Vehicle Systems Workshop on Scow Tractom Mechanics, Alta, Link, Jan. 29-Feb. 2, 1979 (1981, 71p.) Snow recasurements in relation to vehicle performance (1981, p.13-24) Prediction methods (1981, p.39-44) MP 1475 Field investigations (1981, p.47-48) Analysis of vehicle tests and performance productions (1981, p.51-67) Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance evaluation (1982, 7p.) Sono pack profile analysis using extracted thin sections (1982, 15p.) Sonopack profile analysis using extracted thin sections (1982, 15p.) Winter tire tests 1980-81 (1985, p.135-151) Hart, M.M. Heat transfer over a vertical melting plate (1977, 12p.)
Con wet roof insulation be dried out (1983, p.626-439, MP 1599 Comparison of actinal to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2393 Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1918, p.421-430) MP 2011 Grookly, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1984, p.249-257) MP 2031 Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2093 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.31-126) MP 2093 Groon C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groon, G. Wildlife hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-206) Groonan, H. Design procedures for underground heat sink systems (1979, 146p, in var. pagns.) Greischer, L.L. Geophysical sarvey of subglacial geology around the deepdoling site at Dye J, Greenland (1985, p.105-110) MP 1941 Grenfell, T.C. Optical properties of sce and snow in the polar oceans. I	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1924 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 599,) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 589,) SR 78-25 Construction of an embankment with frozen soil (1990, 1059.) Improved techniques for construction of snow roads and air-strips (1988, 799.) Definition of research needs to address airport parament distress in cold regions (1989, 142p.) Emproving snow roads and airstrips in Antarctica (1999, 139.) Isp.; SR 89-22 Hals, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 135p.) MP 1413 Cost of land treatment systems (1979, 135p.) MP 1413 Landsat digital analysis of the initial recovery of the Kokolik River unders fire area, Alaska (1978, 15p.) Landsat digital analysis of the initial recovery of the Kokolik River unders at Kokolik River, Alaska (1978, 15p.) MP 1091 Hamilton, T.D. For permisfrost tunnel 2 late Onaternary geologic record in central Alaska (1988, p.943-949) Hammer, C.U. Stable interper profile through the Ross lee Shelf at Little Arcrica V, Antarctica (1977, p.322-325) MP 933 Hammorto, R. Effect of snow cover on obstacle performance of vehicles (1976, p.122-146)	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] Harris, R.W. Land treatment processes within CAPDET (Computer-assistance) procedure for the design and evaluation of wateroster treatment systems) [1983, 79p.] SR 83-36 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1959 [1960, 31p. plos photographs] MP 1017 Harrison, W.D. Chemistry of interstitial water from subsea permofrost, Prudhoe Bay, Alaska [1978, p.92-96] MP 1105 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.599-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Traction Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] SR 81-165 Snow recasseements in relation to vehicle performance [1981, p.13-24] MP 1475 Frederion methods [1981, p.39-44] MP 1475 Field investigations [1981, p.47-48] MP 1475 Shallow snow model for predicting vehicle performance [1981, 21p.] Measurement of snow surfaces and tire performance evaluation [1982, 7p.] Sowapack profile analysis usung extracted thin sections [1982, 15p.] Winter tire tests 1980-81 [1985, p.135-151] MP 3045 Hart, M.M. Heat transfer over a vertical melting plate [1977, 12p.] CR 77-32 Hartman, C.W. Environmental atlas of Alaska [1978, 95p.]
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of actial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1988, p.421-430) Growley, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned acrial vehicle (1987, p.35-45) MP 2663 Humidity and temperature measurements abtained from an unmanned acrial vehicle (1987, p.35-45) MP 2296 Information systems planning study (1987, 48p.) Grown, C.E. Wheeled versus tracked vehicle snow mobility test program (1999, 19p.) Grown, G. Wildlife hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-200) Growna, H. WMO solid precipitation measurement intercomparison at Sloepers River Research Watershed (1987, p.1-7; MP 2996 Grownan, H. WhO solid precipitation measurement intercomparison at Sloepers River Research Watershed (1987, p.1-7; MP 2996 Grownburg, M. Design procedures for underground heat sink systems (1979, 149, in var. pagna.) Growlang, I.L. Geophysical survey of subglacial geology around the deepdraling site at Dye J, Greenland (1985, p.105-110) MP 1941 Growfell, T.C. Optical properties of ice and snow in the polar oceans. 1 Observations (1984, p.232-241) MP 2255 Optical properties of ice and snow in the polar oceans. 2 Theoretical calculations (1986, p.242-251) MP 2256 Milliterious and manner and snow of saline ice Theoretical calculations (1986, p.242-251) MP 2256 Milliterious (1986, p.242-251)	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 598,) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 589,) Construction of an embankment with frozen soil 758, 78-21 Improved techniques for construction of snow roads and air-strips (1988, 799,) SR 80-21 Improving snow roads and airstrips in Antarctica (1989, 188, 189-21 Improving snow roads and airstrips in Antarctica (1989, 189, 189, 189, 189, 189, 189, 189,	250 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + graphs] Harrin, R.W. Land treatment processes within CAPDET (Computer-assisted procedure for the design and evaluation of wastewater treatment systems) [1983, 79p.] Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 [1980, 31p. plos photographs] Harrison, W.D. Chemistry of intersitial water from subson permofrost, Produce flay, Alaska [1978, p.92-99] MP 1007 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Snow Tractom Mechanics, Alon, Usah, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow recastements in relation to vehicle performance [1981, p.13-24] Production methods [1981, p.39-46] MP 1473 Field investigations [1981, p.47-85] Analysis of vehicle tests and performance productions [1981, p.51-67] Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance evaluation [1982, 7p.] Sono pack profile analysis using extracted thin sections [1982, 15p.] Sonopack profile analysis using extracted thin sections [1982, 15p.] Winter tire tests 1980-81 [1985, p.135-151] MP 2005 Hart, M.M. Heat transfer over a vertical melting plate [1977, 12p.] CR 77-32
Con wet roof insulation be dried out (1983, p.626-639, MP 1599 Comparison of actial to on-the-roof infrared moisture surveys (1993, p.95-105) Wetting of polystyrene and wrethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and wrethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) MP 2337 Wetting of polystyrene and wrethane roof insulations in the laboratory and on a protected membrane roof (1918, p.421-430) MP 2011 Grooley, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1994, p.249-257) MP 2051 Humidity and temperature measurements obtained from an unmanned aerial vehicle (1997, p.35-45) MP 2093 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1997, p.315-126) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1997, p.115-126) MP 2294 Groon, C.E. Wheeled versus tracked vehicle snow mobility test program (1992, 1993) MP 2115 Groon, G. Widdlie hobitat mapping in Lac qui Parle, Minnesota (1944, p.205-200) Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Groonburg, M. Design procedures for underground heat sink systems (1979, 1869, in var. pagns.) Groonburg, M. Design procedures for underground heat sink systems (1979, 1991) Groonburg, M. Design procedures for underground heat sink systems (1979, 1991) Groonburg, M. Design procedures for underground heat sink systems (1979, 1991) Groonburg, M. Design procedures for underground heat sink systems (1979, 1991) Groonb	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) SR 78-21 Improved techniques for construction of snow roads and sirroring (1984, 99p.) SR 80-21 Improved techniques for construction of snow roads and sirroring (1984, 99p.) SR 80-21 Improving snow roads and airstrips in Antarctica (1989, 1981, 1921, 1931, 1932, 1932, 1932, 1932, 1932, 1932, 1932, 1932, 1932, 1932, 1932, 1933, 1934, 1934, 1935, 1937, 1934, 1934, 1935, 1937, 1934,	250] MP 2667 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + grapho] Harris, R.W. Land treatment processes within CAPDET (Computer-assistation procedure for the design and evaluation of wateroaset treatment systems) [1983, 79p.] Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plos photographo) MP 1017 Harrison, W.D. Chemistry of intersitial water from subsea permofront, Prudhoe Bay, Alaska [1978, p.92-98] Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-414] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Soow Traction Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow recasurements in relation to vehicle performance [1981, p.13-24] Producion methods [1981, p.39-46] MP 1475 Field investigations [1981, p.47-48] Analysis of vehicle tests and performance predictions [1981, p.51-67] Shallow snow model for predicting vehicle performance (1981, 21p.) MCasurement of snow surfaces and tire performance evaluation [1982, 25p.] Snowpack profile analysis using extracted thin sections to [1981, 21p.] Snowpack profile analysis using extracted thin sections (1981, p.39-15). Hart, M.M. Heat transfer over a vertical melting plate [1977, 12p.] CR 77-32 Hartman, C.W. Environmental atlas of Alaska [1978, 95p.] MP 1206 Hasselmann, K. MIZEX a pregrant for mesoscale autroe-ocean interaction experiments in Artise marginal act tones. 2, A socace
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the haberatory and on a protected membrane roof (1988, p.421-420) Greekey, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned acrial vehicle (1987, p.35-45) MP 2263 Slant path extinction and visibility measurements from an unmanned acrial vehicle (1987, p.15-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Green, G. Widdite hobitat mapping in Lac qui Paric, Minnesota (1984, p.205-208) Greenan, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7; MP 2396 Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Greenburg, M. Greenburg, M. Greenburg, M. Greenburg, J. Greenburg, J. Greenburg, J. Greenburg, J. Greenburg, J. Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink sy	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil 75p. SR 78-25 Improved techniques for construction of snow roads and aircustrips (1984, 79p.) Definition of research needs to address airport pavement distress in cold regions (1989, 142p.) Emproving snow roads and airstrips in Antarctica (1989, 13p.) SR 89-22 Hals, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) MP 1401 Cost of land treatment systems (1979, 135p.) MP 1402 Hall, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-58) Landsat digital analysis of the initial recovery of the Kokolik River tundra fire area, Alaska (1979, 15p.) Landsat digital analysis of the initial recovery of barned tundra at Kokolik River, Alaska (1970, p.263-272) MP 1091 Hamilton, T.D. For permafrost tunnel a late Quaternary geologic record in central Alaska (1988, p.948-969) MP 2355 Hammer, C.U. Stable twoope profile through the Ross Ice Shelf at Little America V, Antarctica (1977, p.32-325) MP 1095 Hammoto, R. Effect of snow ever on obstacle performance of scholes (1976, p.121-140) Development of large ice sans (1976, 14p.) CR 76-47 Lock wall decong studies (1977, p.7-14) SR 77-22 Specialized specime equipment (1978, 10p.) SR 77-22 Specialized specime equipment (1978, 10p.) SR 77-22 SR 77-25	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + grapho] Harris, R.W. Land treatment processes within CAPDET (Computer-ansist- col procedure for the design and evaluation of waterwater treatment systems) [1983, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 [1960, 3]p. plos photographoj MP 1017 Harrison, W.D. Chemistry of intersivial water from subsea permofront, Pruthoe Bay, Alaska [1978, p.92-99] MP 1085 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.599- 614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tracton Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] SR 81-16 Snow rocasseements in relation to vehicle performance [1981, p.13-24] MP 1475 Frederion methods [1981, p.39-44] MP 1475 Field investigations [1981, p.47-48] MP 1475 Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance (1981, 21p.) Socopack, profile analysis using extracted thin sections [1982, 15p.] SR 82-11 Winter tire tests 1980-81 [1985, p.135-151] MP 2005 Hart, M.M. Heat transfer over a vertical melting plate [1977, 12p.] CR 77-32 Hartman, C.W. Environments of Alaska [1978, 95p.] MP 1206 Hastenan, C.W. Environments in Arctic marginal see 100cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs
Con wet roof insulation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the hoberatory and on a protected membrane roof (1918, p.421-30) Grooky, H.P. Utilization of Unmonned Aerial Vehicles in the ALBE Thrust (1966, p.249-257) MP 293 Humidity and temperature measurements obtained from an unmonned aerial vehicle (1987, p.35-45) MP 293 Sant path extinction and visibility measurements from an unmonned aerial vehicle (1987, p.115-126) Information systems plonning study (1987, 48p.) Groon, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Groon, G. Widdlie hobitat mapping in Lac qui Parle, Minnesota (1984, p.205-206) Groonman, H. Design procedures for underground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for underground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for underground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for underground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for inderground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for inderground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for inderground heat sink systems (1979, 184p, in var. pagas.) Groonburg, M. Design procedures for inderground heat sink systems (1979, p.105-110) MP 2396 Groonburg, M. Design procedures for inderground heat sink systems (1979, p.105-110) MP 2396 Groonburg, M. Design procedures for inderground heat sink systems (1979, p.105-110) MP 2396 Groonburg, M. Design procedures for inderground he	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) MP 1926 Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) SR 78-21 Improved techniques for construction of snow roads and sirsting (1988, 99p.) SR 88-21 Improved techniques for construction of snow roads and sirsting (1988, 99p.) SR 88-18 Definition of research needs to address airport pavement deters in cold regions (1989, 142p.) Improving snow roads and airstrips in Antarctica (1989, 18p.) Hols, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) Cost of land treatment systems (1979, 135p.) MP 1881 Holl, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-54) 1977 tundra fire at Kokolik River, Alaska (1978, 11p.) Landsat digital analysis of the initial recovery of barned tundra at Kokolik River, Alaska (1979, 15p.) Hamilton, T.D. For permafrost tunnel a late Onaternary geologic record in central Alaska (1988, p.948-949) Hamilton, T.D. For permafrost tunnel a late Onaternary geologic record in central Alaska (1988, p.948-949) Hammoto, R. Effect of snow cover on obstacle performance of vehicles (1976, p.121-140) Development of large see sans (1976, 14p.) SR 78-10 Centruction equipment (1977, p.714) SR 77-22 Leck wall deneng studies (1977, 85p.) SR 78-65 Construction equipment problems and procedures Alaska Construction equipment problems and procedures.	250] MP 2667 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + grapho] Harris, R.W. Land treatment processes within CAPDET (Computer-assistation procedure for the design and evaluation of wateroaset treatment systems) [1983, 79p.] Report on ice fall from clear sky in Georgie October 26, 1959 (1960, 31p. plos photographo) MP 1017 Harrison, W.D. Chemistry of intersitial water from subsea permofests, Prudhoe Bay, Alaska [1978, p.92-98] MP 1018 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.589-414] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Soow Traction Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] Snow recasurements in relation to vehicle performance [1981, p.13-24] Producion methods [1981, p.39-46] MP 1475 Field investigations [1981, p.39-46] MP 1475 Shallow snow model for predicting vehicle performance [1981, 21p.] Massurement of snow surfaces and tire performance evaluation [1982, 75] Snowpack profile analysis using extracted thin sections to [1982, 15p.] Measurement of snow surfaces and tire performance evaluation [1982, 75] Snowpack profile analysis using extracted thin sections [1981, 15p.] Snowpack profile analysis using extracted thin sections [1982, 15p.] MP 1478 Snowpack profile analysis using extracted thin sections [1982, 15p.] MP 1478 Snowpack profile analysis using extracted thin sections [1982, 15p.] MP 1478 Snowpack profile analysis using extracted thin sections [1982, 15p.] KR 20-11 White tire texts 1990-81 [1995, p.135-151; MP 2005 Hartman, C.W. Environmental atlas of Alaska [1978, 95p.] MP 1204 Hasselmann, K. MI/EX a program for mesoscale autroe-occan interaction experiments in Arctic marginal acc tones. 2. A sociace plan for a summer Marginal lee Lones. 2. A sociace plan for a summer Marginal lee Lones. 2. A sociace plan for a summer Marginal lee Lones. 2. A sociace plan for a summer Marginal lee Lones. 2. A sociace plan for a summer Marginal lee Lones. 2. A sociace plan for a
Con wet roof insolation be dried out (1983, p.626-539, MP 1509 Comparison of acrial to on-the-roof infrared moisture surveys (1983, p.95-105) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the loboratory and on a protected membrane roof (1987, p.108-119) Wetting of polystyrene and urethane roof insulations in the haberatory and on a protected membrane roof (1988, p.421-420) Greekey, H.P. Utilization of Unmanned Aerial Vehicles in the ALBE Thrust (1986, p.249-257) Humidity and temperature measurements obtained from an unmanned acrial vehicle (1987, p.35-45) MP 2263 Slant path extinction and visibility measurements from an unmanned acrial vehicle (1987, p.15-126) MP 2296 Information systems planning study (1987, 48p.) SR 87-23 Green, C.E. Wheeled versus tracked vehicle snow mobility test program (1989, 19p.) Green, G. Widdite hobitat mapping in Lac qui Paric, Minnesota (1984, p.205-208) Greenan, H. WMO solid precipitation measurement intercomparison at Sleepers River Research Watershed (1987, p.1-7; MP 2396 Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Greenburg, M. Greenburg, M. Greenburg, M. Greenburg, J. Greenburg, J. Greenburg, J. Greenburg, J. Greenburg, J. Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink systems (1979, 18p., in var. pagns.) Greenburg, M. Design procedures for underground heat sink sy	Two-dimensional model of coupled heat and moisture transport in frost-heaving soils (1984, p.336-343) MP 1765 Partial verification of a thaw settlement model (1985, p.18-25) Hans, W.M. Winter earthwork construction in Upper Michigan (1977, 59p.) SR 77-40 Increasing the effectiveness of soil compaction at below-freezing temperatures (1978, 58p.) Construction of an embankment with frozen soil 75p. SR 78-25 Improved techniques for construction of snow roads and aircustrips (1984, 79p.) Definition of research needs to address airport pavement distress in cold regions (1989, 142p.) Emproving snow roads and airstrips in Antarctica (1989, 13p.) SR 89-22 Hals, A.B. Cost-effective use of municipal wastewater treatment ponds (1979, p.177-200) MP 1401 Cost of land treatment systems (1979, 135p.) MP 1402 Hall, D.K. 1977 tundra fire in the Kokolik River area of Alaska (1978, p.54-58) Landsat digital analysis of the initial recovery of the Kokolik River tundra fire area, Alaska (1979, 15p.) Landsat digital analysis of the initial recovery of barned tundra at Kokolik River, Alaska (1970, p.263-272) MP 1091 Hamilton, T.D. For permafrost tunnel a late Quaternary geologic record in central Alaska (1988, p.948-969) MP 2355 Hammer, C.U. Stable twoope profile through the Ross Ice Shelf at Little America V, Antarctica (1977, p.32-325) MP 1095 Hammoto, R. Effect of snow ever on obstacle performance of scholes (1976, p.121-140) Development of large ice sans (1976, 14p.) CR 76-47 Lock wall decong studies (1977, p.7-14) SR 77-22 Specialized specime equipment (1978, 10p.) SR 77-22 Specialized specime equipment (1978, 10p.) SR 77-22 SR 77-25	250] MP 3647 Harrington, M. Vapor drive maps of the U.S.A. [1986, 7p. + grapho] Harris, R.W. Land treatment processes within CAPDET (Computer-ansist- col procedure for the design and evaluation of waterwater treatment systems) [1983, 79p.) SR 83-26 Harrison, L.P. Report on ice fall from clear sky in Georgie October 26, 1939 [1960, 3]p. plos photographoj MP 1017 Harrison, W.D. Chemistry of intersivial water from subsea permofront, Pruthoe Bay, Alaska [1978, p.92-99] MP 1085 Harrison, W.L. Skallow snow performance of wheeled vehicles [1976, p.599- 614] Proceedings of the International Society for Terrain-Vehicle Systems Workshop on Scow Tracton Mechanics, Alta, Utak, Jan. 29-Feb. 2, 1979 [1981, 71p.] SR 81-16 Snow rocasseements in relation to vehicle performance [1981, p.13-24] MP 1475 Frederion methods [1981, p.39-44] MP 1475 Field investigations [1981, p.47-48] MP 1475 Shallow snow model for predicting vehicle performance (1981, 21p.) Measurement of snow surfaces and tire performance (1981, 21p.) Socopack, profile analysis using extracted thin sections [1982, 15p.] SR 82-11 Winter tire tests 1980-81 [1985, p.135-151] MP 2005 Hart, M.M. Heat transfer over a vertical melting plate [1977, 12p.] CR 77-32 Hartman, C.W. Environments of Alaska [1978, 95p.] MP 1206 Hastenan, C.W. Environments in Arctic marginal see 100cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs 2. A scence plan for a summer Marginal tee 200cs

Hatfield, R.W.	En
Calibration measurements of rock stress by vibrating wire stressmeter at high temperatures [1987, p.43-58] MP 2447	c Str
MP 2447 Haugen, R.K.	Eff
Arctic and Subarctic environmental analyses utilizing ERTS-	2
l imagery; bimonthly progress report, 23 June - 23 Aug 1972 [1972, 3p.] MP 991	Eff
Arctic and subarctic environmental analysis (1972, p.28-	Tu
301 MP 1119 Arctic and subarctic environmental analyses using ERTS-1	Ter
imagery. Progress report Dec. 72-June 73 [1973, 75p]	p
MP 1003 Arctic and subarctic environmental analyses utilizing ERTS-	Th
1 imagery [1973, 5p] MP 1611	Mo
Arctic and subarctic environmental analyses utilizing ERTS- 1 imagery. Bimonthly progress report, 23 Aug - 23 Oct.	Vit
1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-	_ t
1 imagery. Bimonthly progress report, 23 Oct 23 Dec.	Dy s
1973 [1973, 6p] MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-	Per
1 imagery. Final report June 1972-Feb. 1974 (1974) 128p ₁ MP 1047	p De
Selected climatic and soil thermal characteristics of the	C
Prudhoe Bay region (1975, p.3-12) MP 1054 Climatic and soil temperature observations at Atkasook on	Exp
the Meade River, Alaska, summer 1975 [1976, 25n.; SR 76-01	Ex
SR 76-01 Remote sensing of land use and water quality relationships—	lce
Wisconsin shore, Lake Michigan [1976, 47p] CR 76-30	Ice
Skylab imagery: Application to reservoir management in New	Me
England [1976, 51p] SR 76-07 Climatic and dendroclimatic indices in the discontinuous per-	Ice
mafrost zone of the Central Alaskan Uplands [1978, p.392-	F
35% MP 1099 Thaw penetration and permafrost conditions associated with	Per
the Livengood to Prudhoe Bay road, Alaska [1978, p 615-621] MP 1102	Оъ
Landsat data collection platform at Devil Canyon site, upper	Ice
Susitna Basin, Alaska—Performance and analysis of data (1979, 17 refs.) SR 79-02	1
Coastal-inland distributions of summer air temperature and	Lal c
precipitation in northern Alaska (1980, p 403-412) MP 1439	Vit 2
Hydrology and climatology of the Caribou-Poker Creeks Research Watershed, Alaska [1982, 34p] CR #2-26	He
Climate of remote areas in north-central Alaska: 1975-1979	e Vit
summary (1982, 110p.) CR 82-35 Relationships between estimated mean annual air and perma-	. 1
frost temperatures in North-Central Alaska (1983, p.462- 467) MP 1658	Ice Sta
Growth and flowering of cottongrass tussocks along a chimatic	c
transect in northcentral Alaska (1984, p.10-11) MP 1950	He
Constraints and approaches in high latitude natural resource	Eff
sampling and research (1984, p 41-46) MP 2013 Natural ground temperatures in upland bedrock terrain, in-	ic
terior Alaska (1988, p.56-60) MP 2360	Exe
Regional climatic trends in northern New England (1988, p.64-71) MP 2748	He
Thermal infrared survey of winter trails in the Ft Wainwright Training Area, Alaska [1990, 16p] SR 90-17	w
Häusler, F.U.	On P
4th report of working group on testing methods in ice [1984, p.1-41] MP 1886	On
Hawkes, I.	ก Vit
Photoelastic instrumentation—principles and chniques [1979, 153p] 2-1.79-13	1
Hawkins, L.M.E.	The
Railways; Section 2 Highways; Section 3 Airports (1981,	Ice
p.671-706; MP 1447 Hayes, R.	The
Application of HEC-2 for ice-covered waterways [1982,	Helli
p.24. '47. MP 1575 Haynes, D.	Ela
lce force measurement on the Yukon River bridge (1981, p.749-777) MP 1396	Heln
Some effects of friction on ice forces against vertical struc-	Lin
tures (1986, p 528-533) MP 2036 Haynes, F.D.	P 5
ice forces on model structures (1975, p 400-407)	Hem Wo
MP 863 Ice forces on simulated structures [1975, p 387-396]	- 11
MP 864	Henr Ge
Interpretation of the tensile strength of ice under triaxial stress [1976, p 375-3°7] MP 996	
Survey of design criteria for harbors and channels in cold regions—an annotated bibliography (1976, 32p)	Uso
CR 76-03	Ch
Interpretation of the tensile strength of ice under triaxial stresses [1976, 9p] CR 76-05	Henr
Effect of temperature on the strength of frozen silt (1977,	2
27p ₁ CR 77-03 Haines-Fairbanks pipeline, design, construction and opera-	De a
tion (1977, 20p) SR 77-04 Measuring the uniaxial compressive strength of ice (1977,	Cas
p.213-223 ₁ MP 1027	Herr
Canol Pipeline Project a historical review [1977, 32p] SR 77-34	Vai 4

Effect of temperature and strain rate on the strength of pol crystalline ice (1977, p.107-111) MP 11:	y- 27
Strength and deformation of frozen silt (1978, p.655-661) MP 11	
Effect of temperature on the strength of snow-ice c1978 25p.; CR 78.	27
Effect of water content on the compressibility of snow-wat mixtures 1979, 26p 1 CR 79- Turbulent heat transfer in large aspect channels [1979, 5p]	02
CR 79- Temperature effect on the uniaxial strength of ice (1979)),
p.667-681; MP 12: Thermal diffusivity of frozen soil [1980, 30p] SR 80-	
Movement study of the trans-Alaska pipeline at selected sit [1981, 32p] CR 81-	es
Vibrations caused by ship traffic on an ice-covered waterw [1981, 27p] CR 81-	05
Dynamic ice-structure interaction analysis for narrow vertic structures [1981, p.472-479] MP 14: Performance of a point source bubbler under thick ice [1982	56
p.111-124; MP 15: Determining the characteristic length of model ice shee	29 :ts
(1982, p.99-104) MP 15 Experimental determination of the buckling loads of floating ice sheets (1983, p.260-265) MP 16	ng
Experiments on ice ride-up and pile-up [1983, p 266-270] MP 16.	
Ice forces on model marine structures t1983, p.778-7873 MP 16	
Ice forces on model bridge piers [1983, 11p.] CR 83- Measurement of ice forces on structures [1983, p.139-155] MP 16-	
Ice force measurements on a bridge pier in the Ottauquech River, Vermont [1983, 6p] CR 83	cc
Performance of a thermosyphon with an inclined evaporat and vertical condenser (1984, p.64-68) MP 16	
and vertical condenser (1984, p.64-68) MP 16' Observations during BRIMFROST '83 (1984, 36p) SR 84- log forces on inclined model, bridge piece 1984, p. 1467	10
Ice forces on inclined model bridge piers [1984, p 1167 1173] MP 24 Laboratory tests and analysis of thermosyphons with inclin-	D7 ed
evaporator sections [1985, p.31-37] MP 18. Vibration analysis of the Yamachiche lightpier [1986, p.238	53 -
Heat transfer characteristics of thermosyphons with incline	ed 34
Vibration analysis of the Yamachiche Lightpier [1986, p.9 18] MP 22:	53
Ice forces on bridge piers (1986, p.83-101) MP 21: Static and dynamic ice loads on the Yamachiche Bend light; er, 1984-86 (1986, p.115-126) MP 23:	pi-
Heat transfer characteristics of a commercial thermosyphe with an inclined evaporator section [1987, p.79-84] MP 21	nn
Effect of oscillatory loads on the bearing capacity of floats ice covers [1987, p.219-224] MP 22:	ng
Exothermic cutting of frozen materials [1987, p.181-183] MP 220	64
Heat transfer performance of commercial thermosypho with inclined evaporator sections (1988, p 275-280) MP 23:	113
On the application of thermosyphons in cold regions (1988)	3.
p.281-286 ₁ MP 23; On the determination of the average Young's modulus for floating ice cover (1988, p.39-43 ₁ MP 23;	24
Vibration analysis of a DEW Line station [1988, p 1513] 1518] MP 23. Thermosyphons and foundation design in cold region	41
[1988, p 251-259] MP 24 Ice reinforced with Geogrid (1989, p 179-185)	43
Thermal stabilization of permafrost with thermosypho [1990 p.323-328] MP 25:	กร
Iclimann, H. Elastic properties of frazil ice from the Weddell Sea. Antar	·c-
tica (1989, p.208-217) MP 26: felms, J.W.	
Limnological investigations. Lake Koocanusa, Montan Part 3: Basic data, post-impoundment, 1972-1978 (1982 597p.) SR 82-	١.
Iemming, J.E. Workshop on Environmental Protection of Permafrost Te	7.
tain (1980, p.30-36) MP 13 Ienry, K. Gentextiles and a new way to use them (1988, p.214-222)	
Geotextiles and a new way to use them (1988, p.214-222) MP 25: Use of geotextiles to mitigate frost heave in soils (1988)	
p 1096-1101 ₁ MP 236 Chemical aspects of soil freezing (1988, 8p ₁ CR 88-1 lenry, K.S.	
Comparative field testing of buried utility locators (1984 25p) MP 19	77
Detection of buried utilities Review of available method and a comparative field study [1984, 36p] CR 84-3	ds
Case study of potential causes of frost heave [1990, 35p] SR 90-4 Ierron, M.M.)9
Vanadium and other elements in Greenland ice cores (1976 4p) CR 76-2	24

```
Atmospheric trace metals and sulfate in the Greenland Ice
Sheet (1977, p 915-920) MP 949
   Interhemispheric comparison of changes in the composition of atmospheric precipitation during the Late Cenozoic era (1977, p.617-631) MP 1079
   Vanadium and other elements in Greenland ice cores (1977,
p 98-102) MP 1092
    Seasonal variations of chemical constituents in annual layers
       easonal variations of chemical constituents in annual of Greenland deep ice deposits §1977, p.302-306, MP 1094
Heuer, C.E.
   Application of he [1979, 27p]
                                             4723 on the Trans-Alaska Pipeline
SR 79-26
Heusser, C.J.
   Geobotanical studies on the Taku Glacier anomaly (1954, p 224-239) MP 1215
Hewitt, A.D.
   Scavenging of infrared screener EA 5763 by falling snow [1987, p.13-20] MP 2292
  (1987, p.13-20) MP 2292
Comparison of EPA and USATHAMA detection capability estimators (1988, p.405-418) MP 2455
Influence of well casing materials on chemical species in ground water (1988, p.450-461) MP 2456
Increased transmission through brass obscurant clouds during snowfall (1988, p.489-496) MP 2605
Snow-smoke interaction (1988, p.497-506) MP 2607
Dynamic aerosol flow chamber (1988, 13p) SR 88-21
   Influence of well casing composition on trace metals in ground water (1989, 18p) SR 89-09
   Does snow have ion chromatographic properties (1989, p.165-171) MP 2755
  p.165-171) MP 2755
Comparisons of low concentration measurement capability estimates in trace analysis method detection limit and certified reporting limit (1989, 21p.) SR 89-20
Leaching of metal pollutants from four well casings used for ground-water monitoring (1989, 11p.) SR 89-32
Influence of ground water monitoring well casings on metals and organic compounds in well water (1989, 9p.)
MP 2717
   Influence of casing materials on trace-level chemicals in well water (1990, 11p.) MP 2720
Hibler, W.D., III
   Mesoscale deformation of sea ice from satellite imagery [1973, 2p.] MP 1120
   Classification and variation of sea ice ridging in the Arctic basin (1974, p.127-146) MP 1022
   Meso-scale strain measurements on the Beaufourt sea pack ice (AIDJEX 1971) (1974, p 119-138) MP 1035
Statistical variations in Arctic sea ice ridging and deformation rates (1975, p J1-J16) MP 850
   Measurement of sea ice drift far from shore using LANDSAT and aerial photographic imagery (1975, p 541-554, MP 849
   Height variation along sea ice pressure ridges and the probability of finding "holes" for vehicle crossings (1975, p. 191-199) MP 848
   Techniques for using LANDSAT imagery without references to study sea ice drift and deformation (1976, p 115-135) MP 1059
 20-yr oscillation in eastern North American temperature records (1976, p 484-486)

Thickness and roughness variations of arctic multiyear sea ice (1976, 25p)

CR 76-18

Techniques for studying sea ice drift and deformation at sites far from land using LANDSAT imagery (1976, p.595-609)

MP 866
   Misgivings on isostatic imbalance as a mechanism for sea ice cracking [1976, p 85-94] MP 1379
   Seasonal variations in apparent sea ice viscosity on the geo-
physical scale (1977, p.87-90) MP 900
Studies of the movement of coastal sea ice near Prudhoe Bay,
Alaska, USA (1977, p.533-546) MP 1066
   Examination of the viscous wind-driven circulation of the Arctic ice cover over a two year period (1977, p 95-133) MP 983
   Modeling pack ice as a viscous-plastic continuum: some preliminary results (1977, p 40-55) MP 1164
Finite element formulation of a sea ice drift model (1977,
  Model simulation of near shore ice drift, deformation and thickness (1978, p.33-44) MP 1010
Measurement of mesocale deformation of Beaufort sea ice (AIDJEX-1971) (1978, p.148-172) MP 1179
   Some results from a linear-viscous model of the Arctic ice
cover (1979, p 293-304) MP 1241
   cover (1979, p 293-304)

Dynamic thermodynamic sea ice model (1979, p 815-846)

MP 1247
   20-yr cycle in Greenland ice core records (1979, p 481-483)
MP 1245
   Documentation for a two-level dynamic thermodynamic sea
ice model (1980, 35p) SR 80-08
   Numerical modeling of sea ice in the seasonal sea ice zone [1980, p.299-356] MP 1296
   (1980, p.299-356)
Sea ice growth, drift, and decay (1980, p 141-209)
MP 1298
   Nonsteady ice drift in the Strait of Belle Isle (1980, p 177-186) MP 1364
   Modeling a variable thickness sea ice cover (1980, p 1943
1973) MP 1424
```

		_
MIZEX—a program for mesoscale air-ice-ocean interaction; experiments in Arctic marginal ice zones 1 Research	Hiral, A. Microcomputer-based image-processing system [1988]	Hoge, G. information systems planning study (1987, 48p.) SR 87-23
strategy (1981, 20p) SR 81-19 Preliminary results of ice modeling in the East Greenland area	p.249-252 ₁ MP 2385 Hirayama, K.	Hogue, G.B.
(1981, p 867-878) MP 1458	Investigation of ice forces on vertical structures [1974,	Ice forces on vertical piles (1972, p 104-114) MP 1024
On modeling mesoscale ice dynamics using a viscous plastic constitutive law [1981, p.1317-1329] MP 1526	153p MP 1041 Standardized testing methods for measuring mechanical prop-	lce forces on vertical piles (1977, 9p) CR 77-10 Holdsworth, G.
Modeling pressure ridge buildup on the geophysical scale	erties of ice (1981, p.245-254) MP 1556	Ice drilling technology (1984, 142p) SR 84-34
(1982, p.141-155) MP 1590	Determination of the flexural strength and elastic modulus of ice from in situ cantilever-beam tests [1982, p 37-47]	Holdsworth, G.W.
On modeling the Weddell Sea pack ice (1982, p 125-130) MP 1549	MP 1568	South Pole ice core drilling, 1981-1982 [1982, p 89-91] MP 1621
On modeling seasonal and interannual fluctuations of arctic sea ice (1982, p.1514-1523) MP 1579	Determining the characteristic length of model are sheets (1982, p.99-104) MP 1570	Holladay, J.S.
Numerical simulation of the Weddell Sea pack ice (1983,	Experimental determination of the buckling loads of floating	Airborne electromagnetic sounding of sea ice thickness and sub-ice bathymetry [1987, p 289-311] MP 2332
p.2873-2887 ₁ MP 1592	ice sheets (1983, p.260-265) MP 1626 Experiments on ice ride-up and pile-up (1983, p.266-270)	Airborne electromagnetic sounding of sea ice thickness and
On forecasting mesoscale ice dynamics and build-up [1983, p.110-115] MP 1625	MP 1627	Sub-ice bathymetry [1987, 40p] CR 87-23 Airborne sea ice thickness sounding [1989, p.1042-1052]
MIZEXa program for mesoscale air-ice-ocean interaction	Properties of urea-doped ice in the CRREL test basin [1983, 440] CR 83-08	MP 2023
experiments in Arctic marginal ice zones 2. A science plan for a summer Marginal Ice Zone Experiment in the	Ice forces on model bridge piers [1983, 11p.] CR 83-19	Sea ice thickness measurement using a down-sized airborne electromagnetic-sounding system [1989, p 394-424]
Fram Strait/Greenland Sea. 1984 (1983, 47p) SR 83-12	Hironaka, M.C.	MP 2693
Marginal ice zones: a description of air-ice-ocean interactive	Detecting underground objects/utilities (1987, p.36-43) MP 2281	Development of an airborne sea ice thickness measurement system and field test results [1989, 47p] CR 89-19
processes, models and planned experiments (1984, p.133- 1461 MP 1673	Hnatiuk, J.	Airborne measurement of sea ice thickness using electromag-
MIZEX-a program for mesoscale air-ice-ocean interaction	Destruction of ice islands with explosives (1978, p.753-765) MP 1018	netic induction during LIMEX 89 (1990, p 309-315) MP 2590
experiments in Arctic marginal ice zones 3. Modeling the marginal ice zone (1984, 99p) SR 84-07	Study of several pressure ridges and ice islands in the Canadi-	Airborne sea ice thickness sounding [1990, p.225-229] MP 2737
Large-scale ice/ocean model for the marginal ice zone	an Beaufort Sea (1978, p 519-532) MP 1187 Sea ice pressure ridges in the Beaufort Sea (1978, p 249-	Holt, B.
(1984, p.1-7) MP 1778 East Greenland Sea ice variability in large-scale model simu-	271 ₁ MP 1132	Science program for an imaging radar receiving station in
lations (1984, p 9-14) MP 1779	Multi year pressure ridges in the Canadian Beaufort Sea r1979, p.107-1261 MP 1229	Alaska (1983, 45p) MP 1884 Holt, E.T.
On the role of ice interaction in marginal ice zone dynamics [1984, p.23-29] MP 1781	[1979, p.107-126] MP 1229 Multi-year pressure ridges in the Canadian Beaufort Sea	Surface roughness of Ross Sea pack ice (1983, p 123-124)
Mechanism for floe clustering in the marginal ice zone	(1981, p.125-145) MP 1514	MP 1764 Sea ice data buoys in the Weddell Sea [1984, 18p]
(1984, p.73-76) MP 1785	Ho, S.C. Effect of seasonal soil conditions on the reliability of the M15	CR 84-11
Ocean circulation its effect on seasonal sea-ice simulations (1984, p.489-492) MP 1700	land mine [1984, 35p] SR 84-18	Hooke, R.L. Mechanical properties of polycrystalline ice: an assessment of
Role of sea ice dynamics in modeling CO2 increases [1984,	Hobbie, J.E. Arctic limnology. a review (1973, p.127-168)	current knowledge and priorities for research (1979, 16p)
p 238-253 ₁ MP 1749 Model simulation of 20 years of northern hemisphere sea-ice	MP 1007	MP 1267 Mechanical properties of polycrystalline ice: an assessment of
fluctuations (1984, p.170-176) MP 1767	Environmental analyses in the Kootenai River region, Montana (1976, 53p) SR 76-13	current knowledge and priorities for research (1980, p.263-
lce dynamics [1984, 52p] M 84-03 MIZEX 83 mesoscale sea see dynamics initial analysis	Hoch, D.	275 ₁ MP 1328 Hopkins, D.M.
(1984, p 19-28) MP 1811	Drainage network analysis of a subarctic watershed. Caribou- Poker Creeks research watershed, interior Alaska [1979,	Buried valleys as a possible determinant of the distribution of
On the rheology of a broken are field due to floe collision [1984, p 29-34] MP 1812	9p) SR 79·19	deeply buned permafrost on the continental shelf of the Beaufort Sea (1979, p 135-141) MP 1288
MIZEX 84 mesoscale sea ice dynamics, post operations re-	Drainage network analysis of a subarctic watershed (1979, p.349-359) MP 1274	Subsea permafrost distribution on the Alaskan shelf [1984,
port (1984, p 66-69) MP 1257 Modeling of Arctic sea ice characteristics relevant to naval	Hodek, R.J.	p.75-82; MP 1852 Hopkins, M.A.
operations (1984, p 67-91) MP 1994	Ice and navigation related sedimentation [1978, p 393-403] MP 1133	Constitutive relations for a planar, simple shear flow of rough
Numerical modeling of sea ice dynamics and ice thickness characteristics. A final report [1985, 50p]	Hodge, S.M.	disks [1985, 17p] CR 85-20 On modeling the energetics of the ridging process [1989,
CR 85-05	Snow and ice (1975, p 435-441, 475-487) MP 844	p 175-178 ₃ MP 2483
Numerical simulation of Northern Hemisphere sea ice variability, 1951-1980 (1985, p 4847-4865) MP 1882	Hodgson, T.P. Static and dynamic ice loads on the Yamachiche Bend lightpi-	Horiguchi, K. Role of heat and water transport in frost heaving of fine-
Modeling sea-ice dynamics (1985, p 549-579) MP 2001	er, 1984-86 (1986, p.115-126) MP 2389	grained porous media under negligible overburden pressure
Role of plastic ice interaction in marginal ice zone dynamics [1985, p.11,899-11,909] MP 1544	Hoekstra, P. In-situ measurements on the conductivity and surface imped-	(1984, p 93-102) MP 1842 Role of phase equilibrium in frost heave of fine-grained soil
On estimating ice stress from MIZEX 83 ice deformation and	ance of sea-ice at VLF frequencies [1971, 19p plus dia-	under negligible overburden pressure (1985, p 30-68) MP 1896
current measurements (1986, p 17-19) MP 2220	grams; MP 1071 Electrical resistivity profile of permafrost (1974, p 28-34)	Horn, D.A.
Large-scale ice-ocean modeling [1986, p 165-184] MP 2142	MP 1045	MIZEX: a program for mesoscale air-ice-ocean interaction experiments in Arctic marginal ice zones 5 MIZEX 84
Ice dynamics (1986, p 577-640) MP 2211	Electrical ground impedance measurements in Alaskan per- mafrost regions (1975, 60p.) MP 1049	summer experiment PI preliminary reports [1984, 176p]
Variability of Arctic sea ice drafts (1986, p 237-256) MP 2198	Geophysical methods for hydrological investigations in per-	Houssais, M.N.
Mes scale sea ice deformation in the East Greenland margin-	mafrost regions (1976, p.75-90) MP 932 Rock, frozen soil and ice breakage by high-frequency electro-	Coupled ice-mixed layer model for the Greenland Sea (1986,
a ce zone (1987, p.7060-7070) MP 2241 Rr = of floe collisions in sea ice theology (1987, p.7085)	magnetic radiation. A review (1976, 17p) CR 76-36	p 225-260 ₁ MP 2143 Houston, B.J.
7096 ₃ MP 2242	Selected examples of radiohm resistivity surveys for geotechnical exploration (1977, 16p) SR 77-01	Regulated set concrete for cold weather construction (1980,
Diagnostic ice-ocean model {1987, p.987-1015} MP 2238	Workshop on Permafrost Geophysics, Golden, Colorado, 23-	p 291-314 ₁ MP 1359 Cold weather construction materials, Part 2-Regulated-set
Coupled air-ice-ocean models [1987, p 131-137]	24 October 1984 (1985, 113p) SR 85-95 Hoff, G.C.	cement for cold weather concreting, field validation of
MP 2412 Evaluation of an operational ice forecasting model during	Cold weather construction materials, Part 2-Regulated-set	laboratory tests (1981, 33p) MP 1466 Houthoofd, J M.
summer (1988, p 159-174) MP 2347	cement for cold weather concreting, field validation of laboratory tests (1981, 33p) MP 1466	Effect of freezing on the level of contaminants in uncontrolled
On modeling the energetics of the ridging process [1989, p 175-178] MP 2483	Hogan, A.W.	hazardous waste sites Part 1. Literature review and con- cepts (1985, p 122-129) MP 2028
Effect of ice pressure on marginal ice zone dynamics (1989,	Meteorological variation of atmospheric optical properties in an antarctic storm (1986, p 1155-1165) MP 2099	Howdyshell, P.
p 514-521; MP 2522 Cavitating fluid sea ice model (1990, p 239-242)	Aerosol exchange in the remote troposphere (1986, p 197-	Seismic and acoustic wave propagation working group report [1987, p 253-255] MP 2419
MP 2738		Howe, J.B.
On modeling the baroclinic adjustment of the Arctic Ocean [1990, p 247-250] MP 2739	MP 2397	lce detector measurements compared to meteorological parameters in natural icing conditions (1987, p. 31-37)
Hicks, J.R.	Obscuration and background dynamics in and over snow [1987, p.181-185] MP 2417	MP 2277
Propane dispenser for cold fog dissipation system (1973, 38p 1 MP 1033	Increased transmission through brass obscurant clouds during	Howe, K.E. Hydrology and climatology of the Caribou-Poker Creeks Re-
Compressed air seeding of supercooled fog (1976, 9p)	snowfall (1988, p 489-496) MP 2605 Snow-smoke interaction (1988, p.497-506) MP 2607	search Watershed, Alaska (1982, 34p) CR 82-26
SR 76-09 Use of compressed air for supercooled fog dispersal (1976.	Snow-smoke interaction (1988, p.497-506) MP 2607 Proceedings (1989, 136p) SR 89-07	Interaction of gravel fills, surface drainage, and culverts with permafrost terrain (1984, 35p) MP 2215
p 1226-1231 ₁ MP 1614	Application of aerosol physics to snow research (1989.	Howells, D.H.
Laboratory studies of compressed air seeding of supercooled fog (1977, 19p) SR 77-12	p 201-207; MP 2756 Chemical migration in snowpack (1989, p 282-286)	Let's consider land treatment, not land disposal (1976, p 60- 62) MP 869
Hinchey, M.J.	MP 2757	Hromadka, T.V., II
Wave-induced bergy bit motion near a floating oil production platform (1990, p 205-215) MP 2580	Antarctic ice sheet brightness temperature variations [1990, p 217-223] MP 2736	
Hinz, C.	Hogan, G.	167p ; SR 77-38
Correlation of Freundlich Kd and n retention parameters with	Studies of high-speed rotor using under natural conditions [1983, p.117-123] MP 1635	One-dimensional frost heave model based upon simultaneous heat and water flux [1980, p 253-262] MP 1333
soils and elements (1989, p 370-379) MP 2570	(1.22) h 11. 182)	and the second of the second o

Hromadka, T.V., II (cont.) Some approaches to modeling phase change in freezing soils	Method for coincidentally determining soil hydraulic conduc- tivity and moisture retention characteristics (1981, 110.)	Land treatment of wastewater—case studies of existing dis- posal systems at Quincy, Washington and Manteca, Cali-
(1981, p.137-145) MP 1437 Results from a mathematical model of frost heave (1981, p.2-	SR 81-02 Laboratory and field use of soil tensiometers above and below	fornia (1976, 36p) Reclamation of wastewater by application on land (1976,
61 MP 1483 Probabilistic-deterministic analysis of one-dimensional ace	0 deg C (1981, 17p) SR 81-07 Simulating frost action by using an instrumented soil column	15p ₁ MP 896 Wastewater renovation by a prototype slow infiltration land
segregation in a freezing soil column (1981, p.127-140) MP 1534	(1981, p 34-42) MP 1485 Partial verification of a thaw settlement model (1985, p 18-	treatment system (1976, 44p.) CR 76-19 Impact of urban wastewater reuse in cold regions on land
Sensitivity of a frost heave model to the method of numerical simulation [1982, p.1-10] MP 1567	25 ₁ MP 1924 Hydraulic properties of selected soils [1985, p.26-35 ₁	treatment systems (1976, 32p) MP 2452 Urban waste as a source of heavy metals in land treatment
Field tests of a frost-heave model [1983, p 409-414] MP 1657	MP 1925 Ingersoll, J.W.	(1976, p 417-432) MP 977 Delineation and engineering characteristics of permafrost
Comparison of two-dimensional domain and boundary inte- gral geothermal models with embankment freeze-thaw field	Investigation of transient processes in an advancing zone of freezing [1983, p.821-825] MP 1663	beneath the Beaufort Sea [1977, p.385-395] MP 1074
data (1983, p.509-513) MP 1659 Two-dimensional model of coupled heat and moisture trans-	International Biological Programme. Tundra Biome	Preliminary evaluation of 88 years rapid infiltration of raw municipal sewage at Calumet, Michigan (1977, p 489- 510) MP 976
port in frost heaving soils (1984, p.91-98) MP 1678	Proceedings 1972 Tundra Biome symposium (1972, 211p) MP 1374	Wastewater reuse at Livermore, California (1977, p.511-
Simple model of ice segregation using an analytic function to model heat and soil-water flow [1984, p 99-104] MP 2104	International Conference on Offshore Mechanics and Arctic Engineering, 7th, Houston, TX, Feb. 7-12, 1988	531) MP 979 Evaluation of existing systems for land treatment of wastewa-
Two-dimensional model of coupled heat and moisture trans-	Proceedings, Vol.4 (1988, 348p) MP 2317 International Conference on Offshore Mechanics and Arctic	ter at Manteca, California, and Quincy, Washington [1977, 34p] CR 77-24
port in frost-heaving soils [1984, p 336-343] MP 1765	Engineering, 8th, The Hague, Netherlands, Mar. 19-23, 1989	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea [1977, p.432-440] MP 1077
Model of 2-dimensional freezing front movement using the complex variable BE method (1985, 9p.) MP 2077	Proceedings of the eighth International Conference on Off- shore Mechanics and Arctic Engineering, 1989. Volume	Wastewater treatment alternative needed (1977, p.82-87) MP 968
Nodal domain integration model of two-dimensional heat and soil-water flow coupled by soil-water phase change [1987,	4 (1989, 476p.) MP 2481 International Conference on Offshore Mechanics and Arctic	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea [1977, p.518-521] MP 1201
124p) SR 87-09 Tracking two-dimensional freezing front movement using the	Engineering, 9th, Houston, TX, Feb. 18-23, 1990 Proceedings Vol.4 (1990, 339p.) MP 2584	Distribution and properties of road dust and its potential im- pact on tundra along the northern portion of the Yukon
complex variable boundary element method [1987, 58p] SR 87-08	International Conference on Snow Engineering, 1st, Santa Barbara, CA, July 10-15, 1988	River-Prudhoe Bay Haul Road Chemical composition of dust and vegetation [1978, p.110-111] MP 1116
Histo, S.V. Inlet current measured with Seasat-1 synthetic aperture radar	First International Conference on Snow Engineering, Santa Barbara, California, July 1988; Proceedings (1989, 573p)	Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska [1978, p.92-98] MP 1385
[1980, p 35-37] MP 1443 Inlet current measured with Seasat-1 synthetic aperture radar	SR 89-06 International Offshore Mechanics and Arctic Engineering	Soil lysimeters for validating models of wastewater renovation by land application [1978, 11p.) SR 78-12
(1980, p 35-37) MP 1481 Huber, N.P.	Symposium, 2nd, Houston, Texas, Jan. 30-Feb. 3, 1983	Evaluation of N models for prediction of No3-N in percolate water in land treatment (1978, p.163-169) MP 1148
Dynamic friction of bobsled runners on ice (1985, 26p) MP 2082	International Offshore Mechanics and Arctic Engineering	Nitrogen behavior in land treatment of wastewater: a simpli-
Friction of solids on ice [1986, 4p] MP 2179 Preliminary study of friction between ice and sled runners	Symposium, 3rd, New Orleans, Louisiana, Feb. 12-17, 1984 Proceedings (1984, 3 vols) MP 1675	Overview of existing land treatment systems (1978, p.193-
(1987, p 297-301) MP 2388 Dynamic friction of a metal runner on ice I Model sled test	International Offshore Mechanics and Arctic Engineering Symposium, 4th, Dallas, Texas, Feb. 17-21, 1985	200; MP 1150 Simulation of the movement of conservative chemicals in soil
[1989, 17p] CR 89-14	Proceedings (1985, 2 vols) MP 2105 International Offshore Mechanics and Arctic Engineering	solution [1978, p.371-380] MP 1156 Effect of waste water reuse in cold regions on land treatment
Thermal analysis of a shallow utilidor [1986, 10p.] MP 2021	Symposium, 5th, Tokyo, Apr. 13-18, 1986 Proceedings (1986, 4 vols) MP 2031	systems (1978, p.361-368) MP 1144 Geochemistry of subsea permafrost at Prudhoe Bay, Alaska
Humiston, N.H.	International Offshore Mechanics and Arctic Engineering Symposium, 6th, Houston, Texas, Mar. 1-6, 1987	(1978, 70p.) SR 78-14 Construction and performance of platinum probes for meas-
Catalog of Corps of Engineers structure inventories suitable for the acid precipitation-structure material study (1985,	Proceedings [1987, 4 vols.] MP 2189 International Symposium and Exhibit on Offshore	urement of redox potential [1978, 8p.] SR 78-27 Computer file for existing land application of wastewater sys-
40p) SR 85-01 Humphreys, D.H.	Mechanics and Arctic Engineering, 6th, Houston, TX, Mar. 1-6, 1987	tems a user's guide (1978, 24p.) SR 78-22 Evaluation of nitrification inhibitors in cold regions land
Ice resistance tests on two models of the WTGB icebreaker (1984, p.627-638) MP 1716	Advances in ice mechanics—1987 (1987, 49p) MP 2207	treatment of wastewater, Part 1. Nitrapyrin [1979, 25p] SR 79-18
Hansicker, S.E. Effect of freeze-thaw cycles on the permeability and macros-	International Symposium: Frozen Soil Impacts on	Field methods and preliminary results from subsea permafrost investigations in the Beaufort Sea, Alaska [1979, p 207-
tructure of soils (1990, p 145-155) MP 2678 Hunt, B.	Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990 Proceedings r1990, 318p 1 SR 90-01	213j MP 1591 Documentation of soil characteristics and climatology during
Perturbation solution of the flood problem. Discussion and author's reply (1988, p 346-349) MP 2536	International Symposium on Cold Regions Heat Transfer,	five years of wastewater application to CRREL test ceils [1979, 82p] SR 79-23
Hunter, J.A. Geophysics in the study of permafrost [1979, p 93-115]	Edmonton, Alta., June 4-6, 1987 Proceedings (1987, 270p) MP 2302	Selected design parameters of existing systems for land ap-
MP 1266	International Symposium on Cold Regions Heat Transfer, Sapporo, Japan, June 28-30, 1989	plication of liquid waste—a computer file (1979, p.65-88) MP 1415
Vanadium and other elements in Greenland ice cores (1976,	Proceedings (1989, 314p) MP 2636 International Symposium on the State of Knowledge in	Use of 15N to study nitrogen transformations in land treatment (1979, 32p) SR 79-31
4p.; CR 76-24 Vanadium and other elements in Greenland ice cores (1977, p.98-102) MP 1092	Land Treatment of Wastewater, Aug. 20-25, 1978, Hanover, New Hampshire	Improved enzyme kinetic model for nitrification in soils amended with ammonium. 1. Literature review (1980, 20m. CR 80.0)
Hutchins, D.R.	State of knowledge on land treatment of wastewater (1978, 2 vols) MP 1145	Disinfection of wastewater by microwaves (1980, 15p)
Comparative near-millimeter wave propagation properties of snow or rain [1983, p.115-129] MP 1690	International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, Aug. 30-31, 1982	SR 80-01 Simplified model for prediction of nitrogen behavior in land treatment of wastewater (1980, 49p) CR 80-12
Attenuation and backscatter for snow and sleet at 96, 140, and 225 GHz (1984, p 41-52) MP 1864	Ice drilling technology (1984, 142p) SR 84-34 Irish, R.	Dynamics of NH4 and NO3 in cropped soils irrigated with
Hutt, D.L. Snow mass concentration and precipitation rate (1988, p.89-	Extraction of topography from side-looking satellite systems —a case study with SPOT simulation data (1983, p.535-	wastewater [1980, 20p] SR 80-27 Effectiveness of land application for phosphorus remova
92 ₁ MP 2326 Model of smoke concentration reduction due to scavenging	550 ₁ MP 1695 Irwin, D.	from municipal waste water at Manteca, California (1980, p.616-621) MP 1444
by snow (1989, p 87-98) MP 2628 Hutt, M.	Corps of Engineers land treatment of wastewater research	Modeling nitrogen transport and transformations in soils: 1 Theoretical considerations (1981, p 233-241)
Mobility bibliography (1981, 313p) SR 81-29 Hutton, M.S.	program an annotated bibliography (1983, 82p.) SR 83-09	MP 1446 Modeling nitrogen transport and transformations in soils 2
Analysis of potential ice jam sites on the Connecticut River at Windsor, Vermont (1976, 31p) CR 76-31	Irwin, G.S. Analysis of vehicle tests and performance predictions [1981.	Validation (1981, p.303-312) MP 1441 Limnological investigations: Lake Koocanusa, Montana. Pt
Ingersoil, J. Development of a remote-reading tensiometer/transducer	p 51-67; MP 1477 Irwin, L.H.	Limnological investigations: Lake Koocanusa, Montana. Pt 5. Phosphorus chemistry of sediments (1981, 9p.) SR 81-15
system for use in subfreezing temperatures [1976, p.31-45] MP 897	Effect of freezing and thawing on resilient modulus of a granu- lar soil exhibiting nonlinear behavior (1981, p 19-26)	Soil microbiology (1981, p. 38-44) MP 1753 Evaluation of a compartmental model for prediction of ni-
Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978,	Isaacs, R.M.	trate leaching losses (1981, 24p) CR 81-23 Effect of soil temperature and pH on nitrification kinetics in
p.403-437) Documentation of soil characteristics and climatology during	Designing for frost heave conditions (1984, p 22-44) MP 1705	soils receiving a low level of ammonium enrichment [1981, 27p] SR 81-33
five years of wastewater application to CRREL test cells [1979, 82p] SR 79-23	Iskandar, A. Delineation and engineering characteristics of permafrost	Overview of models used in land treatment of wastewater [1982, 27p] SR 82-01
Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard	beneath the Beaufort Sea (1976, p. 391-408) MP 1377 Delineation and engineering characteristics of permafrost	Evaluation of a simple model for predicting phosphorus re moval by soils during land treatment of wastewater (1982,
grades of asphalt cement [1980, 55p.; CR 80-05 Frost heave in an instrumented soil column [1980, p 211-	beneath the Beaufort Sea (1976, p.53-60) MP 919 Delineation and engineering characteristics of permafrost	12p.; SR 82-14 User's index to CRREL land treatment computer programs
221 ₁ MP 1331 Infiltration characteristics of soils at Apple Valley, Minn,	beneath the Beaufort Sea (1977, p.234-237) MP 927 Iskandar, I.K.	and data files (1982, 65p) Optimization model for land treatment planning, design and
Clarence Cannon Dam, Mo, and Deer Creek Lake, Ohio, land treatment sites (1980, 410). SR 80-36	Wastewater reuse at Livermore. California (1976. p.511-531) MP 870	operation Part 1. Background and literature review (1983, 35p 1

Optimization model for land treatment planning, design and	Friction of solids on ice (1986, 4p 1 MP 2179	Use of 15N to study nitrogen transformations in land treat-
operation. Part 2. Case study (1983, 30p.) SR 83-07	Natural rotor icing on Mount Washington, New Hampshire	ment (1979, 32p) SR 79-31 Pilot scale study of overland flow land treatment in cold cli-
Corps of Engineers land treatment of wastewater research program: an annotated bibliography (1983, 82p)	(1986, 62p) CR 86-10 Dielectric properties of strained ice. 1: Effect of plastic	mates [1979, p.207-214] MP 1279
SR 83-09	straining (1987, p.143-147) MP 2356	Prototype overland flow test data: June 1977-May 1978
Mathematical simulation of nitrogen interactions in soils [1983, p.241-248] MP 2051	Dielectric properties of strained ice. 2: Effect of sample preparation method (1987, p.149-153) MP 2357	Wastewater treatment in cold regions by overland flow
Land treatment research and development program, synthesis	Preliminary study of friction between ice and sled runners	(1980, 14p ₁ CR 80-07
of research results [1983, 144p] CR 83-20 WASTEN, a model for nitrogen behaviour in soils irrigated	(1987, p 297-301) MP 2358 Self-shedding of accreted ice from high-speed rotors (1987,	Fate and effects of crude oil spilled on subarctic permafrost terrain in interior Alaska (1980, 128p) MP 1310
with liquid waste (1984, p 96-108) MP 1762	p 95-100 ₃ MP 2278	Removal of volatile trace organics from wastewater by over-
Impact of dredging on water quality at Kewaunce Harbor, Wisconsin (1984, 16p) CR 84-21	Parameters affecting the kinetic friction of ice [1987, p.552-561] MP 2258	Removal of organics by overland flow (1980, 9p.)
User's guide for the BIBSORT program for the IBM-PC per-	What makes thunderbolts zig and zag [1988, p 22-27]	MP 1362
sonal computer (1985, 61p) SR 85-04 Economics of ground freezing for management of uncon-	MP 2524 Thickness distribution of accreted ice grown on rotor blades	Rational design of overland flow systems [1980, p 114-121] MP 1400
trolled hazardous waste sites (1985, 15p) MP 2030	under laboratory conditions (1988, p.152-156)	Forage grass growth on overland flow systems (1980, p.347-354) MP 1402
Potential use of artificial ground freezing for contaminant immobilization (1985, 10p) MP 2029	MP 2523 Dynamic friction of a metal runner on ice. I. Model sled test	Fate and effects of crude oil spilled on subarctic permafros
Effect of freezing on the level of contaminants in uncontrolled	(1989, 17p) CR 89-14	terrain in interior Alaska [1980, 67p] CR 80-25
hazardous waste sites Part 1. Literature review and concepts (1985, p.122-129) MP 2028	Izquierdo, M. Humidity and temperature measurements obtained from an	Overland flow, removal of toxic volatile organics (1981, 16p) SR 81-01
Ion and moisture migration and frost heave in freezing Morin	unmanned aenal vehicle [1987, p 35-45] MP 2293	Toxic volatile organics removal by overland flow land treat
clay [1986, p.1014] MP 1970 Corps of Engineers Land Treatment Research and Develop-	Slant path extinction and visibility measurements from an unmanned aerial vehicle [1987, p 115-126] MP 2296	ment (1981, 14p) MP 1423 Winter air pollution at Fairbanks, Alaska (1981, p 512-528)
ment program (1986, p.17-18) MP 2149	Jackson, G.	MP 1395
Effect of freezing on the level of contaminants in uncontrolled hazardous waste sites. Part 1: literature review (1986,	Concurrent remote sensing of arctic sea ice from submarine and aircraft (1989, 20p) MP 2697	Seven-year performance of CRREL slow-rate land treatmen prototypes (1981, 25p.) SR 81-12
33p ₁ SR 86-19	Jackson, L.	Wastewater treatment by a prototype slow rate land treatmen
Retention and release of metals by soils—evaluation of sever- al models [1986, p.131-154] MP 2186	Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway [1984, 28p.] SR 84-05	system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow sys
Ground freezing controls hazardous waste [1987, p 455- 456] MP 2270	Jackson, T.J.	tems (1982, p 135-154) MP 1511
Experimental methods for decontaminating soils by freezing	Survey of methods for soil moisture determination [1979, 74p.] MP 1639	Development of a rational design procedure for overland flow systems [1982, 29p.] CR 82-0
(1988, 12p) MP 2513	74p. ₁ MP 1639 Jacobs, S.S.	Relationship between the ice and unfrozen water phases in
Prototype testing facilities for field evaluation of contaminant transport in freezing soils (1988, 29p) MP 2514	Structure of ice in the central part of the Ross Ice Shelf,	frozen soil as determined by pulsed nuclear magnetic reso nance and physical desorption data (1982, 8p.)
Modeling the transport of chromium (VI) in soil columns (1989, p 996-1004) MP 2670	Antarctica (1985, p 39-44) MP 2110 Jacobson, S.	CR 82-1
[1989, p 996-1004] MP 2670 Use of innovative freezing technique for in-situ treatment of	Preliminary investigations of the kinetics of nitrogen transfor-	Mobility of water in frozen soils [1982, c15p] MP 201:
contaminated soils (1989, p.489-498) MP 2515	mation and nitrosamine formation in land treatment of was- tewater (1979, 59p) SR 79-04	Removal of trace organics by overland flow [1982, p.176- 184; MP 244;
Correlation of Freundlich Kd and n retention parameters with soils and elements (1989, p 370-379) MP 2570	Jain, A.	MP 244. Method for measuring enriched levels of deuterium in soi
Effect of freeze-thaw cycles on the permeability and macrostructure of soils (1990, p 145-155) MP 2678	Inlet current measured with Seasat-1 synthetic aperture radar [1980, p.35-37] MP 1443	water (1982, 12p) SR 82-2
ISTVS Workshop on Measurement and Evaluation of Tire	Inlet current measured with seasat-1 synthetic aperture radar	Baseline water quality measurements at six Corps of Engineers reservoirs, Summer 1981 [1982, 55p] SR 82-3
Performance under Winter Conditions, Alta, Utah, Apr. 11- 14, 1983	(1980, p.35-37) MP 1481 Janoo, V.C.	Transport of water in frozen soil 1. Experimental determi
Proceedings of the ISTVS Workshop on Measurement and	Laboratory investigations of low temperature cracking sus-	nation of soil-water diffusivity under isothermal condition (1982, p 221-226) MP 162
Evaluation of Tire Performance under Winter Conditions, Alta, Utah, 11-14, April 1983 (1985, 177p)	ceptibility of asphalt concrete [1987, p.397-415] MP 2233	Assessment of the treatability of toxic organics by overland flow r1983, 47p 1 CR 83-0
SR 85-15	Use of low viscosity asphalts in cold regions (1989, p.70-80) MP 2462	Transport of water in frozen soil. 2. Effects of ice on the
Itagaki, K. Improved milhvolt-temperature conversion tables for copper	State of the art of pavement response monitoring systems for	transport of water under isothermal conditions (1983, p 15-26) MP 160
constantan thermocouples. 32F reference temperature	roads and airfields (1989, 401p) SR 89-23 Use of soft grade asphalts in airfields and highway pavements	Relationship between the ice and unfrozen water phases i
t 1976, 66p 1 SR 76-18 De-icing of radomes and lock walls using pneumatic devices	in cold regions (1990, 47p) SR 90-12	frozen soils as determined by pulsed nuclear resonance and physical desorption data (1983, p 37-46) MP 163.
(1977, p 467-478) MP 1064	Janosi, Z. Mahilis, marking group separt -1987, p. 272-274.	Soil-water diffusivity of unsaturated frozen soils at subzer-
Mass transfer along ice surfaces observed by a groove relaxa- tion technique (1977, p 34-37) MP 1091	Mobility working group report (1987, p 273-274) MP 2423	temperatures (1983, p.889-893) MP 166 Transport of water in frozen soil. 1. Experimental determination
Laboratory experiments on lock wall descing using pneumatic devices (1977, p 53-68) MP 974	Janowicz, R. lee regime reconnaissance, Yukon River, Yukon [1984,	nation of soil-water diffusivity under isothermal condition
Abnormal internal friction peaks in single-crystal ice (1977,	p 1059-1073 ₁ MP 2406	(1983, 8p) CR 83-2 Impact of dredging on water quality at Kewaunee Harbon
15p ₁ SR 77-23	Jellinek, H.H.G.	Wisconsin (1984, 16p) CR 84-2
Icing on ships and stationary structures under maritime condi- tions—a preliminary literature survey of Japanese sources	Ice removal from the walls of navigation locks [1976, p 1487- 1496] MP 888	Transport of water in frozen soil. 5, Method for measuring the vapor diffusivity when ice is absent (1984, p.172-179)
[1977, 22p] SR 77-27 Dielectric properties of dislocation-free ice [1978, p 207-	Ice releasing block-copolymer coatings [1978, p.544-551] MP 1141	MP 181
217 ₁ MP 1171	Jenkins, T.F.	Impact of slow-rate land treatment on groundwater quality toxic organics (1984, 36p) CR 84-3
Charged dislocation in ice 1 Existence and charge density measurement by X-ray topography (1978, 12p)	Continuous monitoring of total dissolved gases, a feasibility	Reverse phase HPLC method for analysis of TNT, RDX HMX and 2,4-DNT in munitions wastewater [1984, 95p.]
CR 79-25	study (1975, p.101-105) MP 851 Effect of sediment organic matter on migration of various	CR 84-2
Laboratory experiments on icing of rotating blades [1979, p 85-92] MP 1236	chemical constituents during disposal of dredged material 1976, 183p 3 MP 967	Potential use of artificial ground freezing for contaminar immobilization (1985, 10p.) MP 202
Fracture behavior of ice in Charpy impact testing (1980,	Wastewater renovation by a prototype slow infiltration land	Toxic organics removal kinetics in overland flow land treat
13p ₃ CR 80-13 Charged dislocation in ice 2 Contribution of dielectric	treatment system (1976, 44p.) CR 76-19 Fate and effects of crude oil spilled on permafrost terrain	ment (1985, p 707-718) MP 211 Suitability of polyvinyl chloride pipe for monitoring TNT
relaxation (1982, 15p) CR 82-07	First year progress report [1976, 18p.] SR 76-15	RDX, HMX and DNT in groundwater (1985, 27p) SR 85-1
Experimental investigation of potential icing of the space shuttle external tank [1982, 305p] CR 82-25	Composition of vapors evolved from military TNT as in- fluenced by temperature, solid composition, age and source	Comparison of extraction techniques and solvents for explo
Adhesion of ice to polymers and other surfaces (1983, p.241-	(1977, 25p) SR 77-16	sive residues in soil (1985, 33p) SR 85-2
252 ₁ MP 1580 Studies of high-speed rotor using under natural conditions	Wastewater treatment alternative needed (1977, p 82-87) MP 968	Reversed-phase high-performance liquid chromatographi determination of nitroorganics in munitions wastewate
[1983, p.117-123] MP 1635	Fate and effects of crude oil spilled on permafrost terrain.	(1986, p 170-175) MP 204
Implications of surface energy in ice adhesion (1983, p.41- 48) MP 1672	Second annual progress report, June 1976 to July 1977 (1977, 46p) SR 77-44	Interlaboratory evaluation of high-performance liquichromatographic determination of nitroorganics in mun
Self-shedding of accreted ice from high-speed rotors (1983).	Methodology for nitrogen isotope analysis at CRREL 1978.	tion plant wastewater [1986, p 176-182] MP 205
Possibility of anomalous relaxation due to the charged dislo-	57p. ₃ SR 78-08 Performance of overland flow land treatment in cold climates	Suitability of polyvinyl chloride well casings for monitorin munitions in ground water [1986, p 92-98] MP 217
cation process (1983, p 4261-4264) MP 1669	(1978, p 61-70) MP 1152	Removal of trace-level organics by slow-rate land treatmen
Effect of X-ray irradiation on internal friction and dielectric relaxation of ice (1983, p 4314-4317) MP 1670	Physical, chemical and biological effects of crude oil spills on black spruce forest, interior Alaska (1978, p 305-323)	Of Overland flow wastewater treatment at Easley, S.C.
Mechanical ice release processes 1. Self-shedding from	MP 1185	(1986, p 1078-1079) MP 230 Losses of explosives residues on disposable membrane filter
Icing rate on stationary structures under marine conditions	Fate of crude and refined oils in North Slope soils (1978, p 339-347) MP 1186	(1987, 25p) SR 87-0
[1984, 9p] CR 84-12	Five-year performance of CRREL land treatment test cells,	Comparison of extraction techniques for munitions residue
Polyethylene glycol as an ice control coating (1984, 11p) CR 84-28	water quality plant yields and nutrient uptake (1978, 24p) SR 78-26	Development of an analytical method for explosive residue
Ice accretion under natural and laboratory conditions [1985, p.225-228] %IP 2009	International and national developments in land treatment of wastewater (1979, 28p) MP 1420	in soil (1987, 51p.) CR 87-0 Comparison of methanol and tetraglyme as extraction so
Dynamic friction of bobsled runners on ice (1985, 26p)	Land application of wastewater effect on soil and plant potas-	vents for determination of volatile organics in soil [1987]

Jenkins, T.F. (cont.)	Acoustical and morphological properties of undeformed sea	Fate and effects of crude oil spilled on permafrost terrain.
Analytical method for determining tetrazane in water (1987, 34p.) SR 87-25	ice laboratory and field results (1990, p.67-75) MP 2730	Second annual progress report, June 1976 to July 1977 (1977, 46p ₁ SR 77-44
Evaluation of disposable membrane filter units for sorptive	Antarctic ice sheet brightness temperature variations [1990, p 217-223] MP 2736	1977 tundra fire in the Kokolik River area of Alaska [1978, p 54-58] MP 1125
losses and sample contamination [1988, p.45-52] MP 2328	Johannessen, O.	Biological restoration strategies in relation to nutrients at a
Development of analytical methods for military-unique com- pounds (1988, p 370-380) MP 2454	On estimating ice stress from MIZEX 83 ice deformation and current measurements (1986, p.17-19) MP 2220	subarctic site in Fairbanks, Alaska (1978, p.460-466) MP 1100
pounds [1988, p 370-380] MP 2454 Comparison of EPA and USATHAMA detection capability	Current measurements [1986, p.17-19] MP 2220 Johannessen, O.M.	1977 tundra fire at Kokolik River, Alaska [1978, 11p]
estimators [1988, p 405-418] MP 2455	MIZEX—a program for mesoscale air-ice-ocean interaction;	SR 78-10 Effects of winter military operations on cold regions terrain
Influence of well casing materials on chemical species in ground water [1988, p.450-461] MP 2456	experiments in Arctic marginal ice zones. 1 Research strategy [1981, 20p] SR 81-19	[1978, 34p] SR 78-17
Development of an analytical method for the determination	MIZEX—a program for mesoscale air-ice-ocean interaction	Physical, chemical and biological effects of crude oil spills on black spruce forest, interior Alaska [1978, p.305-323]
of explosive residues in soil Part II Additional develop- ment and ruggedness testing (1988, 46p.) CR 88-08	experiments in Arctic marginal ice zones. 2. A science plan for a summer Marginal Ice Zone Experiment in the	MP 1185
Analytical method for determining tetrazene in soil [1988, 22p.] SR 88-15	Fram Strait/Greenland Sea. 1984 (1983, 47p) SR 83-12	Fate and effects of crude oil spilled on subarctic permafrost terrain in interior Alaska (1980, 128p.) MP 1310
Improved RP-HPLC method for determining nitroaromatics	Marginal ice zones a description of air-ice-ocean interactive	LANDSAT digital analysis of the initial recovery of burned
and nitramines in water [1988, 36p] SR 88-23	processes, models and planned experiments (1984, p.133- 146) MP 1673	tundra at Kokolik River, Alaska (1980, p 263-272) MP 1391
Development of an analytical method for the determination of explosive residues in soil Part 3 Collaborative test re-	MIZEX a program for mesoscale air-ice-ocean interaction	Revegetation and restoration investigations [1980, p.129-
sults and final performance evaluation (1989, 89p.) CR 89-09	experiments in Arctic marginal ice zones. 5. MIZEX 84 summer experiment PI preliminary reports [1984, 176p.]	150 ₃ MP 1353 Fate and effects of crude oil spilled on subarctic permafrost
Comparisons of low concentration measurement capability	SR 84-29	terrain in interior Alaska (1980, 67p.) CR 80-29
estimates in trace analysis: method detection limit and certi- fied reporting limit [1989, 219] SR 89-20	Johansen, N.I. Sublimation and its control in the CRREL permafrost tunnel	Chena River Lakes Project revegetation study—three-year summary [1981, 59p] CR 81-18
Ion-pairing RP-HPLC method for determining tetrazene in	[1981, 12p] SR 81-08	Patterns of vegetation recovery after tundra fires in north-
water and soil (1989, p.159-179) MP 2593 Analytical methods for detecting military-unique compounds	Johnsen, S.J. Climatic oscillations depicted and predicted by isotope ana-	western Alaska, U.S.A. (1987, p.461-469) MP 2374 Management of northern gravel sites for successful reclama-
(1989, p 13-14) MP 2713	lyses of a Greenland ice core [1971, p.17-22] MP 998	tion: a review (1987, p.530-536) MP 2375
Influence of ground water monitoring well casings on metals and organic compounds in well water [1989, 9p]	Oxygen isotope profiles through the Antarctic and Greenland	Effects of all-terrain vehicle traffic on tundra terrain near Anaktuvuk Pass, Alaska (1988, 12p) SR 88-17
MP 2717	ice sheets (1972, p 429-434) MP 997	Use of off-road vehicles and mitigation of effects in Alaska
Evaluation of four well casing materials for monitoring select- ed trace level organics in ground water (1989, 29p 1	Stable isotope profile through the Ross Ice Shelf at Little America V, Antarctica [1977, p.322-325] MP 1095	permafrost environments. a review (1990, p 63-72) MP 2682
CR 89-18	20-yr cycle in Greenland ice core records (1979, p 481-483)	Johnson, P.
Liquid chromatographic method for determination of extract- able nitroaromatic and nitramine residues in soil [1989,	Johnson, A.J.	Proceedings of the Second International Symposium on Cold Regions Engineering (1977, 597p) MP 952
p 890-8991 MP 2586 Influence of casing materials on trace-level chemicals in well	Revegetation and selected terrain disturbances along the	Yukon River breakup 1976 (1977, p.592-596) MP 960
water [1990, 11p] MP 2720	trans-Alaska pipeline, 1975-1978 [1981, 115p] CR 81-12	Details behind a typical Alaskan pile foundation (1978, p 891-897) MP 1109
Salting-out solvent extraction for preconcentration of neutral	Johnson, A.W.	Johnson, P.L.
organic solutes from water [1990, p.1355-1356] MP 2743	Tundra disturbances and recovery following the 1949 exploratory drilling, Fish Creek, Northern Alaska (1978).	Vegetative research in arctic Alaska [1973, p.169-198] MP 1008
Jewell, W.	81p ₁ CR 78-28	Johnson, P.R.
Engineering assessment of aquaculture systems for wastewa- ter treatment an overview (1980, p 1-12) MP 1423	Reconnaissance observations of long-term natural vegetation recovery in the Cape Thompson region, Alaska, and addi-	Defensive works of subarctic snow (1977, 23p.)
Jezek, K.C.	tions to the checklist of flora (1985, 75p) CR 85-11	CR 77-06 Measuring unmetered steam use with a condensate pump
Measurements of radar wave speeds in polar glaciers using a down-hole radar target technique (1983, p.199-208)	Johnson, J.B. Surface integral method for determining ice loads on offshore	cycle counter (1977, p.434-442) MP 957
MP 2057 Recent changes in the dynamic condition of the Ross Ice	structures from in situ measurements 1983, p 124-128, MP 2056	Role of research in developing surface protection measures for the Arctic Slope of Alaska [1978, p 202-205]
Shelf, Antarctica (1984, p 409-416) MP 2058	Stress measurements in ice (1983, 31p) CR 83-23	MP 1068
Modified theory of bottom crevasses used as a means for measuring the buttressing effect of ice shelves on inland ice	Frost jacking forces on H and pipe piles embedded in Fair-	Role of research in developing surface protection measures for the Arctic Slope of Alaska (1978, p 202-205)
sheets [1984, p 1925-1931] MP 2059	Preferential detection of sound by persons buried under snow	MP 1519 Ground pressures exerted by underground explosions (1978,
Calculating borehole geometry from standard measurements of borehole inclinometry (1984, 18p) SR 84-15	avalanche debris as compared to persons on the overlying surface (1984, p 42-47) MP 1920	p 284-290 ₎ MP 1520
Ice flow leading to the deep core hole at Dye 3, Greenland	In-ice calibration tests for an elongated, uniaxial brass ice	Environmental atlas of Alaska (1978, 95p) MP 1204 lee forces on the Yukon River bridge—1978 breakup (1979,
[1984, p.185-190] MP 1824 Reconsideration of the mass balance of a portion of the Ross	stress sensor (1985, p.244-249) MP 1859 Frost heave forces on piling (1985, 2p.) MP 1732	40p) MP 1304
Ice Shelf, Antarctica (1984, p 381-384) MP 1919	Kadluk ice stress measurement program (1985, p 88-100)	Snow and ice roads in the Arctic [1979, p 1063-1071] MP 1223
Discrete reflections from thin layers of snow and ice (1984, p.323-331) MP 1871	MP 1899 Frost jacking forces on H and pipe piles embedded in Fair-	Ice thickness-tensile stress relationship for load-bearing ice
Radar measurements of borehole geometry on the Greenland and Antarctic ice sheets [1985, p 242-251] MP 1817	banks silt (1985, p 125-133) MP 1930	(1980, 11p) SR 80-09 Roof leaks in cold regions school at Chevak, Alaska (1980,
and Antarctic ice sheets [1985, p.242-251] MP 1817 Rheology of glacier ice [1985, p.1335-1337] MP 1844	Audibility within and outside deposited snow (1985, p.136- 142) MP 1960	12p ₁ CR 80-11
Geophysical survey of subglacial geology around the deep-	In-ice calibration tests for an elongate, uniaxial brass ice stress	Snow pads used for pipeline construction in Alaska, 1976- construction, use and breakup (1980, 28p) CR 80-17
drilling site at Dye 3, Greenland (1985, p.105-110) MP 1941	sensor (1985, p 506-510) MP 1966 Verification tests for a stiff inclusion stress sensor (1987,	Single and double reaction beam load cells for measuring ice
Laboratory studies of acoustic scattering from the underside of sea ice (1985, p.87-91) MP 1912	p 81-88 ₁ MP 2223	forces (1980, 17p) CR 80-25 Performance of a point source bubbler under thick ice (1982,
Acoustic waves incident on a seawater/sea ice interface	Field observations of thermal convection in a subarctic snow cover (1987, p 105-118) MP 2439	p.i11-124 ₁ MP 1529
(1985, 10p) SR 85-10 Effects of water and ice layers on the scattering properties of	Verification tests of the surface integral method for calculat-	Johnson, R. Cements for structural concrete in cold regions (1977, 13p)
diffuse reflectors (1986, p.259-269) MP 2664	ing structural ice loads (1988, p.449-456) MP 2353 Mukluk ice stress measurement program (1988, p.457-463)	SR 77-35
Acoustical reflection and scattering from the underside of laboratory grown sea ice measurements and predictions	MP 2354	Grouting of soils in cold environments a literature search [1977, 49p] SR 77-42
(1986, p 1486-1494) MP 2222	Ice stress measurements around offshore structures [1988, p 55-59] MP 2611	Grouting silt and sand at low temperatures—a laboratory
Folding in the Greenland ice sheet [1987, p 485-493] MP 2185	Techniques for gas gun studies of shock wave attenuation in	investigation (1979, 33p) CR 79-05 Grouting silt and sand at low temperatures (1979, p 937-
Remote sensing of ice and snow (review) (1987, p.51)	snow [1988, p 657-660] MP 2543 Frost heave forces on H and pipe foundation piles [1988,	950 ₃ MP 1078
MP 2429 Glaciological investigations using the synthetic aperture radar	p 1039-1044 ₁ MP 2367	Resins and non-portland cements for construction in the cold [1980, 19p] SR 80-35
imaging system (1987, p.11-19) MP 2342	Measurement of frost heave forces on H-piles and pipe piles (1988, 49p) CR 88-21	Johnson, T.C.
Alaska synthetic aperture radar (SAR) facility project (1987, p 593-596) MP 2408	Johnson, L.	Resilient modulus and Poisson's ratio for frozen and thawed sift and clay subgrade materials [1977, p 229-281]
Effects of water and ice layers on the scattering properties of	Landsat digital analysis of the initial recovery of the Kokolik River tundra fire area, Alaska [1979, 15p] MP 1638	MP 1724
diffuse reflectors (1987, p.5143-5147) MP 2301 Polar communications status and recommendations Re-	Recovery and active layer changes following a tundra fire in	Effect of freeze-thaw cycles on resilient properties of fine- grained soils (1978, 19p.) MP 1082
port of the Science Working Group (1987, 29p) MP 2322	northwestern Alaska (1983, p 543-547) MP 1660 Revegetation along pipeline rights of-way in Alaska (1984,	Influence of freezing and thawing on the resilient properties
Radioglaciology by V.V. Bogorodskit, et al. [1988, p.55-56]	p 254-264 ₁ MP 2113	of a silt soil beneath an asphalt pavement (1978, p 662- 668) MP 1106
MP 2338 Effect of stratigraphy on radar-altimetry data collected over	Johnson, L.A. Revegetation in arctic and subarctic North America—a litera-	Influence of freezing and thawing on the resilient properties of a silt soil beneath an asphalt concrete pavement (1978,
ice sheets (1988, p 60-63) MP 2458	ture review (1976, 32p.) CR 76-15	59p) CR 78-23
Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation [1988, p.77-82]	Fate and effects of crude oil spilled on permafrost terrain First year progress report [1976, 18p] SR 76-15	Design of airfield pavements for seasonal frost and permafrost conditions (1978, 18p.) MP 1189
MP 2460	Revegetation and erosion control observations along the	Projected thermal and load-associated distress in pavements
High frequency acoustical properties of saline ice (1989, p.9. 23) MP 2686	Trans Alaska Pipeline 1975 summer construction season [1977, 36p.] SR 77-08	incorporating different grades of asphalt cement (1978, p 403-437) MP 1209
	·	·

Resilient response of two frozen and thawed soils (1979, p 257-271, MP 1176	Kane, D. Permafrost (1986, p 99-106) MP 2156	Keribar, R. Computer simulation of bubbler-induced melting of ice covers
Effect of freeze-thaw cycles on resilient properties of fine-	Kane, D.L.	using experimental heat transfer results (1978, p.362-366)
grained soils [1979, p 247-276] MP 1226 Asphalt concrete for cold regions; a comparative laboratory	Seasonal regime and hydrological significance of stream ic- ings in central Alaska (1973, p 528-540) MP 1026	MP 1160 Kerr, A.D.
study and analysis of mixtures containing soft and hard	ings in central Alaska (1973, p 528-540) MP 1026 Kaplar, C.W.	Bearing capacity of floating ice plates subjected to static or
grades of asphalt cement (1980, 55p) CR 80-05 Mathematical model to correlate frost heave of pavements	PERMAFROST (PERENNIALLY FROZEN GLOUND) (1966, 77p) M I-A2	quasi-static loads [1976, p.229-268] MP 884 On the determination of horizontal forces a floating ice plate
with laboratory predictions (1980, 49p) CR 80-10	[1966, 77p] M I-A2 Effects of moisture and freeze-thaw on rigid thermal insula-	exerts on a structure (1978, p.123-134) MP 879
Embankment dams on permafrost in the USSR (1980, 59p) SR 80-41	tions, a laboratory investigation [1978, p.403-417] MP 1085	On the determination of horizontal forces a floating ice plate exerts on a structure (1978, 9p) CR 78-15
Results from a mathematical model of frost heave (1981, p.2-	Karalius, J.A.	Critical velocities of a floating ice plate subjected to in-plane
6 ₁ MP 1483	Effect of temperature on the strength of frozen silt (1977,	forces and a moving load (1979, 12p) CR 79-19 On the buckling force of floating ice plates (1981, 7p)
Effect of freezing and thawing on resilient modulus of a granu- lar soil exhibiting nonlinear behavior (1981, p.19-26)	27p ₁ CR 77-03 Karim, M.F.	CR 81-09
MP 1484	Frazil ice formation [1984, 44p] CR 84-18	Mechanics of ice cover breakthrough [1984, p.245-262] MP 1997
Revised procedure for pavement design under seasonal frost conditions (1983, 129p) SR 83-27	Kato, K. Determining the characteristic length of model ice sheets	Ice cover research-present state and future needs 1986,
Design implications of subsoil thawing [1984, p 45-103] MP 1706	[1982, p 99-104] MP 1570	p 384-399; MP 2004 Effect of oscillatory loads on the bearing capacity of floating
Evaluation of seasonal variation in resilient modulus of granu-	Experimental determination of the buckling loads of floating ice sheets [1983, p.260-265] MP 1626	ice covers (1987, p 219-224) MP 2216
lar soil affecting pavement performance (1985, c21p.) MP 2076	Experiments on ice ride-up and pile-up (1983, p 266-270)	On the determination of the average Young's modulus for a floating ice cover [1988, p.39-43] MP 2324
Resilient modulus of freeze-thaw affected granular soils for	lce forces on model bridge piers [1983, 11p.] CR 83-19	Kerr, R.
pavement design and evaluation. Part 1 Laboratory tests on soils from Winchendon, Massachusetts, test sections	Ice action on two cylindrical structures (1983, p.159-166)	Vanadium and other elements in Greenland ice cores [1976, 4p] CR 76-24
(1986, 70p) CR 86-04	MP 1643 Ice action on pairs of cylindrical and conical structures	Vanadium and other elements in Greenland ice cores (1977,
Frost action predictive techniques an overview of research results (1986, p.147-161) MP 2267	[1983, 35p] CR 83-25	p 98-102; MP 1092 Kestler, M.
Resilient modulus of freeze-thaw affected granular soils for	Ice force measurements on a bridge pier in the Ottauquechee River, Vermont (1983, 6p) CR 83-32	Comparison of insulated and noninsulated pavements (1989,
pavement design and evaluation. (1986, 138p) CR 86-13	Ice action on two cylindrical structures (1984, p.107-112)	p 367-378 ₃ MP 2471 Kettle, R.J.
Resilient modulus of freeze-thaw affected granular soils for	MP 1741 Some effects of friction on ice forces against vertical struc-	Soil freezing response, influence of test conditions (1985,
pavement design and evaluation. Part 2. Field validation tests at Winchendon, Massachusetts, test sections (1986,	tures (1986, p 528-533) MP 2036	p 49-58 ₁ MP 1990 Khalid, R.A.
62p ₁ CR 86-12	Katopodes, N.D. On zero-inertia and kinematic waves [1982, p.1381-1387]	Water movement in a land treatment system of wastewater by
Frost action predictive techniques for roads and airfields. A comprehensive survey of research findings [1986, 45p]	MP 2053	overland flow [1979, p.185-206] MP 1285 Khettry, R.
CR 86-18	Keefauver, E. Computer file for existing land application of wastewater sys-	Wetlands for wastewater treatment in cold climates (1984,
Resilient modulus of freeze-thaw effected granular soils for pavement design and evaluation. Part 3 Laboratory tests	tems. a user's guide (1978, 24p) SR 78-22	9p + figs 1 MP 1945
on soils from Albany County Airport [1987, 36p] CR 87-02	Keliher, T.E. Antarctic sea ice dynamics and its possible climatic effects	King, G.G. Growth and flowering of cottongrass tussocks along a climatic
Jones, K.P.	[1976, p 53-76] MP 1378	transect in northcentral Alaska [1984, p 10-11] MP 1950
Density of natural ice accretions related to nondimensional icing parameters (1990, p 477-496) MP 2705	Comparison between derived internal dielectric properties and radio-echo sounding records of the ice sheet at Cape	Intensity of snowfall at the SNOW experiments (1986,
icing parameters (1990, p 477-496) MP 2705 Jones, S.J.	Folger, Antarctica (1978, 12p) CR 78-04	p.205-217 ₁ MP 2287
Mechanical properties of polycrystalline ice an assessment of	Ice sheet internal radio-echo reflections and associated physi- cal property changes with depth [1979, p 5675-5680]	Kirchlechner, P. Study of water drainage from columns of snow [1979, 19p]
current knowledge and priorities for research (1979, 16p.) MP 1207	MP 1319	CR 79-01
Jordan, R.	Keller, D. Secondary stress within the structural frame of DYE-3 1978-	Kirschfield, R.A. Oceanic heat flux in the Fram Strait measured by a drifting
SNOW-TWO data report. Volume 2: System performance [1984, 417p] SR 84-20	1983 (1984, 44p) SR 84-26	buoy (1989, p 995-998) MP 2531
Thermal measurements in snow [1986, p.183-193] MP 2660	Response of pavement to freeze-thaw cycles: Lebanon, New Hampshire, Regional Airport (1989, 31p) SR 89-02	Kitagawa, H. Comparative model tests in ice of a Canadian Coast Guard R-
Extinction coefficient for a distribution of ice fog particles	Keller, D.B.	class icebreaker (1989, p 1/1-1/18) MP 2751
[1987, p.527-539] MP 2286	Five-year performance of CRREL land treatment test cells, water quality plant yields and nutrient uptake (1978,	Comparative model tests in ice of a Canadian Coast Guard R- class icebreaker (1990, p 31-52) MP 2762
Snow as a thermal background, preliminary results from the 1987 field test (1989, p.5-24) MP 2624	24p; SR 78-26 Baseline water quality measurements at six Corps of Engi-	Kittaka, S.
Joubert, R.H.	neers reservoirs, Summer 1981 (1982, 55p) SR 82-30	lce releasing block-copolymer coatings [1978, p 544-551] MP 1141
Full-depth pavement considerations in seasonal frost areas [1979, 24p] MP 1188	Kelley, J.J. Carbon dioxide dynamics on the Arctic tundra (1971, p.48-	Kivekäs, L.
Pothole primer-a public administrator's guide to under-	52 ₁ MP 903	Brittleness of reinforced concrete structures under arctic con- ditions (1985, 28 + 14p) MP 1969
standing and managing the pothole problem (1981, 24p) SR 81-21	CO2 exchange in the Alaskan Arctic tundra meteorological assessment by the aerodynamic method [1972, p 36-39]	Brittleness of reinforced concrete structures under arctic con-
Juma, N.G.	MP 1375	Brittleness of reinforced concrete structures under arctic con-
Soil microbiology [1981, p.38-44] MP 1753 Kachadoorian, R.	Case for comparison and standardization of carbon dioxide reference gases (1973, p 163-181) MP 964	ditions (1986, 20p.) CR 86-02
Design considerations for airfields in NPRA [1978, p 441-	Micrometeorological investigations near the tundra surface	Kleinerman, M.M. Proceedings (1989, 475p) SR 89-39
458 ₁ MP 1086 Engineering geology studies on the National Petroleum Re-	(1973, p.109-126) MP 1006 Kelsh, D.J.	Klemas, V.
serve in Alaska (1988, p.899-922) MP 2519	Measurement and interpretation of electrical freezing poten-	Use of remote sensing for the U.S. Army Corps of Engineers dredging program (1985, p. 1141-1150) MP 1890
Kachi, H. Ice releasing block-copolymer coatings [1978, p 544-551]	tial of soils (1988, 9p) CR 88-10 Kempema, E.W.	Comparison of SPOT simulator data with Landsat MSS imagery for delineating water masses in Delaware Bay, Broad-
MP 1141	Seafloor temperature and conductivity data from coastal wa-	kill River, and adjacent wetlands [1985, p.1123-1129]
Kaderabek, T.J. Increasing the effectiveness of soil compaction at below-freez-	ters of the U.S. Beaufort Sea (1989, 19p) CR 89-01 Kendrick, G.	MP 1909 Potential of remote sensing in the Corps of Engineers dredg-
ing temperatures (1978, 58p) SR 78-25	Comparison of thermal observations of Mount St. Helens	ing program (1985, 42p) SR 85-20
Kalafut, J. Unconfined compression tests on snow a comparative study	before and during the first week of the initial 1980 cruption (1980, p.1526-1527) MP 1482	Klouds, G.A. Interhemispheric comparison of changes in the composition
(1977, 27p) SR 77-20	Kennedy, F.E.	of atmospheric precipitation during the Late Cenozoic era
Brazil tensile strength tests on sea ice a data report (1977, 39p.) SR 77-24	Thermal response of downhill skis (1989, 40p) CR 89-23	(1977, p 617-631) MP 1079 Seasonal variations of chemical constituents in annual layers
CRREL Hopkinson bar apparatus (1987, 29p)	Kennedy, F.E., Jr.	of Greenland deep ice deposits (1977, p 302-306)
SR 87-24 Hopkinson pressure bar apparatus: a tool for rapid assessment	Dynamic friction of bobsled runners on ice [1985, 26p] MP 2082	Knapp, L.K.
of material properties at high strain rates (1988, p.885)	Friction of solids on ice (1986, 4p) MP 2179	Losses of explosives residues on disposable membrane filters
903) MP 2517 Influence of low temperature thermal cycling on tensile	Kennedy, J.F. Temperature and flow conditions during the formation of	Evaluation of disposable membrane filter units for sorptive
strength of fiber composites (1988, p.141-147)	river ice (1970, 12p) MP 1723	losses and sample contamination (1988, p 45-52) MP 2328
MP 2435 Temperature and structure dependence of the flexural	River-ice problems a state-of-the-art survey and assessment of research needs (1974, p 1-15) MP 1002	Knuth, K.V.
strength and modulus of freshwater model ice (1988,	Laboratory investigation of the mechanics and hydraulies of river ice jams (1976, 97p) MP 1060	Data acquisition first the FERF then the world (1989, p 136-138) MP 2567
43p CR 88-06 Performance of laminated composites in cold (1988, p.269-	Laboratory investigation of the mechanics and hydraulics of	Koch, P.
281 ₁ MP 2433	river ice jams (1977, 45p) CR 77-09 Frazil ice formation (1984, 44p) CR 84-18	Analysis of roof snow load case studies, uniform loads (1983, 29p)
Response of advanced composite space materials to thermal cycling (1988, p 506-517) MP 2478	Kent, T.D.	Kocl, B.R.
Experiments on the cutting process in ice (1989, 36p) CR 89-05	ice regime reconnaissance, Yukon River, Yukon 1984, p 1059-1073 ₁ MP 2406	South Pole ice core drilling, 1981-1982 [1982, p.89-91] MP 1621
CK 65.03	h 1053-1016) 1316 2400	(411 102)

Koh, G. Near-infrared reflectance of snow-covered substrates [1981,	Locating wet cellular plastic insulation in recently constructed roofs [1983, p.168-173] MP 1729	Dynamics of near-shore ice [1977, p 503-510] MP 1200
17p. ₁ CR 81-21	Estimating transient heat flows and measuring surface tem-	leeberg thickness and crack detection (1978, p.131-145) MP 1128
Snow crystal habit (1982, p.181-216) MP 1561 Visible propagation in falling snow as a function of mass con-	Can wet roof insulation be dried out [1983, p 626-639]	Destruction of ice islands with explosives (1978, p.753-765)
centration and crystal type [1983, p.103-111] MP 1757	MP 1509 Comparison of aerial to on-the-roof infrared moisture surveys	MP 1018 Iceberg thickness profiling [1978, p.766-774] MP 1019
Snow characterization at SNOW-ONE-B (1983, p 155-	[1983, p.95-105] MP 1709	Axial double point-load tests on snow and ice [1978, 11p.] CR 78-01
195 ₁ MP 1847 Performance of microprocessor-controlled snow crystal repli-	Deteriorated concrete panels on buildings at Sondrestrom, Greenland [1984, 11p] SR 84-12	Radar anisotropy of sea ice due to preferred azimuthal orien-
cator [1984, p.107-111] MP 1866 Approach to snow propagation modeling [1984, p.247-259]	Secondary stress within the structural frame of DYE-3: 1978- 1983 [1984, 44p] SR 84-26	tation of the horizontal c-axes of ice crystals 1978, p.171- 2011 MP 1111
MP 1869	Deteriorated building panels at Sondrestrom, Greenland	Radar profile of a multi-year pressure ridge fragment (1978,
Forward-scattering corrected extinction by nonspherical par- ticles [1984, p.261-271] MP 1870	(1985, p.7-10) MP 2017 Britileness of reinforced concrete structures under arctic con-	Study of several pressure ridges and ice islands in the Canadi-
Ice fog as an electro-optical obscurant [1985, 11p] CR 85-08	ditions (1985, 28 + 14p.) MP 1969 Roof moisture surveys: yesterday, today and tomorrow	an Beaufort Sea [1978, p.519-532] MP 1187 Sea ice pressure ridges in the Beaufort Sea [1978, p 249-
Forward-scattering corrected extinction by nonspherical par-	(1985, p 438-443 + figs.) MP 2040	271 ₁ MP 1132
ticles (1985, p.1023-1029) MP 1958 Wavelength-dependent extinction by falling snow (1986,	Brittleness of reinforced concrete structures under arctic conditions (1985, p 111-121) MP 2272	Dynamics of near-shore ice [1978, p.11-22] MP 1205 Recent ice observations in the Alaskan Beaufort Sea federal-
p.51-55 ₁ MP 2019	Roof blister valve (1986, p.29-31) MP 2138 Brittleness of reinforced concrete structures under arctic con-	state lease area (1978, p.7-12) MP 1252 Radar anisotropy of sea ice due to preferred azimuthal orien-
Snow mass extinction coefficient (1986, p 35-38) MP 2659	ditions [1986, 20p.] CR 86-02	tation of horizontal c axes of ice crystals [1978, p 6037-
Effects of water and ice layers on the scattering properties of diffuse reflectors [1986, p 259-269] MP 2664	Roof blisters. Physical fitness building, Fort Lee, Virginia (1986, 15p.) Sr 86-35	Measurement of mesoscale deformation of Beaufort sea ice
Extinction coefficient measurement in falling snow with a	Infrared teating for leaks in new roofs (1987, p 49-54) MP 2282	(AIDJEX-1971) [1978, p.148-172] MP 1179 Dynamics of near-shore ice [1978, p.230-233]
Optical snow precipitation gauge (1987, p.26-31)	Blistering of built-up roof membranes pressure measurements	MP 1619
MP 2259 Forward scatter meter for measuring extinction in adverse	[1987, 22p.] SR 86-29 Porous portland cement concrete as an airport runway over-	Remote detection of water under ice-covered lakes on the North Slope of Alaska (1978, p.448-458) MP 1214
weather (1987, p.81-84) MP 2295 Effects of water and ice layers on the scattering properties of	lay: laboratory evaluation (1989, 20p.) SR 89-12	Remote detection of massive ice in permafrost along the Alyeska pipeline and the pump station feeder gas pipeline
diffuse reflectors (1987, p.5143-5147) MP 2301	Korhonen, C.J. Performance of wall coatings for concrete and masonry build-	[1979, p.268-279] MP 1175 Remote detection of a freshwater pool off the Sagavanirktok
Snow mass concentration and precipitation rate (1988, p 89- 92) MP 2326	ings in Alaska [1989, 27 refs] SR 89-36 Antifreeze admixtures for cold weather concreting. Prelimi-	River delta, Alaska (1979, p 161-164) MP 1224
Two-stream approximation to radiative transfer in falling snow (1988, p.463-470) MP 2604	nary test res. 's (1990, 8p) MP 2742	Icebergs an overview (1979, 7p) SR 79-21 Multi year pressure ridges in the Canadian Beaufort Sea
Increased transmission through brass obscurant clouds during	Kosikowski, L. Rapid detection of water sources in cold regions—a selected	(1979, p.107-126; MP 1229 Ice pile-up and ride-up on Arctic and subarctic beaches
snowfall (1988, p.489-496; MP 2605 Optical technique for characterizing precipitation (1989,	bibliography of potential techniques (1979, 75p) SR 79-10	(1979, p.127-146) MP 1230
p 71-76 ₁ MP 2627	Kosloff, P.	Anisotropic properties of sea are in the 50- to 150-MHz range (1979, p 5749-5759) MP 1258
Radiative transfer in falling snow: a two-stream approxima- tion (1989, 10p) CR 89-06	Internal structure, composition and properties of brackish ice from the Bay of Bothnia during the BEPERS-88 experiment	Dynamics of near-shore ice [1979, p.181-207] MP 1291
Snow crystal characterization [1989, p 17-23] MP 2642 Physical and optical properties of falling snow [1989, 22p.]	[1989, p 1318-1333] MP 2763 Internal structure, composition and properties of brackish ice	Oil pooling under sea ice [1979, p.310-323] MP 1289
CR 89-16	from the Bay of Bothnia (1990, p 5-15) MP 2725	Anisotropic properties of sea ice in the 50-150 MHz range (1979, p 324-353) MP 1620
Optical measurement of precipitation [1989, 13p] SR 89-30	Kotuby-Amacher, J. Retention and release of metals by soils—evaluation of sever-	Subsurface measurements of McMurdo Ice Shelf (1979, p 79-80) MP 1338
Kohnen, H. Ultrasonic measurements on deep ice cores from Antarctica	al models (1986, p.131-154) MP 2186 Kovacs, A.	Shore ice pile-up and ride-up: field observations, models,
(1978, p 48-50) MP 1202	Investigation of ice islands in Babbage Bight (1971, 46	theoretical analyses (1980, p 209-298) MP 1295 Radio-echo sounding in the Allan Hills, Antarctica, in support
Ultrasonic velocity investigations of crystal anisotropy in deep ice cores from Antarctica [1979, 16p]	leaves ₁ MP 1381 Meso-scale strain measurements on the Beaufourt sea pack	of the meteorite field program (1980, 9p.) SR 80-23 Investigations of sea ice anisotropy, electromagnetic proper-
CR 79-10 Ultrasonic velocity investigations of crystal anisotropy in	ice (AIDJEX 1971) (1974, p.119-138) MP 1035 Islands of grounded ice [1975, p 213-216] MP 852	ties, strength and under-ice current orientation (1980, p.109-153) MP 1323
deep ice cores from Antarctica (1979, p.4865-4874) MP 1239	Islands of grounded sea ice (1976, 24p) CR 76-04	Investigations of sea ice anisotropy, electromagnetic proper-
Relationship of ultrasonic velocities to c-axis fabrics and relaxation characteristics of ice cores from Byrd Station,	Thickness and roughness variations of arctic multiyear sea ice (1976, 25p.) CR 76-18	ties, strength, and under-ice current orientation (1980, 18p) CR 80-20
Antarctica [1979, p.147-153] MP 1282	Dynamics of near-shore ice [1976, p.9-34] MP 1380 Islands of grounded sea ice [1976, p.35-50] MP 987	Pooling of oil under sea ice (1981, p 912-922) MP 1459
Komárková, V. Tundra disturbances and recovery following the 1949 ex-	Islands of grounded sea ice (1976, p 35-50) MP 987 Study of piles installed in polar snow (1976, 132p) CR 76-23	Sea ice piling at Fairway Rock, Bering Strait, Alaska, observa-
ploratory drilling, Fish Creek, Northern Alaska (1978, 81p.) CR 78-28	CR 76-23 Grounded ice in the fast ice zone along the Beaufort Sea coast	tions and theoretical analysis (1981, p 985-1000) MP 1460
Kong, J.A.	of Alaska (1976, 21p) CR 76-32 Some characteristics of grounded floebergs near Prudhoe Bay,	Sea ice rubble formations off the northeast Bering Sea and Norton Sound coasts of Alaska (1981, p 1348-1363)
Correlation function study for sea ice (1988, p.14,055-14,- 063) MP 2511	Alaska (1976, p 169-172) MP 1118	MP 1527 Dynamics of near-shore ice (1981, p.125-135)
Korhonen, C. CRREL roof moisture survey, Pease AFB Buildings 33, 116,	Some characteristics of grounded floebergs near Prudhoe Bay, Alaska (1976, 10p) CR 76-34	MP 1599
122 and 205 (1977, 10p) SR 77-02	Dynamics of near-shore ice [1976, p 267-275] MP 922	Multi-year pressure ridges in the Canadian Beaufort Sea [1981, p 125-145] MP 1514
Hand-held infrared systems for detecting roof moisture (1977, p.261-271) MP 1390	Dynamics of near-shore ice (1977, p.151-163)	free pile-up and ride-up on arctic and subarctic beaches [1981, p 247-273] MP 1538
Maintaining buildings in the Arctic (1977, p 244-251) MP 1508	MP 1073 Stake driving tools a preliminary survey (1977, 43p)	Sea ice rubble formations in the Bering Sea and Norton Sound, Alaska [1981, 23p] SR 81-34
Infrared detective, thermograms and roof moisture 1977,	SR 77-13	High-resolution impulse rade- measurements for detecting
p 41-44j Roof moisture survey ten State of New Hampshire buildings	Sea ice thickness profiling and under-ice oil entrapment (1977, p 547-550) MP 940	sea ice and current alinement under the Ross Ice Shelf (1981, p.96-97) MP 1543
(1977, 29p) CR 77-31 CRREL roof moisture survey, Building 208 Rock Island Arse-	Runway site survey, Pensacola Mountains, Antarctica [1977, 45p] SR 77-14	Brine zone in the McMurdo Ice Shelf, Antarctica (1982, p 166-171) MP 1850
nai (1977, 6p.) SR 77-43	Studies of the movement of coastal sea ice near Prudhoe Bay, Alaska, U.S.A. (1977, p.533-546) MP 1066	Bering Strait sea ice and the Fairway Rock icefoot (1982,
Detecting wet roof insulation with a hand-held infrared camera (1978, p A9-A15) MP 1213	Unconfined compression tests on snow a comparative study	Effects of conductivity of high-resolution impulse radar
Summary of Corps of Engineers research on roof moisture detection and the thermal resistance of wet insulation	(1977, 27p) SR 77-20 Study of a grounded floeberg near Reindeer Island, Alaska	sounding, Ross Ice Shelf, Antarctica (1982, 12p) CR 82-42
(1978, 6p) SR 78-29 Roof moisture survey—U.S. Military Academy (1979, 8	(1977, 9p.) MP 1751 Brazil tensile strength tests on sea ice; a data report (1977,	Brine zone in the McMurdo Ice Shelf, Antarctica (1982, 28p) CR 82-39
refs. ₁ SR 79-16	39p ₁ SR 77-24	Shore ice ride-up and pile-up features Part 1 Alaska's Beau-
Extending the useful life of DYE-2 to 1986, Part 1 Preliminary findings and recommendations (1979, 15p) SR 79-27	Detection of moisture in construction materials (1977, 9p.) CR 77-25	Chemical fractionation of brine in the McMurdo Ice Shelf,
SR 79-27 CRREL roof moisture survey, Pease AFB buildings 35, 63,	Nearshore ice motion near Prudhoe Bay, Alaska (1977, p.23- 31) MP 1162	Antarctica (1983, 16p) CR 83-06 Detection of cavities under concrete pavement (1983, 41p)
93, 112, 113, 120 and 220 [1980, 31p] SR 80-14 Roofs in cold regions Marson's Store, Claremont, New	Dielectric constant and reflection coefficient of the snow sur- face and near-surface internal layers in the McMurdo Ice	CR 83-18
Hampshire (1980, 13p) SR 80-25	Shelf [1977, p 137-138] MP 1011	Characteristics of multi-year pressure ridges (1983, p.173- 182) MP 1698
Moisture detection in roofs with cellular plastic insulation West Point, New York, and Manchester, New Hampshire	leeberg thickness profiling using an impulse radar (1977, p 140-142) MP 1012	Sea ice on the Norton Sound and adjacent Bering Sea coast (1983, p 654-666) MP 1699
(1982, 22p) SR 82-07 Infrared inspection of new roofs (1982, 14p) SR 82-33	Subsurface measurements of the Ross Ice Shell, McMurdo Sound, Antarctica (1977, p 146-148) MP 1013	Electromagnetic properties of sea ice (1984, 32p) CR 84-02
Examination of a blistered built-up roof O'Neill Building.	Dynamics of near-shore ice (1977, p 411-424)	Electromagnetic properties of sea ice (1984, p.53-75)
Hanscom Air Force Base (1983, 12p) SR 83-21	MP 1076	MP 1776

Forces associated with ice pile-up and ride-up [1984, p.239- 262] MP 1887	Kulla, J.B.	Lang, K.T.
Shore ice ride-up and pile-up features Part 2 Alaska's Beau-	Oxygen isotope investigation of the origin of the basal zone of the Matanuska Glacier, Alaska (1978, p 673-685)	Influence of ground water monitoring well casings on metals and organic compounds in well water (1989, 9p)
fort Sea coast-1983 and 1984 (1984, 28p. + map)	MP 1177	MP 2717
CR 84-26 Authors' response to discussion on. Electromagnetic proper-	Kumai, M.	Lang, T.E.
ties of sea ice [1984, p.95-97] MP 1822	identification of nuclei and concentrations of chemical spe- cies in snow crystals sampled at the South Pole (1976,	Constitutive relation for the deformation of snow [1981, p.3- 14] MP 1370
Measuring multi-year sea ice thickness using impulse radar	p.833-841 ₁ MP 853	Lange, M.A.
[1985, p.55-67] MP 1916 Impulse radar sounding of frozen ground [1985, p 28-40]	Examining anteretic soils with a scanning electron micro-	Sea-ice investigations during the Winter Weddell Sea Project
MP 1952	scope (1976, p.249-252) MP 931 Electron microscope analysis of aerosols in snow and deep ice	[1987, p 88-89] MP 2491 lee thickness distribution across the Atlantic sector of the
Analysis of wide-angle reflection and refraction measure-	cores from Greenland (1977, p.341-350) MP 1725	Antarctic Ocean in midwinter [1987, p.14,535-14,552]
ments (1985, p 53-60) MP 1953	Elemental analyses of ice crystal nuclei and aerosola (1977,	MP 2314
lce island fragment in Stefansson Sound, Alaska (1985, p.101-115) MP 1900	5p ₃ MP 1191 Antarctic soil studies using a scanning electron microscope	Development of sea ice in the Weddell Sea (1989, p 92-96) MP 2615
Apparent unconfined compressive strength of multi-year sea	[1978, p.106-112] MP 1386	Elastic properties of frazil ice from the Weddell Sea, Antarc-
ice (1985, p.116-127) MP 1901	Measurement and identification of aerosols collected near	tica (1989, p 208-217) MP 2620
Investigation of the electromagnetic properties of multi-year sea ice (1985, p 151-167) MP 1902	Barrow, Alaska [1978, 6p] CR 78-20	Snow cover effects on antarctic sea ice thickness (1990, p 16- 21) MP 2726
Electromagnetic measurements of multi-year sea ice using	Electron microscope investigations of frozen and unfrozen bentonite (1979, 14p ₁ CR 79-28	Quantification of sea-ice textures through automated digital
impulse radar (1985, 26p) CR 85-13	Disinfection of wastewater by microwaves (1980, 15p.)	image analysis (1990, p.28-32) MP 2727
Sea ice and the Fairway Rock icefoot [1985, p 25-32] MP 2145	SR 80-01	Acoustical and morphological properties of undeformed sea ice: laboratory and field results (1990, p 67-75)
Electromagnetic measurements of multi-year sea ice using	Formation of ice crystals and dissipation of supercooled fog by artificial nucleation, and variations of crystal habit at	MP 2730
impulse radar [1986, p 67-93] MP 2020	early growth stages [1982, p.579-587] MP 1539	Comparison of the compressive strength of antarctic frazil ice
Chemical fractionation of brine in the McMurdo Ice Shelf, Antarctics (1986, p.307-313) MP 2239	Elemental compositions and concentrations of micros-	and laboratory-grown columnar ice [1990, p.79-84] MP 2731
Modeling the electromagnetic property trends in sea ice and	pherules in snow and pack ice from the Weddell Sea [1983, p.128-131] MP 1777	Sea ice, a habitat for the foraminifer Neogloboquadrina pa-
example impulse radar and frequency-domain electromag-	Morphology and ecology of diatoms in sea ice from the Wed-	chyderma? [1990, p 86-92] MP 2732
netic ice thickness sounding results [1986, p 57-133] MP 2197	dell Sea [1984, 41p] CR 84-05	Langieben, M.P.
Electromagnetic property trends in sea ice, Part 1 (1987,	Actidity of snow and its reduction by alkaline aerosols (1985,	Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langleben (1983, p. 779-782) MP 1577
45p ₁ CR 87-06	p 92-94; MP 2008 Chemical properties of snow in the northeastern United States	Langston, D.
Modeling the electromagnetic property trends in sea ice, Part 1 (1987, p 207-235) MP 2330	(1987, p (C1)625-(C1)630) MP 2232	Growth history of lake ice in relation to its stratigraphic,
Airborne electromagnetic sounding of sea ice thickness and	Microstructure of frozen soils examined by SEM [1988,	crystalline and mechanical structure [1977, 24p] CR 77-01
sub-ice bathymetry (1987, p 289-311) MP 2332	p 390-395 ₁ MP 2361	Langway, C.C., Jr.
Airborne electromagnetic sounding of sea are thickness and sub-ice bathymetry (1987, 40p) CR 87-23	Effect of aerosols on pH of snow (1990, p 17-30) MP 2675	Climatic oscillations depicted and predicted by isotope ana-
sub-ice bathymetry (1987, 40p) CR 87-23 Onshore ice pile-up and ride-up: observations and theoretical	Kuroiwa, D.	lyses of a Greenland ice core [1971, p.17-22] MP 998
assessment [1988, p.108-142] MP 2336	PHYSICS AND MECHANICS OF SNOW AS A MATERI-	Oxygen isotope profiles through the Antarctic and Greenland
Airborne measurement of sea ice thickness and subice bath-	AL [1962, 79p] M II-B	ice sheets (1972, p 429-434) MP 997
ymetry (1988, p 111-120) MP 2345 Electromagnetic measurements of a second-year sea ice floe	Kurtz, M.K. Ice-cratering experiments Blast Lake, Alaska [1966, Various	C-14 and other isotope studies on natural ice [1972, p.D70- D92] MP 1052
[1988, p.121-136] MP 2346	pagings) MP 1034	Polar ice-core storage facility (1976, p 71-75) MP 874
Airborne sea ice thickness sounding (1939, p.1042-1052)	Kutz, R.	Vanadium and other elements in Greenland ice cores [1976,
MP 2623 Estimating sea are thickness using time-of-flight data from	Concurrent remote sensing of arctic sea arce from submarine and aircraft (1989, 20p.) MP 2697	4p) CR 76-24
impulse radar soundings (1989, 10p) CR 89-22	and aircraft (1989, 20p.) MP 2697 Kyriakakis, T.	Atmospheric trace metals and sulfate in the Greenland Ice Sheet (1977, p 915-920) MP 949
Sea ice thickness measurement using a down-sized airborne	User's guide for the BIBSORT program for the IBM-PC per-	Interhemispheric comparison of changes in the composition
electromagnetic-sounding system [1989, p.394-424] MP 2693	sonal computer (1985, 61p) SR 85-04	of atmospheric precipitation during the Late Cenozoic era
Development of an airborne sea ice thickness measurement	Lacombe, J.	[1977, p 617-631] MP 1079 Vanadium and other elements in Greenland ice cores [1977,
system and field test results (1989, 47p) CR 89-19	Measurements of airborne-snow concentration (1982, p. 225- 281) MP 1563	p 98-102) MP 1092
Airborne measurement of sea ice thickness using electromagnetic induction during LIMEX 89 [1990, p 309-315]	Airborne-Snow Concentration Measuring Equipment (1982,	Seasonal variations of chemical constituents in annual layers
MP 2590	p 17-46 ₁ MP 1981	of Greenland deep ice deposits (1977, p 302-306) MP 1094
Airborne sea ice thickness sounding [1990, p 225-229]	Visible propagation in falling snow as a function of mass con- centration and crystal type (1983, p.103-111)	Stable isotope profile through the Ross Ice Shelf at Little
MP 2737	MP 1757	America V, Antarctica (1977, p 322-325) MP 1095
Sea ice thickness versus impulse radar time-of-flight data (1990, p 91-98) MP 2704	Performance and optical signature of an AN/VVS-1 laser	LaPotin, N.T.
Investigation of the LIZ-3 Dew Line Station water supply lake	rangefinder in falling snow Preliminary test results (1983, p 253-266) MP 1759	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548
(1990, 10p) SR 90-11	Snow characterization at SNOW-ONE-B (1983, p 155-	Development of a geographic information system for the Say-
Koza, S.M. Development of an analytical method for the determination	195 ₎ MP 1847	lorville River Basin, Iowa (1987, p.265-269) MP 2549
of explosive residues in soil Part 3 Collaborative test re-	Technique for measuring the mass concentration of falling snow [1983, p 17-28] MP 1647	Use of SPOT HRV data in the Corps of Engineers dredging
sults and final performance evaluation (1989, 89p) CR 89-09	Comparative near-millimeter wave propagation properties of	program (1988, p.1295-1299) MP 2528
Kozo, T.L.	snow or rain (1983, p.115-129) MP 1690	Multiband imaging systems (1990, 10p) SR 90-15
Wind-generated polynyas off the coasts of the Bering Sea	Attenuation and backscatter for snow and sleet at 96, 140, and	LaPotin, P.J.
islands [1990, p 126-132] MP 2734	225 GHz (1984, p 41-52) MP 1864 Tank E/O sensor system performance in winter: an overview	Analysis of the Revere, Quincy and Stamford structure data bases for predicting building material distribution (1985,
Krabill, W.B. Concurrent remote sensing of arctic sea ice from submarine	(1985, 26p) MP 2073	35p) SR 85-07
and aircraft [1989, 20p] MP 2697	Use and application of PRESTO in Snow-III West (1986,	Description of the building materials data base for New Haven, Connecticut (1985, 129p) SR 85-19
Recent measurements of sea ice topography in the eastern	p 11-24; MP 2658 Optical snow precipitation gauge [1987, p 26-31]	Regression models for predicting building material distribu-
Arctic (1990, p.132-136) MP 2735 Kreig, R.A.	MP 2259	tion in four northeastern cities (1985, 50p) SR 85-24
Guidebook to permafrost and related features along the Elli-	Preview of the SNOW-III West data base [1987, p 3-11]	Description of the building materials data base for Pittsburgh, Pennsylvania [1986, 87p] SR 86-08
ott and Dalton Highways, Fox to Prudhoe Bay, Alaska	MP 2291	Description of the building materials data base for Portland,
(1983, 230p) MP 1640 Terrain analysis from space shuttle photographs of Tibet	Snow mass concentration and precipitation rate [1988, p 89- 92 ₁ MP 2326	Maine (1986, 83p) SR 86-13
e1986, p 400-4091 MP 2097	increased transmission through brass obscurant clouds during	Description of the building materials data base for Cincinnati,
Natural ground temperatures in upland bedrock terrain, in-	snowfall (1988, p 489-496) MP 2605	Ohio (1986, 85p) SR 86-31 Statistical analysis of building wall materials distribution in
terior Alaska (1988, p 56-60) MP 2360	SNOW III WEST field experiment report. Volume 1 SR 88-28	four northeastern cities (1989, 156p) SR 89-01
Krishfield, R.A. Oceanic heat flux in the Fram Strait measured by a drifting	Snow concentration and precipitation rate measurements dur-	QuickDraw data structures for image processing (1989,
buoy (1990, p 291-296) MP 2740	ing SNOW IV (1989, p 25-29) MP 2643	17p ₁ SR 89-00 Larsen, E.T.
Kruk, G.	Impact of the winter environment on infrared target signa-	Observation and analysis of protected membrane roofing sys-
Soil microbiology (1981, p 38-44) MP 1753	tures and EO sensor performance (1989, np.) MP 2587	tems (1977, 40p) CR 77-11
Kugzruk, F.K. Thickness and roughness variations of arctic multiyear sea ice	Ladanyi, B.	Larson, R.E. Engineering aspects of an experimental system for land reno-
(1976, 25p) CR 76-18	General report session 2: mechanical properties (1979, p. 7-	vation of secondary effluent (1978, 26p) SR 78-23
Misgivings on isostatic imbalance as a mechanism for sea ice cracking (1976, p. 85-94) MP 1379	18 ₃ MP 1726 Lanan, G.A.	Larson, R.W.
cracking (1976, p 85-94) MP 1379 Kuhu, P.M.	Ice gouge hazard analysis (1986, p.57-66) MP 2106	100 MHz diefectric constant measurements of snow cover: dependence on environmental and snow pack parameters
Results of the US contribution to the Joint US/USSR Bering	Lane, J.W.	[1985, p 829-834] MP 1913
Sea Experiment (1974, 197p) MP 1032	Optical properties of salt ice (1975, p 363-372)	Single-horn reflectometry for in situ dielectric measurements
Kulvinen, K.C. South Pole ice core drilling, 1981-1982 [1982, p.89-91]	MP 854 Descring using lasers (1976, 25p.) CR 76-10	at microwave frequencies (1988, p.89-92) MP 2333 Larson, W.F.
MP 1621	Roof response to icing conditions (1979, 40p)	Uptake of nutrients by plants irrigated with municipal was-
fee drilling technology (1984, 142p) SR 84-34	CR 79-17	tewater effluent (1978, p 395-404) MP 1151

Larson, W.E. (cont.)	Post occupancy evaluation of a planned community in Arctic	LeMasurier, W.E.
Engineering aspects of an experimental system for land reno-	Canada (1980, 27p) SR 80-06	Marie Byrd Land quaternary volcanism: Byrd ice core cor-
vation of secondary effluent [1978, 26p] SR 78-23	Post occupancy evaluation of a remote Australian community: Shay Gap, Australia (1980, 57p) SR 80-29	relations and possible climatic influences (1972, p.139-
Lawson, D.E.	ty: Shay Gap, Australia (1980, 57p) SR 80-29 Lee, C.L.	141 ₂ MP 994 Lemieux, G.
Subsidence, inundation, and sedimentation: environmental consequences of the 1964 Alaska earthquake in the Portage,	Laboratory investigation of the mechanics and hydraulics of	Compression of wet snow [1978, 17p] CR 78-10
Alaska, area (1974, p 3-9) MP 2409	nver ice jams (1976, 97p) MP 1060	Laboratory experiments on icing of rotating blades (1979,
Placer River Silt-an intertidal deposit caused by the 1964	Laboratory investigation of the mechanics and hydraulies of	p 85-92 ₁ MP 1236
Alaska earthquake (1976, p 151-162) MP 2410	fiver ice jams [1977, 45p] CR 77-09	Lemieux, G.E.
Oxygen isotope investigation of the origin of the basal zone	Lee, C.R.	Experimental investigation of potential icing of the space
of the Matanuska Glacier, Alaska (1978, p 673-685; MP 1177	Toxic volatile organics removal by overland flow land treat- ment [1981, 14p] MP 1421	shuttle external tank (1982, 305p) CR \$2-25
Human-induced thermokarst at old drill sites in northern	Overland flow an alternative for wastewater treatment	Studies of high-speed rotor icing under natural conditions (1983, p.117-123) MP 1635
Alaska (1978, p 16-23) MP 1254	(1982, p.181-184) MP 1506	Unsteady river flow beneath an ice cover (1983, p 254-260)
Tundra disturbances and recovery following the 1949 ex-	Lee, H.J.	MP 2079
ploratory drilling, Fish Creek, Northern Alaska (1978,	Geotechnical properties and freeze/thaw consolidation	Ice accretion under natural and laboratory conditions (1985,
81p. ₁ CR 75-28	behavior of sediment from the Beaufort Sea, Alaska (1985, 83p 1 MP 2025	p 225-228 ₃ MP 2009
Sedimentological analysis of the western terminus reg on of the Matanuska Glacier, Alaska [1979, 112p]	83p ₁ MP 2025 Lee, M.	Hudson River ice management (1985, p 96-110)
CR 79-09	fee releasing block-copolymer coatings (1978, p 544-551)	MP 2174
Comparison of the pebble orientation in ice and deposits of	MP 1141	Controlled river ice cover breakup; part 1. Hudson River field experiments 1986, p 281-291; MP 2391
the Matanuska Glacier, Alaska (1979, p 629-645)	Lee, S M.	cxperiments [1986, p 281-291] MP 2391 Controlled river ice cover breakup; part 2. Theory and
MP 1276	Improved techniques for construction of snow roads and air-	numerical model studies (1986, p 293-305) MP 2392
Environmental analysis of the Upper Susitna River Basin using Landsat imagery [1980, 41p] CR 80-04	strips [1988, 99p] SR ##-18	Natural rotor icing on Mount Washington, New Hampshire
Drilling and coring of frozen ground in northern Alaska,	Improving snow roads and airstrips in Antarctica (1989, 18p.) SR 89-22	(1986, 62p) CR 86-10
Spring 1979 (1980, 14p) SR 80-12	18p j SR 89-22 Leggett, D.C.	Dielectric properties of strained ace 2. Effect of sample
Distinguishing characteristics of diamictons at the margin of	Effect of sediment organic matter on migration of various	preparation method (1987, p.149-153) MP 2357
the Matanuska Glacier, Alaska (1981, p.78-84)	chemical constituents during disposal of dredged material	Preliminary study of friction between ice and sled runners [1987, p 297-301] MP 2358
MP 1462	[1976. 183p] MP 967	
Sedimentological characteristics and classification of deposi- tional processes and deposits in the glacial environment	Reclamation of wastewater by application on land (1976,	Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont (1987, p 163-177) MP 2400
(1981, 16p) CR 81-27	15p ₃ MP 896 Wastewater renovation by a prototype slow infiltration land	Options for management of dynamic ice breakup on the Con-
Mobilization, movement and deposition of active subserial	treatment system (1976, 44p) CR 76-19	necticut River near Windsor, Vermont [1988, 16p]
sediment flows, Matanuska Glacier, Alaska (1982, p 279-	Vapor pressure of 2,4,6-trinitrotoluene by a gas chromato-	CR 88-01
300 ₁ MP 1806	graphic headspace technique [1977, p 83-90] MP 915	Development of a dynamic ice breakup control method for
Long-term modifications of perennially frozen sediment and	Composition of vapors evolved from military TNT as in-	the Connecticut River near Windsor, Vermont (1988, p 221-233) MP 2510
terrain at East Oumalik, northern Alaska (1982, 33p) CR 82-36	fluenced by temperature, solid composition, age and source r1977, 25p s	Thickness distribution of accreted ice grown on rotor blades
Ground ice in perennially frozen sediments, northern Alaska	(1977, 25p) SR 77-16 Determination of 2,4,6-trinitrotoluene in water by conversion	under laboratory conditions [1988, p 152-156]
[1983, p 695-700] MP 1661	to nitrate (1977, p 880) MP 980	MP 2523
Erosion of perennially frozen streambanks (1983, 22p)	Evaluation of existing systems for land treatment of wastewa-	Dynamic ice breakup control for the Connecticut River near
CR 83-29	ter at Manteca, California, and Quincy, Washington (1977,	Windsor, Vermont [1988, p 245-258] MP 2449
Prototype drill for core sampling fine-grained perennially	34p ₁ CR 77-24	Dynamic friction of a metal runner on ice. I. Model sled test
frozen ground (1985, 29p) CR 85-01	Wastewater treatment alternative needed (1977, p 82-87) MP 968	(1989, 17p) CR 89-14
Erosion of northern reservoir shores An analysis and application of pertinent literature (1985, 198p.)	Determination of dissolved nitrogen and oxygen in water by	Leppäranta, M. Ice properties in the Greenland and Barents Seas during sum-
M 85-01	headspace gas chromatography (1979, 5p.) SR 79-24	mer (1983, p.142-164) MP 2062
Pebble fabric in an ice-rafted diamicton [1985, p 577-591]	Improved enzyme kinetic model for nitrification in soils	Growth model for black ice, snow ice and snow thickness in
MP 1959	amended with ammonium. 1. Literature review (1980,	subarctic basins (1983, p 59-70) MP 2063
Response of permafrost terrain to disturbance a synthesis of	20p ₃ CR 80-01	Size and shape of ice floes in the Baltic Sea in spring (1983.
observations from northern Alaska, USA (1986, p 1-7) MP 2165	Removal of volatile trace organics from wastewater by over- land flow land treatment (1980, p.211-224) MP 1313	p 127-136 ₃ MP 2061
Glaciers and sediment (1986, p 53-69) MP 2154	Overland flow: removal of toxic volatile organics [1981.	On the role of ice interaction in marginal ice zone dynamics (1984, p 23-29) MP 1781
Ice problems associated with rivers and reservoirs (1986,	16p ₃ SR 81-01	Analysis of linear sea ice models with an ice margin (1984,
p.70-98 ₁ MP 2155	Toxic volatile organics removal by overland flow land treat-	p 31-36 ₁ MP 1782
Sub-ice channels and longitudinal frazil bars, ice-covered	ment (1981, 14p) MP 1421	Mechanism for floe clustering in the marginal ice zone
Tanana River, Alaska (1986, p 465-474) MP 2129	Identifying and determining halocarbons in water using gas chromatography (1981, 13p.) SR 81-26	(1984, p 73-76) MP 1785
Frazil ice pebbles: frazil ice aggregates in the Tanana River near Fairbanks, Alaska r1986, p 475-483; MP 2130	Effect of soil temperature and pH on nitrification kinetics in	MIZEX 83 mesoscale sea ice dynamics: initial analysis
mear Fairbanks, Alaska [1986, p 475-483] MP 2130 Morphology, hydraulics and sediment transport of an ice-	soils receiving a low level of ammonium enrichment (1981,	(1984, p.19-28) MP 1811
covered river. Field techniques and initial data (1986,	27 _{P1} SR 81-33	On the rheology of a broken ice field due to floe collision [1984, p 29-34] MP 1812
37p) CR 86-11	Removal of trace organics by overland flow (1982, p 176-	MIZEX 84 mesoscale sea ice dynamics, post operations re-
Evaluation of the magnetic induction conductivity method for	184) MP 2442 Assessment of the treatability of toxic organics by overland	port (1984, p 66-69) MP 1257
detecting frazil ice deposits [1987, 12p] CR 87-17	flow (1983, 47p) CR 83-03	Role of plastic ice interaction in marginal ice zone dynamics
Glacigenic resedimentation classification concepts and application to mass-movement processes and deposits (1989,	Reverse phase HPLC method for analysis of TNT, RDX,	(1985, p.11,899-11,909) MP 1544
p.147-169 ₁ MP 2472	HMX and 2,4-DNT in munitions wastewater (1984, 95p)	On estimating ice stress from MIZEX 83 ice deformation and
Cryogenic sampling of frazil ice deposits (1989, 6p)	CR 84-29	current measurements (1986, p.17-19) MP 2220 Mesoscale sea ice deformation in the East Greenland margin-
SR 89-28	Toxic organics removal kinetics in overland flow land treat- ment [1985, p.707-718] MP 2111	al ice zone [1987, p 7060-7070] MP 2241
In-situ sampling and characterization of frazil ice deposits	TNT, RDX and HMX explosives in soils and sediments	Role of floe collisions in sea ice rheology (1937, p 7085-
(1990, p 193-205) MP 2694 Layman, R.	Analysis techniques and drying losses (1985, 11p)	7096; MP 2242
Comments on the characteristics of in situ snow at millimeter	CR #5-15	Lever, J.H.
wavelengths (1986, p 317-320) MP 2666	Comparison of extraction techniques and solvents for explosive residues in soil (1985, 33p) SR 85-22	Investigation into the post-stable behavior of a tube array in
Scattering at mm wavelengths from in situ snow (1986,	Sorption of military explosive contaminants on bentonite	Cross-flow (1989, p 457-465) MP 2561
p 1.6.1-1 6 2 ₁ MP 2141	drilling muds (1985, 33p) CR 85-18	Dynamic simulations of iceberg-seabed interactions (1989, p 137-151; MP 2684
Layman, R.W.	Reversed-phase high-performance liquid chromatographic	Vertical lifting and penetration of floating ice sheets with
Development of a simplified method for field monitoring of	determination of nitroorganies in munitions wastewater	cylindrical indentors (1989, p 104) MP 2688
soil moisture (1978, p 40-44) MP 1194 Remote sensing of water quality using an airborne spec-	(1986, p 170-175) MP 2049 Effect and disposition of TNT in a terrestrial plant (1986,	Dynamic analysis of a floating ice sheet undergoing vertical
troradiometer (1980, p 1353-1362) MP 1491	p 49-52 ₁ MP 2098	indentation (1990, p 195-203) MP 2579
Water quality monitoring using an airborne spectroradiome-	Effect and disposition of TNT in a terrestrial plant and valida-	Wave-induced bergy bit motion near a floating oil production platform #1990, p 205-215; MP 2580
ter (1984, p 353-360) MP 1718	tion of analytical methods (1986, 17p) CR 86-15	platform (1990, p 205-215) MP 2580 Salmon River ice jam control studies interim report (1990,
Ledbetter, C.B.	Persistence of chemical agents on the winter battlefield Part	8p 3 SR 90-06
Temporary environment Cold regions habitability (1976.	1 Literature review and theoretical evaluation [1987, 20p] CR 87-12	Lewellen, R.I.
162p j SP 76-10 Notes on conducting the behavior setting survey by interview	Sorption of chemical agents and simulants measurement and	Operational report 1976 USACRREL-USCS subsea perma-
method [1976, 33p] SR 76-14	estimation of octanol-water partition coefficient 11987,	frost program Beaufort Sea, Alaska (1976, 20p) SR 76-12
Energy conservation in buildings (1976, 8p.) SR 76-17	15p ₁ SR 87-18	
Guidelines for architectural programming of office settings	Ice surface hydrolysis of disopropylfluorophosphate (DFP) (1987, p 809-815) MP 2457	1977 CRRFI - USGS permafrost program Beaufort Sea, Alas- ka, operational report (1977, 19p) SR 77-41
{1977, 14p ₃ SR 77-05	(1987, p. 809-815) MP 2457 Persistence of chemical agents on the winter battlefield Part	Field methods and preliminary results from subsea permafrost
Collaboration of architect and behavioral scientist in research	2 Evaporation from ice and snow -1988, 10p;	investigations in the Beaufort Sea, Alaska (1979, p 207-
(1977, 8p) CR 77-23	CR 88-03	213 ₁ MP (591
Small communities result in greater satisfaction an examination of undermanning theory (1977, 15p.) SR 77-36	Comments on Modeling adsorption desorption kinetics of	Buried valleys as a possible determinant of the distribution of deeply buried permafrost on the continental shelf of the
Architectural programming Making socially responsive ar-	pesticides in a soil suspension by J.T.I. Briesten and L.J.T. Van der Pas (1989, p.231) MP 2532	Beaufort Sea (1979, p 135-141) MP 1288
chitecture more accessible (1978, 7p.) SR 78-02	Salting-out solvent extraction for preconcentration of neutral	L'Heureux, D.
Communication in the work place, an ecological perspective	organic solutes from waver (1990, p.1355-1356)	Eruptions from under-ice explosions (1988, 26p)
(1979, 19p) SR 79-03	MP 2743	SR 88-14

· · ·	On the desire of polymeric composite structures for cold	Lyack, D.R.
Liandi, F. Applications of the finite-element method to the problem of	On the design of polymeric composite structures for cold regions applications (1988, p.435-458) MP 2395	Continuously deforming finite elements for the solution of
heat transfer in a freezing shaft wall [1986, 24p.]	Response of advanced composite space materials to thermal	parabolic problems, with and without phase change (1981, p. 81-96) MP 1493
CR 86-08	cycling (1988, p.506-517) MP 2478	p 81-96; MP 1493 Optimization model for land treatment planning, design and
Lin, F.C. Correlation function study for sea ice {1988, p.14,055-14,-	Low, P.F. Isothermal compressibility of water mixed with Na-saturated	operation Part 1. Background and literature review (1983,
063 ₁ MP 2511	montmorillonite [1983, p 45-50] MP 2066	35p) SR \$3-06
Linden, D.R.	Lowman, R.A.	Optimization model for land treatment planning, design and operation Part 2 Case study (1983, 30p) SR 83-07
Uptake of nutrients by plants irrigated with municipal was- tewater effluent r1978, p 395-404; MP 1151	Direct filtration of streamborne glacial silt (1982, 17p) CR \$2-23	Optimization model for land treatment planning, design and
tewater effluent (1978, p 395-404) MP 1151 Engineering aspects of an experimental system for land reno-	Lozowski, E.P.	operation. Part 3. Model description and user's guide
vation of secondary efficient [1978, 26p.] SR 78-23	Computer modeling of time-dependent rime icing in the at-	1933, 38p 3 SR 83-06 Economics of ground freezing for management of uncon-
Lindsey, R.W.	mosphere (1983, 74p) CR 83-02	trolled hazardous waste sites (1985, 15p) MP 2030
Turbulent heat flux from Arctic leads (1979, p 57-91) MP 1340	Luk, C.H. Proceedings, Vol.4 r1988, 348p.; MP 2317	Finite element simulation of ice crystal growth in subcooled
Linell, K.A.		sodium-chloride solutions [1985, p 527-532] MP 2100
PERMAFROST (PERENNIALLY FROZEN GROUND)	Lukow, T.E. Propane dispenser for cold fog dissipation system (1973).	Finite element simulation of planar instabilities during
[1966, 77p.] M I-A2	38p ₁ MP 1033	solidification of an undercooled melt [1987, p 81-111]
Some experiences with tunnel entrances in permafrost (1978, p 813-819) MP 1107	Lunardini, V.J.	MP 2585
Design and construction of foundations in areas of deep sea-	Neumann solution applied to soil systems [1980, 7p] CR 80-22	Computer modeling of atmospheric ice accretion and aerody- namic loading of transmission lines [1987, p.103-109]
sonal frost and permafrost [1980, 310p] SR 80-34	Phase change around a circular pipe (1980, 18p.)	MP 2273
Design of foundations in areas of significant frost penetration (1980, p.118-184) MP 1358	CR 80-27	Lyons, R.O.
(1980, p.118-184) MP 1358 Ling, C.H.	Heat transfer in cold climates (1981, 731p.) MP 1435	Ice regime reconnaissance, Yukon River, Yukon [1984, p 1059-1073] MP 2406
Continuum sea ice model for a global climate model (1980.	Approximate solution to Neumann problem for soil systems (1981, p.76-81) MP 1494	Lyons, W.B.
p.187-196 ₃ MP 1622	[1981, p 76-81] MP 1494 Cylindrical phase change approximation with effective there	Dominion Range ice core, Queen Maud Mountains, Antarc-
Link, L.E.	mal diffusivity (1981, p.147-154) MP 1438	tica—general site and core characteristics with implications
International arctic research programs [1989, 74p.] SR 89-21	Effects of ice on coal movement via the inland waterways	(1990, p 11-16) MP 2/0/ Määttänen, M.
U.S. Federal arctic research (1989, p.65-74) MP 2671	(1981, 72p) SR 81-13 Phase change around a circular cylinder (1981, p.598-600)	Vibrations caused by ship traffic on an ice-covered waterway
Cold regions engineering research-strategic plan (1989,	MP 1507	(1981, 27p) CR 81-05
p.172-190 ₃ MP 2571	Mine/countermine problems during winter warfare. Final	Dynamic ice-structure interaction analysis for narrow vertical structures (1981, p. 472-479) MP 1456
Link, L.E., Jr. Smart weapons operability enhancement (1989, p.165-173)	report of a workshop (1981, 43p) SR \$1-20	Structures (1981, p 472-479) MP 1456 Dynamic ice-structure interaction during continuous crushing
MP 2539	Phase change around insulated buried pipes: quasi-steady method r1981, p 201-207; MP 1496	[1983, 48p.] CR 83-05
Linkins, A.E.	method (1981, p 201-207) MP 1496 Application of the heat balance integral to conduction phase	MacAyeal, D.R.
Sensitivity of plant communities and soil flora to seawater	change problems (1981, 14p.) CR 81-25	Can relict crevasse plumes on antarctic ice shelves reveal a
spills, Prudhoe Bay, Alaska (1983, 35p) CR 83-24 Reconnaissance observations of long-term natural vegetation	Freezing of soil with surface convection (1982, p 205-212)	history of ice-stream fluctuation [1988, p 77-82] MP 2460
recovery in the Cape Thompson region, Alaska, and addi-	MP 1595	Mackay, J.R.
tions to the checklist of flora (1985, 75p) CR 85-11	Mobility of water in frozen soils (1982, c15p) MP 2012	On the origin of pingos-a comment (1976, p.295-298)
Liston, N.	Conduction phase change beneath insulated heated or cooled	MP 916
Mobility bibliography [1981, 313p.] SR 81-29	structures (1982, 40p) CR 82-22	MacKeith, P. Recent glacier-volcano interactions on Mt. Redoubt, Alaska
U.S. tundra biome publication list [1983, 29p] SR 83-29	Proceedings (1983, 813p) MP 1581	(1988, 18p ₁ MP 2431
Topical databases: Cold Regions Technology on-line (1985,	Freezing of semi-infinite medium with initial temperature gradient (1983, p 649-652) MP 1583	MacLean, S.F., Jr.
p.12-15 ₃ MP 2027	Approximate phase change solutions for insulated buried cyl-	Barrow, Alaska, USA (1975, p 73-124) MP 1050
Listen, R.A.	inders (1983, p.25-32) MP 1593	Coastal tundra at Barrow (1980, p 1-29) MP 1356
Air cushion vehicle ground contact directional control devices (1976, 15p.) CR 76-45	Freezing and thawing, heat balance integral approximations	Madore, K. Disinfection of wastewater by microwaves (1980, 15p)
Radial tire demonstration (1985, p.281-285) MP 2102	(1983, p 30-37) MP 1597 Approximate solution to conduction freezing with density	SR 80-01
Performance of highway and all-season radial tires and trac-	variation (1983, p 43-45) MP 1598	Maishman, D.
tion aids on ice and in snow (1986, 20p) SR 86-07	Thawing beneath insulated structures on permafrost (1983,	Freezing a temporary roadway for transport of a 3000 ton
After-action report—Reforger '85 (1986, 20p) SR 86-22	p.750-755 ₁ MP 1662	dragline (1988, p.357-365) MP 2378
Evaluation of the Caterpillar Challenger tractor for use in	Proceedings [1984, 3 vols.] MP 1675 Freezing of a semi-infinite medium with initial temperature	Mak, L.M. Wave-induced bergy bit motion near a floating oil production
Antarctica (1989, 12p. + figs.) MP 2718	gradient (1984, p 103-106) MP 1740	platform (1990, p.205-215) MP 2580
Liu, G.	Proceedings (1985, 2 vols.) MP 2105	Makkonen, L.
Airborne electromagnetic sensing of sea ice thickness (1987, 77p) MP 2673	Freezing of soil with phase change occurring over a finite	Atmospheric icing on sea structures [1984, 92p] M 84-02
Lobecz, E.F.	temperature zone (1985, p.38-46) MP 1854 Arctic thermal design (1985, p.70-75) MP 2167	Makshtas, A.P.
Storm drainage design considerations in cold regions (1978.	Arctic thermal design (1985, p.70-75) MP 2167 Review of analytical methods for ground thermal regime cal-	Reports of the US-USSR. Weddell Polynya Expedition,
p.474-489) MP 1068	culations (1985, p 204-257) MP 1922	October-November 1981 Volume 7: Surface-level meteoro-
Some experiences with tunnel entrances in permafrost [1978, p 813-819] MP 1107	Free and forced convection heat transfer in water over a melt-	logical data (1983, 32p) SR 83-14 Energy exchange over antarctic sea ice in the spring (1985,
Design and construction of foundations in areas of deep sea-	ing horizontal ice sheet (1986, p 227-236) MP 2033	p 7199-7212 ₁ MP 1889
sonal frost and permafrost (1980, 310p) SR 80-34	Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p)	Malhotra, R.V.
Design of foundations in areas of significant frost penetration (1980, p. 118-184) MP 1358	CR \$6-03	Snow hydrology in the upper Yamuna basin, India (1988, n. 84-93) MP 2633
Surface drainage design for airfields and heliports in arctic		p 84-93; MP 2633 Mariar, T.
and subarctic regions [1981, 56p] SR 81-22	JR 60-14	Arctic and subarctic environmental analyses utilizing ERTS-
Arctic and subarctic construction: general provisions (1986, 75p) SR 86-17	Ice heat sinks Part 2 Horizontal systems (1986, 104p) SR 86-26	1 imagery (1973, 5p) MP 1611
75p ₁ SR 46-17 Loder, T.C.	Condensing steam tunnel heat sinks [1986, 29p]	Merler, T.L.
Chemical, physical and structural properties of estuarine ice	SR \$6-24	Arctic and Subarctic environmental analyses utilizing ERTS- 1 imagery, bimonthly progress report, 23 June - 23 Aug
in Great Bay, New Hampshire (1987, p.833-840)	Fice and forced convection heat frauster in water over a men.	1972 (1972, 3p ₁ MP 991
MP 2251	Proceedings (1987, 4 vols.) MP 2189	Arctic and subarctic environmental analysis (1972, p.28-
Loehr, R. Engineering systems [1983, p 409-417] MP 1948	Exact solution for melting of frozen soil with thaw consolida-	30; MP 1119
Lochr, R.C.	tion (1987, p 97-102) MP 2191	Arctic and subarctic environmental analyses utilizing ERTS- 1 imagery. Bimonthly progress report, 23 Aug. 23 Oct.
Site selection methodology for the land treatment of wastewa-	Proceedings (1987, 270p) MP 2302	1973 (1973, 3p) MP 1030
ter (1981, 74p.) SR 81-28	Some analytical methods for conduction heat transfer with freezing/thawing (1987, p.55-64) MP 2304	Arctic and subarctic environmental analyses utilizing ERTS-
Lohanick, A. Scientific challenges at the poles (1987, p 23-26)	Freezing of soil with an unfrozen water content and variable	1 imagery Bimonthly progress report, 23 Oct - 23 Dec. 1973 (1973, 6p.) MP 1031
MP 2228	thermal properties (1988, 23p) CR 88-02	Arctic and subarctic environmental analysis utilizing ERTS-
Multifrequency passive microwave observation of saline ice	Heat conduction with freezing or thawing [1988, 329p] M 88-01	I imagery Final report June 1972-Feb 1974 (1974,
grown in a tank (1988, p 1687-1690) MP 2459	Freezing a temporary roadway for transport of a 3000 ton	125p) MP 1047
Long, S.E. Analysis of diffusion wave flow routing model with applica-	1	Remote sensing of land use and water quality relationships— Wisconsin shore, Lake Michigan (1976, 47p)
tion to flow in tailwaters [1983, 31p] CR #3-07	Effect of variable thermal properties on freezing with an un-	CR 76-30
Modeling rapidly varied flow in tailwaters (1984, p 271-	frozen water content (1988, p 1127-1132) MP 2370	Analysis of potential ice jam sites on the Connecticut River at Windsor, Vermont (1976, 31p) CR 76-31
289 ₃ MP 1711	Freezing and thawing of soils in cylindrical coordinates [1989, p 185-208] MP 2594	
Lonsdale, H K. Towing scaperes (1974, p.2) MP 1020	AD 0444	
Towing scabergs (1974, p.2) MP 1020 Lord, H.W.	Review of pure conduction with freezing (1989, p 27-32)	Detecting structural heat losses with mobile infrared thermog-
Influence of low temperature thermal cycling on tensile	MP 2638	
strength of fiber composites (1988, p 141-147) MP 2435	Experiments on the heat transfer from water flowing through	raphy Part 4 Estimating quantitative heat loss at Dart- mouth College, Hanover, New Hampshire [1976, 9p] CR 76-33
MF 4433	a comenical oben commer franch haven't	

Marshall, S.J. (cont.)	Sludge dewatering by natural freeze-thaw (1990, p.116- 122; MP 2714	McDade, C. Dynamics of NH4 and NO3 in cropped soils irrigated with
Photomacrography of artifacts in transparent materials (1976, 31p.) CR 76-40	Martel, J.	wastewater (1980, 20p.) SR 80-27
Infrared thermography of buildings: an annotated bibliography (1977, 21p) SR 77-09	New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712	Corps of Engineers land treatment of wastewater research program: an annotated bibliography (1983, 82p.) SR 83-09
Infrared thermography of buildings: qualitative analysis of	Marten, G.C.	McDaniel, J.
window infiltration loss, Federal Office Building, Burlington, Vermont (1977, 17p.) SR 77-29	Uptake of nutrients by plants irrigated with municipal was- tewater effluent [1978, p.395-404] MP 1151	Comparative near-millimeter wave propagation properties of
Infrared thermography of buildings: Qualitative analysis of	Martin, R.J., III	snow or rain (1983, p.115-129) MP 1690 McDonald, C.
five buildings at Rickenbacker Air Force Base, Columbus, Ohio (1977, 21p) SR 77-26	Mechanisms of crack growth in quartz (1975, p.4837-4844) MP \$55	Humidity and temperature measurements obtained from an
Comparative testing system of the applicability for various	Martin, R.T.	unmanned aerial vehicle (1987, p 35-45) MP 2293 Slant path extinction and visibility measurements from an
thermal scanning systems for detecting heat losses in buildings (1978, p.B71-B90) MP 1212	Mechanical properties of polycrystalline ice: an assessment of current knowledge and priorities for research (1979, 16p)	unmanned aerial vehicle (1987, p.115-126) MP 2296
Infrared thermography of buildings—a bibliography with ab-	MP 1207	McFadden, T. Radiation and evaporation heat loss during ice fog conditions
Infrared thermography of buildings: 1977 Coast Guard survey	Application of the Andrade equation to creep data for ice and frozen soil [1979, p 29-36] MP 1802	(1975, p.18-27) MP 1051
(1979, 40p) SR 79-20	Martin, S.	Thermal pollution studies of French Creek, Eielson AFB, Alaska (1976, 5p.) CR 76-14
Roof response to using conditions (1979, 40p) CR 79-17	MIZEX—a program for mesoscale air-ice-ocean interaction; experiments in Arctic marginal ice zones. 1. Research	Debris of the Chena River (1976, 14p.) CR 76-26
Measuring building R-values for large areas (1981, p.137- 138, MP 1388	strategy (1981, 20p) SR \$1-19	Failure of an ice bridge (1976, 13p) CR 76-29
138 ₁ MP 1388 Thermal patterns in ice under dynamic loading (1983, p 240-	Martin, W. Ice strength estimates from submarine topsounder data	Suppression of ice fog from cooling ponds [1976, 78p] CR 76-43
243 ₁ MP 1742	(1989, p 425-426) MP 2691	Fate and effects of crude oil spilled on permafrost terrain. First year progress report (1976, 18p.) SR 76-15
Toward in-situ building R-value measurement (1984, 13p) CR 84-01	Martinson, C.R. Sediment displacement in the Ottauquechee River—1975-	Utility distribution systems in Sweden, Finland, Norway and
Thermal (2-5 6 micron) emittance of diathermanous materials as a function of optical depth, critical angle and temperature	1978 (1980, 14p) SR 80-20	England (1976, 121p.) SR 76-16 Utility distribution practices in northern Europe (1977, p.70-
(1984, p 209-220) MP 1863	Analysis of velocity profiles under ice in shallow streams [1981, p.94-111] MP 1397	95 ₁ MP 928
Time-lapse thermography a unique electronic imaging application (1984, p.84-88) MP 2103	Method for measuring brash ice thickness with impulse radar	Freeze damage prevention in utility distribution lines (1977, p 221-231) MP 929
Emittance: a little understood image deception in thermal	(1981, 10p) SK 81-11 Resistance coefficients from velocity profiles in ice-covered	Freeze damage protection for utility lines (1977, p.12-16)
imaging applications (1985, p. 72-78) MP 1962	shallow streams (1982, p.236-247) MP 1540	MP 953 Ice fog suppression using monomolecular films [1977, p.361-
Thermal emissivity of diathermanous materials (1985, p872-878) MP 1963	Mine detection using non-sinusoidal radar. Part 1: Spatial analysis of laboratory test data [1984, 99p.] SR 84-22	367 ₁ MP 956
Martel, C.J.	Determining the characteristic length of floating ice sheets by	Yukon River breakup 1976 (1977, p.592-596) MP 960 Ice breakup on the Chena River 1975 and 1976 (1977, 44p.)
Performance of overland flow land treatment in cold climates [1978, p.61-70] MP 1152	moving loads (1985, p.155-159) MP 1855 Impulse radar sounding of level first-year sea ice from an	CR 77-14
Land treatment systems and the environment (1979, p 201-	icebreaker [1985, 9p.] SR 85-21	Investigation of slumping failure in an earth dam abutment at Kotzebue, Alaska (1977, 21p.) SR 77-21
225 ₃ MP 1414 International and national developments in land treatment of	Development of a river :ce prow (1988, 26p.) CR 88-09	Fate and effects of crude oil spilled on permafrost terrain.
wastewater (1979, 28p) MP 1420	Radar profiling of Newton Airfield in Jackman, Maine (1989, 90.) SR 89-04	Second annual progress report, June 1976 to July 1977 [1977, 46p.] SR 77-44
Pilot scale study of overland flow land treatment in cold cli- mates (1979, p 207-214) MP 1279	(1989, 9p.) Ice reinforced with Geogrid (1989, p.179-185)	Fresh water supply for a village surrounded by salt water-
Wastewater treatment in cold regions by overland flow	MP 2484	Point Hope, Alaska (1978, 18p) SR 78-07 Physical, chemical and biological effects of crude oil spills on
(1980, 14p.) CR 80-07 Removal of volstile trace organics from wastewater by over-	Model tests in ice of a Canadian Coast Guard R-class ice- breaker: high friction model (1989, 41p) SR 89-25	black spruce forest, interior Alaska (1978, p 305-323) MP 1185
land flow land treatment (1980, p.211-224) MP 1313	Marvin, E.L.	Ice fog suppression using reinforced thin chemical films
Removal of organics by overland flow (1980, 9p.) MP 1362	Arctic construction: working group report [1987, p 311-314] MP 2426	(1978, 23p) CR 78-26 Ice fog suppression using thin chemical films (1979, 44p)
Rational design of overland flow systems [1980, p 114-121] MP 1490	Marzbanian, P.C.	MP 1192
Forage grass growth on overland flow systems (1980, p 347-	Structural evaluation of porous pavement test sections at Walden Pond State Reservation, Concord, Massachusetts	Ice forces on the Yukon River bridge—1978 breakup (1979, 40p) MP 1304
354 ₁ MP 1402	(1980, 43p) SR 80-39	Case study: fresh water supply for Point Hope, Alaska (1979,
Spray application of wastewater effluent in a cold climate: performance evaluation of a full-scale plant [1980, p 620-	Matise, B.K. SNOW III WEST field experiment report. Volume 1	p 1029-1040 ₁ MP 1222 Fate and effects of crude oil spilled on subarctic permafrost
626; MP 1403 Overland flow: removal of toxic volatile organics [1981,	[1988, 170p.] SR 88-28	terrain in interior Alaska (1980, 128p.) MP 1310
16p) SR #1-01	Matlock, C.S. Piles in permafrost for bridge foundations (1967, 41p.)	Waste heat utilization through soil heating [1980, p.105- 120] MP 1363
Toxic volatile organics removal by overland flow land treat- ment (1981, 14p) MP 1421	MP 1411	Ice fog suppression in Arctic communities [1980, p 54-65] MP 1357
Vegetation selection and management for overland flow sys-	May, T.A. Climatic and soil temperature observations at Atkasook on	Fate and effects of crude oil spilled on subarctic permafrost
tems (1982, p.135-154) MP 1511 Development of a rational design procedure for overland flow	the Meade River, Alaska. summer 1975 (1976, 25p; SR 76-01	terrain in interior Alaska (1980, 67p) CR 80-29 Ice force measurement on the Yukon River bridge (1981,
systems (1982, 29p) CR \$2-02	Mayewski, P.A.	p 749-777; MP 1396
Overland flow: an alternative for wastewater treatment [1982, p.181-184] MP 1506	Chemical, physical and structural properties of estuarine ice in Great Bay, New Hampshire (1987, p 833-840)	McGaw, R. Proposed size classification for the texture of frozen earth
Evaluating the heat pump alternative for heating enclosed	MP 2251	materials (1975, 10p) MP 921
wastewater treatment facilities in cold regions (1982, 23p.) SR \$2-10	Dominion Range ice core, Queen Maud Mountains, Antarc- tica—general site and core characteristics with implications	Development of a remote-reading tensiometer/transducer system for use in subfreezing temperatures (1976, p 31-
Energy conservation at the West Dover, Vermont, water pol- lution control faculty (1982, 180) SR 82-24	(1990, p 11-16) MP 2707	45 ₁ MP 897
Heating enclosed wastewater treatment facilities with heat	Mayket. G.A. On the decay and retreat of the ice cover in the summer MIZ.	Simple procedure to calculate the volume of water remaining unfrozen in a freezing soil (1976, p 114-122) MP 899
pumps (1982, p.262-280) MP 1976	1984, پ 1984, إد 1984, MP 1780	Periodic structure of New Hampshire silt in open-system freezing (1977, p.129-136) MP 902
Assessment of the treatability of toxic organics by overland flow (1983, 47p) CR 83-03	Optical properties of ice and snow in the polar oceans. 1. Observations (1986, p 232-241) MP 2255	Improved drainage and frost action criteria for New Jersey
Heat recovery from primary effluent using heat pumps (1985, p. 199-203) MP 1978	Treatment of shortwave radiation and open water in large-	pavement design Phase 2: Frost action (1978, 80p) SR 78-09
(1985, p 199-203) MP 1978 Of: Overland flow wastewater treatment at Easley, S.C.	scale models of sea-ice decay (1990, p 242-246) MP 2759	Thermal properties and regime of wet tundra soils at Barrow,
(1986, p.1078-1079) MP 2300 Evaluation of the Shasta waterless system as a remote site		Alaska (1978, p 47-53) MP 1096 Mobility of water in frozen soils (1982, c15p)
sanitation facility (1987, 24p.) SR \$7-16		MP 2012
New approach for sizing rapid infiltration systems (1988, p. 211-215) MP 2323	McComber, P. Analysis of selected ice accretion measurements on a wire at	Investigation of transient processes in an advancing zone of freezing (1983, p.821-825) MP 1663
Rational design of sludge freezing beds (1988, p 575-581)	Mt. Washington (1985, p.34-43) MP 2173	Full-cycle heating and cooling probe method for measuring
MP 2343 Developing a thawing model for sludge freezing beds (1988.	McCormick, M.P.	.hermal conductivity (1984, 8p) MP 1891 McGee, I.E.
p.1426-1430 ₁ MP 2372		Critical comparison of moving average and cumulative sum-
Predicting freezing design depth of sludge-freezing beds (1988, p.145-156) MP 2461		mation control charts for trace analysis data r1987, 57p.; SR 87-21
Development and design of sludge freezing beds (1988,	under Arctic and alpine conditions (1971, p 55-57)	McGilvary, W.R.
49p 3 CR 88-20 Dewaterability of freeze-thaw conditional sludges (1989,	MP 904 Ecological effects of oil spills and seepages in cold-dominated	Vertical lifting and penetration of floating ice sheets with cylindrical indentors [1989, p 104] MP 2688
p.237-241 ₁ MP 2616	environments (1971, p.61-65) MP 905	Dynamic analysis of a floating ice sheet undergoing vertical
Thermal conductivity of sludges (1989, p 241-245) MP 2632	Comparative investigation of periodic trends in carbohydrate	indentation (1990, p 195-203) MP 2579 McGrew, S.G.
Hydraulic model of overland flow on grass covered slopes	MP 1376	Dielectric properties at 4.75 GHz of saline ice slabs (1985,
(1989, p.569.578) MP 2710 Development and design of sludge freezing beds (1989,	Second annual progress report, June 1976 to July 1977	Microwave dielectric, structural, and salinity properties of
p.799-808 ₁ MP 2556		simulated sea ice (1986, p.832-839) MP 2188

Structure and dielectric properties at 4.8 and 9.5 GHz of		
saline ice (1986, p.14,281-14,303) MP 2182	Review of techniques for measuring soil moisture in situ [1980, 17p] SR 80-31	McRoberts, E.C. Design implications of subsoil thawing [1984, p.45-103]
Microwave and structural properties of saline ice £1987,	Infiltration characteristics of soils at Apple Valley, Minn.; Clarence Cannon Dam, Mo; and Deer Creek Lake, Ohio,	MP 1706
	land treatment sites [1980, 41p] SR 80-36	McWhinnie, M.A. Ross Ice Shelf Project environmental impact statement July,
McKenna, C. Reference guide for building diagnostics equipment and tech-	Hydraulic characteristics of the Deer Creek Lake land treat-	1974 (1978, p.7-36) MP 1075
niques (1986, 148p) MP 2226	ment site during wastewater application (1981, 37p) CR 81-07	Meals, D.W.
McKenna, C.M. Reference guide for building diagnostics equipment and tech-	Wastewater applications in forest ecosystems (1982, 22p)	Spray application of wastewater effluent in West Dover, Vermont: an initial assessment (1979, 38p.) SR 79-06
niques (1989, 64p) SR 89-27	CR 82-19	Spray application of wastewater effluent in a cold climate:
McKim, H.L.	Microbiological aerosols from a field-source wastewater irrigation system [1983, p 65-75] MP 1578	performance evaluation of a full-scale plant (1980, p 620- 626) MP 1403
Arctic and subarctic environmental analysis (1972, p 28-30) MP 1119	Landsat-4 thematic mapper (TM) for cold environments	Case study of land treatment in a cold climate—West Dover,
Arctic and subarctic environmental analyses using ERTS-1	[1983, p 179-186] MP 1651 Extraction of topography from side-looking satellite systems	Vermont (1982, 96p.) CR \$2-44
imagery. Progress report Dec. 72-June 73 (1973, 75p) MP 1003	-a case study with SPOT simulation data [1983, p 533.	Meese, D.A. Chemical, physical and structural properties of estuarine ice
Arctic and subarctic environmental analyses utilizing ERTS-	550 ₁ MP 1695 Use of radio frequency sensor for snow/soil moisture water	in Great Bay, New Hampshire (1987, p 833-840)
1 imagery (1973, 5p) MP 1611	content measurement [1983, p 33-42] MP 1689	MP 2251
Mesoscale deformation of sea ice from satellite imagery [1973, 2p] MP 1120	Hydrologic forecasting using Landsat data [1983, p.159-	Chemical and structural properties of sea ice in the southern Beaufort Sea [1989, 294p] MP 2656
Arctic and subarctic environmental analyses utilizing ERTS-	1683 MP 1691 Integration of Landsat land cover data into the Sagmaw River	Chemical and structural properties of sea ice in the southern Beaufort Sea (1989, 1340) CR 89-25
1 imagery. Bimonthly progress report, 23 Aug 23 Oct. 1973 (1973, 3p.) MP 1030	Basin geographic information system for hydrologic model-	Beaufort Sea [1989, 134p] CR 89-25 Dominion Range ice core, Queen Maud Mountains, Antarc-
Arctic and subarctic environmental analyses utilizing ERTS-	ing [1984, 19p] SR 84-01 Water quality monitoring using an airborne spectroradiome-	tica—general site and core characteristics with implications
1 imagery. Bimonthly progress report, 23 Oct 23 Dec. 1973 (1973, 6p.) MP 1031	ter [1984, p 353-360] MP 1718	(1990, p.11-16) MP 2707 Chemical and structural properties of sea ice in the southern
1973 (1973, 6p.) MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-	Using Landsat data for snow cover/vegetation mapping [1984, p II(140)-II(144)] MP 1975	Beaufort Sea [1990, p 32-35] MP 2728
1 imagery. Final report June 1972-Feb. 1974 (1974,	Potential use of SPOT HRV imagery for analysis of coastal	Mehran, M.
128p.j MP 1947 New England reservoir management: Land use/vegetation	sediment plumes (1984, p.199-204) MP 1744 Spatial analysis in recreation resource management for the	Evaluation of a compartmental model for prediction of ni- trate leaching losses (1981, 24p) CR 81-23
mapping in reservoir management (Merrimack River basin)	Berlin Lake Reservoir Project (1984, p 209-219)	Mathematical simulation of nitrogen interactions in soils
(1974, 30p.) MP 1039 Near real time hydrologic data acquisition utilizing the	MP 2084	[1983, p 241-248] MP 2051 Meier, M.F.
LANDSAT system (1975, p 200-211) MP 1055	Ohio River main stem study: the role of geographic informa- tion systems and remote sensing in flood damage assess-	Mechanical properties of polycrystalline ice: an assessment of
Islands of grounded ice (1975, p.213-216) MP 852	ments [1984, p.265-281] MP 2083	current knowledge and priorities for research (1979, 16p.) MP 1207
Applications of remote sensing for Corps of Engineers programs in New England (1975, 8p. + 14 figs. and tables)	USACRREL's snow, ice, and frozen ground research at the Sleepers River Research Watershed [1984, p 229-240]	Meiman, J.R.
MP 913	MP 2071	Spread of cetyl-I-C14 alcohol on a melting snow surface
Wastewater reuse at Livermore, California [1976, p.511- 531] MP \$70	Use of remote sensing for the U.S. Army Corps of Engineers dredging program (1985, p.1141-1150) MP 1890	[1966, p.5-8] MP 876 Melloh, R.A.
Remote sensing of land use and water quality relationships-	Catalog of Corps of Engineers structure inventories suitable	Seasonal distribution of low flow events in New Hampshire
Wisconsin shore, Lake Michigan (1976, 47p) CR 76-30	for the acid precipitation-structure material study (1985, 40p) SR 83-01	streams with emphasis on the winter period (1990, p.47- 53: MP 2681
Development of a remote-reading tensiometer/transducer	Evaluation of SPOT HRV simulation data for Corps of Engi-	53; Mr 2681 Mellor, M.
system for use in subfreezing temperatures (1976, p.31-45) MP 897	neers applications (1985, p 61-71) MP 2184 Comparison of SPOT simulator data with Landsat MSS im-	ANTARCTIC ICE SHEET (1961, 50p) MI-BI
Skylab imagery: Application to reservoir management in New	agery for delineating water masses in Delaware Bay, Broad-	OVERSNOW TRANSPORT (1963, 58p plus appends.) M 111-A4
England (1976, 51p) SR 76-07	kill River, and adjacent wetlands [1985, p 1123-1129] MP 1909	SNOW AND ICE ON THE EARTH'S SURFACE (1964,
Environmental analyses in the Kootenai River region, Montana [1976, 53p] SR 76-13	Evaluating trafficability [1985, p.474-475] MP 2023	163p) M II-CI
Preliminary analysis of water equivalent/snow characteristics	Potential of remote sensing in the Corps of Engineers dredg- ing program (1985, 42p.) SR 85-20	PROPERTIES OF SNOW (1964, 105p) M III-A1 SNOW REMOVAL AND ICE CONTROL (1965, 37p)
using LANDSAT digital processing techniques (1977, 16 leaves) MP 1113	ing program (1985, 42p.) SR 85-20 Evaluating trafficability (1986, p 237-239) MP 2662	SNOW REMOVAL AND ICE CONTROL (1965, 37p) M III-A3b
	1007 - 100 100	EXPLOSIONS AND SNOW (1965, 34p) M III-A3a
Applications of remote sensing in the Boston Urban Studies	Remote sensing and water resources (1987, p.186-190)	
Program, Parts I and II (1977, 36p) CR 77-13	MP 2535	BLOWING SNOW (1965, 79p) M III-A3c
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) MP 979	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548	BLOWING SNOW (1965, 79p) M III-A3c AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW-
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, India [1988.	BLOWING SNOW (1965, 79p) M III-A3c AVALANCHES (1968, 215p.) M III-A3d METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a
Program, Parts 1 and 11 (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979	WP 2533 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging	BLOWING SNOW (1965, 79p.) M III-A3c AVALANCHES (1968, 215p.) M III-A3d METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) MP 2633 Use of SPOT HRV data in the Corps of Engineers dedging program (1988, p.1295-1299) MP 2528	BLOWING SNOW (1965, 79p.) M III-A3e AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p., MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 QuickDraw data structures for image processing (1989, 17p.) SR 89-08	BLOWING SNOW (1965, 79p) M III-A3c AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2c
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511. 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir man-	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, India [1988, p.84-93] MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 17p.] SR 89-08 Interfacing geographic information system data with real-time	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2c UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2a
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) SR 89-08 Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A3e METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2e INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2e FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2e UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2e Investigation of ice islands in Babbage Bight (1971, 46)
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p., reservoir management and operation (1977, c150p., MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) SR 78-06 Use of remote sensing to quantify construction material and to define geologic lineaments, Dickey-Lincoln School	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2525 QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) SR 99-15	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A3e METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2e INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2e FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2e UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2e Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water icts (1973, 22p.)
Program, Parts 1 and 11 (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction maternal and to define geologic interments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167	WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) SR 89-08 Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) SR 90-15 McLaia, B.G.	BLOWING SNOW (1965, 79p) M III-A3c AVALANCHES (1968, 215p.) M III-A3c METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2c UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2d Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction material and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090	WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] Snow hydrology in the upper Yamuna basin, india [1988, p.84-93] Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p] SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.) SR 78-15	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2c UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2d Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224)
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates	WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) SR 89-08 Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) SR 90-15 MCLasia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) SR 78-15 MCLasia, B.G.	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A3e METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2e INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2e FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2e UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2e Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224) MP 360 General considerations for drill system design (1976, p.77-
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction material and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving	WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] Snow hydrology in the upper Yamuna basin, india [1988, p.84-93] Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p] SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.] McLaughlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] MP 1143	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A24 FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A25 CUTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 46 leaves) Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224) General considerations for drill system design (1976, p.77- 111) MP 856
Program, Parts 1 and 11 (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) Performance of overland flow land treatment in coldinates (1978, p.61-70) MP 1152	WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) Multiband imaging systems (1990, 10p.) SR 90-15 MCLasia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) SR 78-15 MCLasia, D. Mcthodology used in generation of snow load case histories (1977, p.163-174) MCNell, D.	BLOWING SNOW (1965, 79p.) M III-A3e AVALANCHES (1968, 215p.) M III-A3e METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2e UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) M III-A2e Investigation of ice islands in Babbage Bight (1971, 246 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) General considerations for drill system design (1976, p.77- 111) MP 856 MP 856 MP 856 MP 856 Ceneral considerations of drill system design (1976, p.77- 111) MP 856 MP 856 Ceneral considerations of axial system design (1976, p.77- 111) MP 856 MP 856 CR 76-16
Program, Parts 1 and 11 (1977, 36p.) Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction maternal and to define geologic intements, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological aerosols from a field source during sprinkler	MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) McLoughlia, D. Mcthodology used in generation of snow load case histories (1977, p.163-174) McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus dia-	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A24 FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A25 UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224) General considerations for drill system design (1976, p.77- 111) MP 856 Mechanics of cutting and boring Part II- Kinematics of axial rotation machines (1976, 45p.) Mechanics of cutting and boring Part III- Kinematics of R 76-16 Mechanics of cutting and boring Part III- Kinematics of R 76-16
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) We of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction material and to define geologic interments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280)	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2526 QuickDraw data structures for image processing (1989, 17p.) SR 89-08 Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) SR 90-15 MCLasia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) SR 78-15 MCLasia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) MCLasia, B.G. Waterproofing strain gages for low ambient temperatures (1977, p.163-174) MP 1143 MP 1141	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2b UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 218-224, MP 360 General considerations for drill system design (1976, p. 77- 111) MP 356 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 45p.) Mechanics of cutting and boring Part III: Kinematics of continuous belt machines [1976, 24p.] CR 76-16 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines [1976, 24p.] CR 76-17 Investigation of water jets for lock wall deicing (1976,
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c.150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MMP 2527 Multiband imaging systems (1990, 10p.) MR 95-25 Multiband imaging systems (1990, 10p.) SR 90-15 MCLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) SR 78-15 MCLaighlia, D. Methodology used in generation of snow load case historics (1977, p.163-174) McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) MCNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) M III-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A24 FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A25 CUTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1971, 49 leaves) General considerations for drill system design (1976, p.77- 111) MP 856 Mechanics of cutting and boring Part III- Kinematics of axial rotation machines (1976, 45p.) Mechanics of cutting and boring Part III- Kinematics of continuous belt machines (1976, 24p.) Investigation of water jets for lock wall decieng (1976, p. 76-16) Investigation of water jets for lock wall decieng (1976, p. 76-16) MP 865
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) RP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) SR 78-06 Use of remote sensing to quantify construction material and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1190 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1152 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological acrosols from a field source during sprinkler irrigation with wastewater (1978, p. 273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p)	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, india [1988, p.84-93] MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p.] SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.) SR 78-15 McLaeghlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] MP 1143 McNetll, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p. plus diagrams] McNetll, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas [1974, p 67-71]	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2b UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 218-224, MP 360 General considerations for drill system design (1976, p. 77- 111) MP 356 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 45p.) Mechanics of cutting and boring Part III: Kinematics of continuous belt machines [1976, 24p.] CR 76-16 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines [1976, 24p.] CR 76-17 Investigation of water jets for lock wall deicing (1976,
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c.150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, p. 164-169) Water resources by satellite (1978, p.164-169) Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological acrosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) SR 79-29 Development of a simplified method for field monitoring of	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, India [1988, p.84-93] MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p.] SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.] SR 78-15 McLaighlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] MP 1143 McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p. plus diagrams] MP 1071 McNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas [1974, p 67-71, MP 1046	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) M III-A3A METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2A FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2A INVESTIGATION ON SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2A Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1971, 46 leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224) General considerations for drill system design (1976, p.77- III) MP 856 Mechanics of cutting and boring Part III Kinematics of axial rotation machines (1976, 45p.) Mechanics of cutting and boring Part III Kinematics of continuous belt machines (1976, 24p.) Investigation of water jets for lock wall decing (1976, p 02713-22) MP 865 Development of large ice saws [1976, 14p.) MP 1021 Mechanics of cutting and boring Part 4 Dynamics and en-
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) SR 78-06 Use of remote sensing to quantify construction material and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1152 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) mP 1153 Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p. 273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p) Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) MP 1194	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] Snow hydrology in the upper Yamuna basin, india [1988, p.84-93] Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p.] MR 2537 Multiband imaging systems [1990, 10p.] SR 90-15 McLata, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.) SR 78-15 McLasghlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] McNell, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p. plus diagrams] McNell, J.D. Airborne E-phase resistivity surveys of permafrost central Alaska and Mackenzic River areas [1974, p 67-71] McPhee, M.G. Effect of the oceanic boundary layer on the mean drift of pack	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) MIII-A34 METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 37p.) FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A24 UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 424 Investigation of ice islands in Babbage Bight (1971, 426) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224) General considerations for drill system design (1976, p.77- 111) MP 856 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 45p.) CR 76-16 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines (1976, 24p.) CR 76-17 Investigation of water jets for lock wall deicing (1976, p G2/13-22) Development of large ice saws (1976, 14p.) CR 76-47 Ice and snow at high altitudes (1977, 14p.) MP 1121
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and magery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1153 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163), where the complex of the control	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) MR 95-25 Multiband imaging systems (1990, 10p.) SR 90-15 MCLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) McLaeghlia, D. Mcthodology used in generation of snow load case histories (1977, p.163-174) McNelll, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) MCNelll, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzic River areas (1974, p 67-71) MCPhee, M.G.	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) M III-A3A METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2A FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2A INVESTIGATION ON SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2A Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1971, 46 leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p 218-224) General considerations for drill system design (1976, p.77- Ili) MP 856 Mechanics of cutting and boring CR 76-16 Mechanics of cutting and boring CR 76-17 Investigation of water jets for lock wall decing (1976, p 02/13-22) Development of large ice saws [1976, 14p.) MP 865 Development of large ice saws [1976, 14p.) MP 865 Development of large ice saws [1976, 14p.) MP 865 Development of large ice saws [1977, 10p.) MP 865 Development of large ice saws [1977, 10p.) MP 865 Development of large ice saws [1977, 10p.) MP 1021 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 85p.) CR 77-07 Permafrost excayating attachment for heavy buildozers
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction material and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p 61-70) MP 1152 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) SR 79-29 Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) MP 1194 Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p 197-199)	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, India [1988, p.84-93] MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p] SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.] SR 78-15 McLaughlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] MP 1143 McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p plus diagrams] MP 1071 McNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas [1974, p 67-71], MP 1046 McPhee, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice, application of a simple model [1979, p 388-400), MP 1198 Physical oceanography of the seasonal sea ice zone [1980.	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2e UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 246 leaves) Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 218-224) MP 260 General considerations for drill system design (1976, p.77- 111) Mechanics of cutting and boring Part III: Kinematics of assial totation machines (1976, 45p.) Mechanics of cutting and boring Part III: Kinematics of assial totation machines (1976, 24p.) MP 267 MP 267 MP 267 Development of large ice saws (1976, 14p.) CR 76-17 Investigation of water jets for lock wall deicing (1976, p. 02/13-22) Development of large ice saws (1977, 10p.) MP 211 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 35p.) CR 77-07 Permafrost excavating attachment for heavy buildozers (1977, p. 144-151) MP 355
Program, Parts I and II (1977, 36p.) Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction maternal and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological acrosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) SR 79-29 Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p.197-198) MP 1510 Land treatment systems and the environment (1979, p.201-	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2523 Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2526 QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) MR 2527 Multiband imaging systems (1990, 10p.) SR 90-15 MCLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) SR 78-15 MCLaighlia, D. Methodology used in generation of snow load case historics (1977, p.163-174) McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) MCNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzic River areas (1974, p 67-71) McPlace, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice. application of a simple model (1979, p 388-400) MP 1198 Physical oceanography of the seasonal sea ice zone (1980, p.93-132) MP 1294	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A3e METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2b UTILITIES ON PERMANENT SNOWFIELDS (1994, 42p.) M III-A2b Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1971, 46 leaves) MP 218-224) MP 218-224) MP 660 General considerations for drill system design (1976, p.77- 111) MP 856 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 45p.) CR 76-17 Investigation of water jets for lock wall deicing (1976, p. Q27/13-22) Development of large ice saws (1976, 14p.) CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 1121 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 85p.) Permafrost excavating attachment for heavy buildozers (1977, p. 144-151) Engineering properties of snow (1977, p.15-66) MP 1015
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511- 531) MP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) SR 78-06 Use of remote sensing to quantify construction material and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p 61-70) MP 1152 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p) SR 79-29 Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) MP 1194 Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p. 197-1991) MP 1510 Land treatment systems and the environment (1979, p. 201- 2251 MP 1414 International and national developments in land treatment of	WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] Snow hydrology in the upper Yamuna basin, India [1988, p.84-93] Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p.] SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.] McLanghlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p. plus diagrams] McNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas [1974, p 67-71] McNeill, J.D. Effect of the oceanic boundary layer on the mean drift of pack ice, application of a simple model [1979, p 388-400] MP 1046 Physical oceanography of the seasonal sea ice zone [1980, p.93-132] Study of oceanic boundary-layer characteristics including inertial oscillation at three drifting stations in the Arctic erital oscillation at three drifting stations in the Arctic	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2b UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 24b.) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 218-224) MP 360 General considerations for drill system design (1976, p. 77- 111) MP 356 Mechanics of cutting and boring Part III: Kinematics of axial totation machines (1976, 45p.) MP 367 MP 367 MP 367 MP 367 MP 367 MP 367 CR 76-16 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines (1976, 24p.) MP 367 MP 367 MP 367 CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 1121 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 85p.) CR 77-07 Permafrost excavating attachment for heavy buildozers (1977, p. 144-151) Engineering properties of snow (1977, p.15-66) MP 1015 Measuring the uniaxial compressive strength of ice (1977)
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) SR 78-06 Use of remote sensing to quantify construction maternal and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological acrosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) SR 79-29 Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p. 197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 1420	WP 2535 Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-55) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) Meterproofing strain gages for low ambient temperatures (1978, 20p.) McLasghlia, D. Methodology used in generation of snow load case historics (1977, p.163-174) McNeill, J.D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) McNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas (1974, p 67-71) MP 1046 McPhee, M.G. Effect of the oceanic boundary layer on the mean dried pack ice. application of a simple model (1979, p 388-400) MP 1198 Physical oceanography of the seasonal sea ice zone (1980, p.93-132) Study of oceanic boundary-layer characteristics including incrital oscillation at three drifting stations in the Arctic Ocean (1980, p.90-884) MP 1369	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) NVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2c UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 246 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 260 General considerations for drill system design (1976, p.77- 111) Mechanics of cutting and boring Part III: Kinematics of 856 Mechanics of cutting and boring Part III: Kinematics of 76-16 Mechanics of cutting and boring Part III: Kinematics of 76-17 Investigation of water jets for lock wall deicing (1976, p. 02/13-22) Development of large ice saws (1976, 14p.) MP 367 CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 1015 Measuring the uniaxial compressive strength of ice (1977, p. 213-223) MP 1015 Measuring the uniaxial compressive strength of ice (1977, p. 213-223) Mechanics of cutting and boring Part 6 Dynamics and en-
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1167 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction material and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) SR 79-29 Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p. 197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 144 Bacterial aerosols from a field source during multiple-sprinkler irrigation Deer Creek Lake State Park, Ohn (1279) MP 144 Bacterial aerosols from a field source during multiple-sprinkler irrigation Deer Creek Lake State Park, Ohn (1279)	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 QuickDraw data structures for image processing (1989, 179, 179, 179) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) MR 2527 Multiband imaging systems (1990, 10p.) MR 2527 Multiband imaging systems (1990, 10p.) MR 2527 Multiband imaging strain gages for low ambient temperatures (1978, 20p.) SR 78-15 McLaig, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) McHodology used in generation of snow load case histories (1977, p.163-174) McNelll, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) MN 1071 McNelll, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas (1974, p 67-71) McPlace, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice, application of a simple model (1979, p 388-400) MP 1046 McPlace, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice, application of a simple model (1979, p 388-400) MP 1198 Study of oceanic boundary-layer characteristics including inertial oscillation at three drifting stations in the Artic Ocean (1980, p 870-884) Upper ocean temperature, salinity and density in the vicinity of arcite Drift Station FRAM 1, March to May 379.	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) NVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2c UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 246 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 260 General considerations for drill system design (1976, p.77- 111) Mechanics of cutting and boring Part III: Kinematics of 856 Mechanics of cutting and boring Part III: Kinematics of 76-16 Mechanics of cutting and boring Part III: Kinematics of 76-17 Investigation of water jets for lock wall deicing (1976, p. 02/13-22) Development of large ice saws (1976, 14p.) MP 367 CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 1015 Measuring the uniaxial compressive strength of ice (1977, p. 213-223) MP 1015 Measuring the uniaxial compressive strength of ice (1977, p. 213-223) Mechanics of cutting and boring Part 6 Dynamics and en-
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and magery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, p leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1153 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) MP 1153 Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p. 273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p) Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p.197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 1414 International and national developments in land treatment of wastewater (1979, 28p) SR 78-32 SR 78-32	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] Snow hydrology in the upper Yamuna basin, india [1988, p.84-93] Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p.] SR 99-05 McLaia, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.) SR 78-15 McLaeghlia, D. Methodology used in generation of snow load case histories [1977, p.163-174] McNelli, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p. plus diagrams] McNelli, J.D. Airborne E-phase resistivity surveys of permafrost - central Alassa and Mackenzic River areas [1974, p 67-71] McPake, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice, application of a simple model [1979, p 388-400] MP 1198 Physical oceanography of the seasonal sea ice zone [1980, p.93-132] Study of oceanic boundary-layer characteristics including inertial oscillation at three drifting stations in the Arctic Ocean [1980, p.70-884] Upper ocean temperature, salinity and density in the vicinity of arctic Drift Station FRAM 1, March to May 1979 SR 81-05	BLOWING SNOW (1965, 79p) M III-A3e AVALANCHES (1968, 215p.) M III-A3e METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) M III-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) M III-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2e UTILITIES ON PERMANENT SNOWFIELDS (1994, 42p.) M III-A2e Investigation of ice islands in Babbage Bight (1971, 46 leaves) MP 1381 Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1971, 46 leaves) MP 360 General considerations for drill system design (1976, p.77- III) MP 856 Mechanics of cutting and boring Part III: Kinematics of action machines (1976, 45p.) CR 76-16 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines (1976, 24p.) CR 76-17 Investigation of water jets for lock wall decing (1976, p 02/13-22) MP 865 Development of large ice saws [1976, 14p.) CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 1021 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 85p.) CR 77-07 Permafrost excavating attachment for heavy buildozers (1977, p 144-151) Engineering properties of snow (1977, p.15-66) MP 1015 Measuring the uniaxial compressive strength of ice (1977, p 213-223) Mechanics of cutting and boring Part 6 Dynamics and energetics of transverse rotation machines (1977, 36p.) CR 77-19
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction maternal and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p.197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 1540 MP 1540 Bacterial aerosols from a field source during multiple-sprinkler irrigation Deer Creek Lake State Park, Ohio (1979, 64p.) SR 79-32 Survey of methods for soil moisture determination (1979, 74p.) MP 1639	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) Meterproofing strain gages for low ambient temperatures (1978, 20p.) McLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) McLaeghlia, D. Methodology used in generation of snow load case histories (1977, p.163-174) McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) McNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzic River areas (1974, p 67-71) MP 1046 McPhee, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice. application of a simple model (1979, p 388-400) MP 1198 Physical oceanography of the seasonal sea ice zone (1980, p.33-132) Study of oceanic boundary-layer characteristics including inertial oscillation at three drifting stations in the Arctic Ocean (1980, p.870-884) Upper ocean temperature, salinity and density in the vicinity of arctic Drift Station FRAM 1, March to May 1979 (1981, 20p.) Sea ice drag laws and simple boundary layer concepts, including application to rapid melting (1982, 17p.)	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW-FIELDS (1968, 43p.) NIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW-FIELD SITES (1969, 57p.) FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2b UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 46 feaves) Cutting ice with high pressure water jets (1973, 22p.) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) General considerations for drill system design (1976, p. 77-111) MP 856 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 24p.) CR 76-17 Investigation of water jets for lock wall deicing (1976, p. G2/13-22) Development of large ice saws (1976, 14p.) CR 76-17 Ice and snow at high altitudes (1977, 10p.) MP 856 MP 865 CR 77-07 Permafrost excavating attachment for heavy buildozers (1977, p. 144-151) Measuring the uniaxial compressive strength of ice (1977, p. 213-223) Mechanics of cutting and boring Part 6 Dynamics and energetics of parallel motion tools (1977, p. 15-66) Measuring the uniaxial compressive strength of ice (1977, p. 213-223) Mechanics of cutting and boring Part 6 Dynamics and energetics of transverse rotation machines (1977, 36p.) MP 1015 Measuring the uniaxial compressive strength of ice (1977, p. 213-223) Mechanics of cutting and boring Part 6 Dynamics and energetics of transverse rotation machines (1977, 36p.) MP 1027
Program, Parts I and II (1977, 36p) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p) Use of remote sensing to quantify construction maternal and to define geologic lineaments, Dickey-Lincoln School Lakes Project, Maine (1978, p leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1153 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163), MP 1153 Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p) Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) MP 1194 Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p.197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 1414 International and national developments in land treatment of wastewater (1979, 28p) Survey of methods for soil moisture determination (1979, 74p) MP 1639 Environmental analysis of the Upper Susitian River Basin	Use of SPOT HRV data in a Corps dredging operation in Lake Eric [1987, p 49-58] MP 2548 Snow hydrology in the upper Yamuna basin, India [1988, p.84-93] MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program [1988, p.1295-1299] MP 2528 QuickDraw data structures for image processing [1989, 179,] Interfacing geographic information system data with real-time hydrologic forecasting models [1989, p 857-861] MP 2527 Multiband imaging systems [1990, 10p.] SR 90-15 McLala, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.] SR 78-15 McLala, B.G. Waterproofing strain gages for low ambient temperatures [1978, 20p.] SR 78-15 McMethodology used in generation of snow load case histories [1977, p.163-174] MP 1143 McNelll, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies [1971, 19p. plus dagrams] McNelll, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas [1974, p 67-71] McNelle, J.D. Effect of the oceanic boundary layer on the mean drift of pack ice. application of a simple model [1979, p 388-400] MP 1046 McPhee, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice. application of a simple model [1979, p 388-400] MP 198 Physical oceanography of the seasonal sea ice zone [1980, p.93-132] Study of oceanic boundary-layer characteristics including inertial oscillation at three drifting stations in the Arctic Ocean (1980, p 870-884) Upper ocean temperature, salinity, and density in the vicinity of arctic Drift Station FRAM 1, March to May 1979 Sea ice drag laws and simple boundary layer concepts, including application to rapid mellting [1982, 17p.] CR 82-04	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) NVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2a INVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 57p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) MIII-A2c UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 24c) leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 2860 General considerations for drill system design (1976, p. 77- 111) MP 856 Mechanics of cutting and boring Part III: Kinematics of axial totation machines (1976, 45p.) MP 860 CR 76-16 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines (1976, 24p.) MP 867 MP 867 MP 867 MP 867 MP 867 MP 867 CR 76-17 Investigation of water jets for lock wall deicing (1976, p. 02/13-22) Development of large ice saws (1976, 14p.) CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 1121 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 85p.) CR 77-07 Permafrost excavating attachment for heavy buildozers (1977, p. 144-151) Measuring the uniaxial compressive strength of ice (1977, p. 213-223) Mechanics of cutting and boring Part 6 Dynamics and energetics of transverse rotation machines (1977, 36p.) CR 77-19 Lock wall deicing with high velocity water jet at Soo Locks.
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1169 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction maternal and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, 9 leaves) MP 1167 Water resources by satellite (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p.197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 1540 MP 1540 Bacterial aerosols from a field source during multiple-sprinkler irrigation Deer Creek Lake State Park, Ohio (1979, 64p.) SR 79-32 Survey of methods for soil moisture determination (1979, 74p.) MP 1639	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 QuickDraw data structures for image processing (1989, 17p.) Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) Meterproofing strain gages for low ambient temperatures (1978, 20p.) McLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) McLaeghlia, D. Methodology used in generation of snow load case histories (1977, p.163-174) McNeill, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) McNeill, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzic River areas (1974, p 67-71) MP 1046 McPhee, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice. application of a simple model (1979, p 388-400) MP 1198 Physical oceanography of the seasonal sea ice zone (1980, p.33-132) Study of oceanic boundary-layer characteristics including inertial oscillation at three drifting stations in the Arctic Ocean (1980, p.870-884) Upper ocean temperature, salinity and density in the vicinity of arctic Drift Station FRAM 1, March to May 1979 (1981, 20p.) Sea ice drag laws and simple boundary layer concepts, including application to rapid melting (1982, 17p.)	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW-FIELDS (1968, 43p.) NVESTIGATION AND EXPLOITATION OF SNOW-FIELD SITES (1969, 57p.) M III-A2a INVESTIGATION AND SUBSURFACE STRUCTURES IN MII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 54p.) M III-A2b INVESTIGATION OF SNOW-FIELDS (1969, 54p.) MP 1001 Snow accumulation for is actic freshwater supplies (1971, 4p.) P 218-224) MP 218-224) MP 866 General considerations for drill system design (1976, p.77. 111) MP 856 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 45p.) MP 865 MP 865 Development of large ice saws (1976, 14p.) CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 865 Development of large ice saws (1976, 14p.) CR 76-47 Ice and snow at high altitudes (1977, 10p.) MP 865 MP 865 MP 865 MP 865 MP 865 Development of large ice saws (1977, 10p.) MP 1027 Mechanics of cutting and boring Part 4 Dynamics and energetics of parallel motion tools (1977, 85p.) MP 865 MP 866 CR 77-07 Permafrost excavating attachment for heavy buildozers (1977, p 144-151) MP 866 MP 867 MP 867 MP 867 MP 868 MP 968 MP 968 MP 969 MP 96
Program, Parts I and II (1977, 36p.) CR 77-13 Wastewater reuse at Livermore, California (1977, p.511-531) WP 979 Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p.) MP 1114 Effect of inundation on vegetation at selected New England flood control reservoirs (1978, 13p.) MP 1167 Computer processing of Landsat digital data and sensor interface development for use in New England reservoir management (1978, 61p.) Use of remote sensing to quantify construction material and to define geologic inneaments, Dickey-Lincoln School Lakes Project, Maine (1978, p.164-169) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1090 Performance of overland flow land treatment in cold climates (1978, p.61-70) MP 1152 Growth and nutrient uptake of forage grasses when receiving various application rates of wastewater (1978, p.157-163) Microbiological aerosols from a field source during sprinkler irrigation with wastewater (1978, p.273-280) MP 1154 Mass water balance during spray irrigation with wastewater at Deer Creek Lake land treatment site (1978, 43p.) SR 79-29 Development of a simplified method for field monitoring of soil moisture (1978, p.40-44) Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p. 197-198) MP 1510 Land treatment systems and the environment (1979, p. 201-225) MP 1414 International and national developments in land treatment of wastewater (1979, 28p.) MP 1419 Bacterial aerosols from a field source during multiple-sprinkler irrigation Deer Creek Lake State Park, Ohio (1979, 64p.) SR 79-32 Survey of methods for soil moisture determination (1979, 74p.) Environmental analysis of the Upper Susitina River Basin using Landsat imagery (1980, 41p.) CR 88-04	Use of SPOT HRV data in a Corps dredging operation in Lake Eric (1987, p 49-58) MP 2548 Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) MP 2633 Use of SPOT HRV data in the Corps of Engineers dredging program (1988, p.1295-1299) MP 2528 QuickDraw data structures for image processing (1989, 179, 179, 189-08 Interfacing geographic information system data with real-time hydrologic forecasting models (1989, p 857-861) MP 2527 Multiband imaging systems (1990, 10p.) SR 90-15 McLaia, B.G. Waterproofing strain gages for low ambient temperatures (1978, 20p.) SR 78-15 McLanghlin, D. Methodology used in generation of snow load case histories (1977, p.163-174) MP 1143 McNelll, D. In-situ measurements on the conductivity and surface impedance of sea-ice at VLF frequencies (1971, 19p. plus diagrams) MP 1071 McNelll, J.D. Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas (1974, p 67-71) MP 1046 McPhee, M.G. Effect of the oceanic boundary layer on the mean drift of pack ice. application of a simple model (1979, p 388-400) MP 1046 McPhee, M.G. Effect of socialization at three drifting stations in the Arctic Ocean (1980, p 870-884) Upper ocean temperature, salinity and density in the vicinity of arctic Drift Station FRAM 1, March to May 1979 (1981, 20p.) Scaice drag laws and simple boundary layer concepts, including application to rapid melting (1982, 17p.) Using sea ice to measure vertical heat flux in the ocean	BLOWING SNOW (1965, 79p.) AVALANCHES (1968, 215p.) METHODS OF BUILDING ON PERMANENT SNOW- FIELDS (1968, 43p.) NVESTIGATION AND EXPLOITATION OF SNOW- FIELD SITES (1969, 37p.) MIII-A2a INVESTIGATION AND SUBSURFACE STRUCTURES IN SNOW (1969, 34p.) MIII-A2b FOUNDATIONS AND SUBSURFACE STRUCTURES IN SNOW (1969, 34p.) MIII-A2b UTILITIES ON PERMANENT SNOWFIELDS (1969, 42p.) Investigation of ice islands in Babbage Bight (1971, 26 leaves) MP 1001 Snow accumulation for arctic freshwater supplies (1975, p. 218-224) MP 218-224, MP 860 General considerations for drill system design (1976, p.77- 111) MP 856 Mechanics of cutting and boring Part III: Kinematics of axial rotation machines (1976, 45p.) MP 867 MP 867 MP 867 MP 867 MP 867 MP 868 MP 1011 Mechanics of cutting and boring Part III: Kinematics of continuous belt machines (1976, 14p.) MP 867 MP 967 MP 1015 MP 973 MP 1015 MP 973 Obtaining fresh water from icebergs (1977, p 193) MP 1117

lellor, M. (cont.) Destruction of ice islands with explosives [1978, p 753-765]	Hard-surface runways in Antarctica (1988, 87p) SR \$8-13	Catalog of Corps of Engineer for the acid precipitations
MP 1018 Some elements of iceberg technology (1978, 31p) CR 78-02	Vehicles for freight-hauling and for science traverses in Antarctica [1988, Var. p] MP 2504	40p 3 Analysis of the Revere, Quir
Large mobile drilling rigs used along the Alaska pipeline	Eruptions from under-ice explosions (1988, 26p) SR 88-14	bases for predicting building
[1978, 23p] SR 78-04 Investigation of ice clogged channels in the St. Marys River	Deployment of floating bridges in ice-covered rivers (1988, 38p) SR 88-20	Evaluation of SPOT HRV sin neers applications (1985, p
(1978, 73p.) MP 1170	Planing machines for building runways on ice (1989, 8p. +	Comparison of SPOT simula
Mechanics of cutting and boring Part 8. Dynamics and energetics of cuitinuous belt machines (1978, 24p)	attachments; MP 2505 Blasting and blast effects in cold regions. Part 3. explosions	agery for delineating water kill River, and adjacent we
CR 78-11 Study of several pressure ridges and use islands in the Canadi-	in ground materials (1989, 62p.) SR 89-15 Introduction to drilling technology (1989, p.95-114)	Description of the building
an Beaufort Sea (1978, p.519-532) MP 1187 Undersea pipelines and cables in polar waters (1978, 34p.)	MP 2591 First impressions of the comet drilling problem (1989, p 229-	Potential of remote sensing in
CR 78-22 Sechanical properties of polycrystalline ice an assessment of	Airfields on antarctic glacier ice (1989, 97p.) CR 89-21	ing program (1985, 42p) Regression models for prediction in four northeastern c
current knowledge and priorities for research (1979, 16p) MP 1207 Fowing ships through ice-clogged channels by warping and	Merry, C.J. Correlation and quantification of airborne spectrometer data	Description of the building m Pennsylvania (1986, 87p)
kedging [1979, 21p.] CR 79-21	to turbidity measurements at Lake Powell, Utah (1970, p 1309-1316) MP 1271	Description of the building r
The iceberg cometh (1979, p 66-75) MP 1305	New England reservoir management: Land use/vegetation	Maine (1986, 83p)
cebreaking concepts [1980, 18p.] SR 80-02 High-force towing [1980, p 231-240] MP 1275	mapping in reservoir management (Merrimack River basin) (1974, 30p) MP 1039	Description of the building m Ohio (1986, 85p)
Some aspects of Soviet trenching machines (1980, 13p)	Islands of grounded ice (1975, p.213-216) MP 852	Instructions for completing a
SR 80-07 Mechanical properties of polycrystalline ice (1980, p 217-	Applications of remote sensing for Corps of Engineers programs in New England (1975, 8p + 14 figs and tables)	Use of Landsat digital data
245 ₁ MP 1302	MP 913	upper Saint John River ba
Mechanical properties of polycrystalline ice: an assessment of current knowledge and priorities for research (1980, p. 263-	Skylab imagery: Application to reservoir management in New England (1976, 51p) SR 76-07	Remote sensing and water re
275 ₁ MP 1328 Ship resistance in thick brash ice (1980, p 305-321 ₃	Environmental analyses in the Kootenai River region, Montana (1976, 53p.) SR 76-13	Use of SPOT HRV data in a C
MP 1329 Mechanics of cutting and boring. Part 5. Dynamics and	Preliminary analysis of water equivalent/snow characteristics	Eric (1987, p 49-58) Development of a geographic
energetics of indentation tools (1980, 82p.) CR 80-21	using LANDSAT digital processing techniques (1977, 16 leaves) MP 1113 Applications of remote seasing in the Boston Urban Studies	lorville River Basin, Iowa
Cyclic loading and fatrgue in ice (1981, p 41-53) MP 1371	Program, Parts I and II (1977, 36p) CR 77-13	CRREL's experiences of ren to the Corps user (1987, p
Subsess trenching in the Arctic (1981, p.843-882) MP 1464	Airborne spectroradiometer data compared with ground wa- ter-turbidity measurements at Lake Powell, Utah correla-	Effects of filtering and clas
tandardized testing methods for measuring mechanical prop-	tion and quantification of data (1977, 38p) SR 77-28	resolution imagery in distin p.57-58 ₃
erties of ice (1981, p.245-254) MP 1556 Subsea renching in the Arctic (1981, 31p.) CR 81-17	Use of the Landsat data collection system and imagery in reservoir management and operation (1977, c150p)	Use of SPOT HRV data in t
Mechanics of cutting and boring Part 7: Dynamics and en-	MP 1114	program (1988, p 1295-129 Statistical analysis of buildir
ergetics of axial rotation machines (1981, 38p.) CR 81-26	Land treatment module of the CAPDET program (1977, 4p) MP 1112	four northeastern cities (1
Deformation and failure of ice under constant stress or con-	Effect of inundation on vegetation at selected New England	Interfacing geographic inform
stant strain-rate (1982, p 201-219) MP 1525 Glacier mechanics (1982, p 455-474) MP 1532	flood control reservoirs (1978, 13p) MP 1169 Computer processing of Landsat digital data and sensor inter-	hydrologic forecasting mod
Breaking ice with explosives (1982, 64p) CR 82-40	face development for use in New England reservoir man-	Multiband imaging systems
stress/strain/time relations for ice under uniaxial compres-	agement (1978, 61p ₃ SR 78-06 Use of remote sensing to quantify construction material and	Metz, M.C. Workshop on Permafrost Ge
sion (1983, p 207-230) MP 1587 Protection of offshore arctic structures by explosives (1983,	Use of remote sensing to quantify construction material and to define geologic lineaments, Dickey-Lincoln School to the Brain Maint 1078, 0 to the Brain Mai	24 October 1984 (1985, 1
p.310-322 ₁ MP 1605	Use of remote sensing techniques and other information	Michel, B. ICE PRESSURE ON EN
Mechanical behavior of sea ice [1983, 105p] M 83-1 fnow concentration and effective air density during snow-	sources in regional site selection of potential land treatment	(1970, 71p)
falls (1983, p 505-507) MP 1769 Strain measurements on dumbbell specimens (1983, p.75-	areas (1978, p. 107-119) MP 1146 Computer procedure for comparison of land treatment and	WINTER REGIME OF R
77 ₁ MP 1683	conventional treatment preliminary designs, cost analysis and effluent quality predictions (1978, p 335-340)	Michitti, F.
Mechanical properties of ice in the Arctic seas [1984, p 235- 259] MP 1674	MP 1155	Unconfined compression test [1977, 27p.]
Summary of the strength and modulus of ice samples from multi-year pressure ridges (1984, p.126-133)	Snow cover mapping in northern Maine using LANDSAT digital processing techniques [1979, p.197-198]	Middlebrooks, C.H. Energy requirements for small
MP 1679	MP 1510 Environmental analysis of the Upper Susitna River Basin	tems (1979, \$2p)
Vechanical properties of multi-year sea ice. Phase 1: Test results (1984, 105p) CR 84-09	using Landsat imagery (1980, 41p) CR 80-04	Middlebrooks, E.J. Wastewater stabilization por
Mechanical properties of multi-year sea ice Testing tech-	Materials availability study of the Dickey-Lincoln dam site (1980, p 158-170) MP 1316	_
niques [1984, 39p] CR 84-08 (cebreaking by gas blasting [1984, p.93-102] MP 1827	Remote sensing of water quality using an airborne spec-	Energy requirements for small tems (1979, 82p)
Ith report of working group on testing methods in ice (1984,	troradiometer (1980, p 1353-1362; MP 1491 Snowpack estimation in the St. John River basin (1980,	Energy and costs for agricult
p 1-41; MP 1886 Shopper's guide to ice penetration (1984, p 1-35)	p 467-486 ₁ MP 1799	p 339-346; Lime stabilization and land d
MP 1992	Use of Landsat data for predicting snowmelt runoff in the upper Saint John River basin (1983, p 519-533)	lagoon sludge (1982, p 20)
Penetration of shaped charges into ice (1984, p. 137-148) MP 1995	MP 1694	Accumulation, characterizat for cold regions lagoons (
ce penetration tests (1984, p 209-240) MP 1996	Extraction of topography from side-looking satellite systems—a case study with SPOT simulation data (1983, p. 535-	Miers, B.T.
summary of the strength and modulus of ice samples from multi-year pressure ridges (1985, p.93-98) MP 1848	550 ₂ MP 1695 Land treatment processes within CAPDET (Computer-assist-	Environmental factors and a rants, climate and terrain
Mechanical properties of multi-year sea icc Phase 2 Test	ed procedure for the design and evaluation of wastewater	Miles, M.W.
ce penetration tests (1985, p.223-236) MP 2014	treatment systems) (1983, 79p.) SR 83-26 Hydrologic forecasting using Landsat data (1983, p. 159-	Lidar detection of leads in A
ce-coring augers for shallow depth sampling (1985, 22p.) CR 85-21	1683 MP 1691 Integration of Landsat land cover data into the Saginaw River	Lidar detection of leads in a
Blasting and blast effects in cold regions Part 1 Air blast	Basin geographic information system for hydrologic model-	Lidar-derived particle conce
(1985, 62p) SR 85-25 Revised guidelines for blasting floating ice (1986, 37p)	ing (1984, 19p.) SR 84-01 Water quality monitoring using an airborne spectroradiome-	leads [1990, p.9-12] Miller, J.
SR 86-10	ter (1984, p 353-360) MP 1718	Alaska synthetic aperture rad
Concentration and flux of wind-blown snow [1986, 16p] SR 86-11	Using Landsat data for snow cover/vegetation mapping (1984, p. II(140)-II(144)) MP 1975	p 593-5963 Miller, M.S.
Mechanical behavior of sea ice [1986, p 165-281] MP 2210	Potential use of SPOT HRV imagery for analysis of coastal sediment plumes (1984, p 199-204) MP 1744	Use of Landsat data for pre- upper Saint John River ha
Blasting and blast effects in cold regions Part 2 underwater explosions (1986, 56p.) SR 86-16	Wildlife habitat mapping in Lac qui Parle, Minnesota (1984,	
some developments in shaped charge technology 1986.	p 205-2083 MP 2085 Spatial analysis in recreation resource management for the	Fatraction of topography for a case study with SPOT
29p.; SR 86-18 Drill bits for frozen fine-grained soils (1986, 3)p.;	Berlin Lake Reservoir Project (1984, p 209-219) MP 2084	550) Use of Landsat digital data
SR 86-27	Ohio River main stem study the role of geographic informa-	upper Saint John River ba
Equipment for making access holes through arctic sea ice (1986, 34p) SR 86-32	tion systems and femote sensing in flood damage assess- ments (1984, p. 265-281) MP 2083	Miller, P.C.
Deviation of guidelines for blasting floating ice (198°, p.193	Use of remote sensing for the U.S. Army Corps of Engineers	Aretic ecosystem, the coa-
206 ₁ MP 2247	dredging program (1985, p.1141-1150) MP 1890	(1980, 571b.)

Catalog of Corps of Engineers structure inventories suitable for the acid precipitation-structure material study (1985, 40p) SR 85-01 uincy and Stamford structure data ding material distribution (1985, SR 85-07 simulation data for Corps of Engisimulation gaus 10, p. 6-71; MP 2184 ulator data with Landsat MSS imter masses in Delaware Bay, Broadwetlands (1985, p. 1123-1129) MP 1909 ing materials data base for New 85, 129p SR 83-19 g in the Corps of Engineers dredg-1 SR 85-20 1 SR 89-20
dicting building material distribun cities (1985, 50p) SR 85-24
g materials data base for Pittsburgh,
b) SR 86-08 materials data base for Portland, SR 86-13 materials data base for Cincinnati, SR 86-31 ga field worksheet for inventorying 1, 25p.1 SR 86-33 tta for snow cover mapping in the basin, Maine (1987, 68p) CR 87-08 resources [1987, p.186-190] MP 2535 Corps dredging operation in Lake MP 2548 hic information system for the Say-ra (1987, p 265-269) MP 2549 emote sensing technology transfer p 271-273 MP 2550 lassification routines on different tinguishing land use classes (1988, MP 2534 MF 2334

In the Corps of Engineers dredging
12991

Mp 2528

ding wall materials distribution in
(1989, 156p)

SR 89-01

remains system data with real-time
models (1989, p 857-861)

MP 2527 ıs (1990, 10p) SR 90-15 Geophysics, Golden, Colorado, 23-113p 3 SR 85-05 ENGINEERING STRUCTURES M III-BID RIVERS AND LAKES (1971, M III-BIS ests on snow, a comparative study SR 77-20 nali flow wastewater treatment sys-SR 79-07 ond linings (1978, 116p.) SR 78-28

nall flow wastewater treatment sys-SR 79-07 ultural reuse of wastewater (1980, MP 1401 I disposal of cold region wastewater 107-213₁ MP 1696 tation, and stabilization of sludges (1984, 40p) SR 84-06

standards for atmospheric obscu-n (1987, 137p 1 MP 2309

Arctic sea ice (1989, p 530-532) MP 2602

arctic sea ice (1990, p 119-123) MP 2733

icentrations in plumes from arctic MP 2758

radar (SAR) facility project (1987, MP 2408

predicting snowmelt runoff in the basin (1983, p 519-533) MP 1694

from side-looking satellite systems OT simulation data (1933), p.535 MP 1495 life for snow cover mapping in the haun, Maine (1937, 63p). CR 87-68

oastai tundra at Barrow, Alaska MP 1355 80, 571pg

Miller, R.D.	Moll, M.	Ice forces on rigid, vertical, cylindrical structures (1984,
Numerical solutions for rigid-ice model of secondary frost heave (1980, p 656-669) MP 1454	C-14 and other isotope studies on natural ice 11972, p.D70- D923 MP 1052	34p.) CR 84-32 Sheet ice forces on a conical structure; an experimental study
Numerical solutions for a rigid-ice model of secondary frost heave (1982, 11p.) CR 82-13		(1985, p.46-54) MP 1915
heave [1982, 11p.] CR 82-13 Exploration of a rigid ice model of frost heave [1985, p 281-296] MP 1880	Application of HEC-2 for ice-covered waterways (1982, p.241-248; MP 1575 Meore, H.E.	Sheet ice forces on a conical structure: an experimental study [1985, p.643-655] MP 1900 Tharacteristic frequency of force variations in communum
Hydraulic conductivity and unfrozen water content of air-free frozen silt (1990, p.323-329; MP 2551	Excavation of frozen materials (1980, p.323-345) MP 1360	crushing of sheet ice against rigid cylindrical structure [1986, p.1-12] MP 2011
Minns, S.E. Experimental investigation of potential icing of the space	Meere, J. Comparison of thermal observations of Mount St. Helens	Impact ice force and pressure: An experimental study with urea ice [1986, p.569-576] MP 2037
shuttle external tank (1982, 305p) CR 82-25 Minsk, L.D.	before and during the first week of the initial 1980 eruption [1980, p.1526-1527] MP 1482	Morrison, H.F. Airborne electromagnetic sensing of sea ice thickness (1987, 77p) MP 2673
Use of de-icing salt—possible environmental impact (1973, p.1-2) MP 1037	Moore, J.L. Lidar detection of leads in arctic sea ice (1990, p.119-123) MP 2733	77p 3 MP 2673 Morrison, T.L. Comparative tractive performance of microsiped and conven
Winter maintenance research needs (1975, p.36-38) MP 950	Moore, R.K. Surface-based scatterometer results of Arctic sea ice (1979,	tional radial tire designs (1986, 11p.) SR 86-39 Morse, J.S.
Ice accumulation on ocean structures [1977, 42p.] CR 77-17 Freeze-thaw tests of liquid deicing chemicals on selected	p 78-85; MP 1260 Radar backscattering from artificially grown sea ice (1989,	USACRREL precise thermistor meter [1985, 34p.] SR 85-26
pavement materials (1977, 16p.) CR 77-28 Current research on snow and ice removal in the United	p.259-264; MP 2667 Radar backscatter measurements over saline ice ¿1990,	Vibration analysis of a DEW Line station [1988, p.1513- 1518] MP 2341
States (1978, p.21-22) MP 1199 Systems study of snow removal (1979, p 220-225)	p.603-615; MP 2741 Morel-Seytonx, H.J.	Preliminary design guide for arctic equipment (1989, 359.) SR 89-11
MP 1237 Freezing and thawing tests of liquid deicing chemicals on	Integral transform method for the linearized Boussinesq groundwater flow equation [1981, p.375-884] MP 1470	Mulherin, N. Hudson River ice management (1985, p.96-110) MP 2174
selected pavement materials (1979, p.51-58) MP 1220	Morey, R.M.	Communication tower icing in the New England region
Noncorrosive methods of ice control (1979, p.133-162) MP 1265	Detection of moisture in construction materials (1977, 99.) CR 77-25	(1986, "p.) MP 2101 Control.ed ever ice cover breakup; part I. Hudson River field
Ice adhesion tests on coatings subjected to rain crosson [1980, 14p.] SR 80-28	Radar anisotropy of sea ice due to preferred azimuthal orien- tation of the horizontal c-axes of ice crystals (1978, p.171-	experiments (1986, p.281-291) MP 2391 Controlled river see cover beakup; part 2. Theory and
leing on structures (1980, 18p.) CR 80-31	2011 MP 1111 Radar anisotropy of sea ice due to preferred azimuthal orien-	numerical model studies (1916, p.293-305) MP 2392 Atmospheric icing on communication masts in New England
Snow removal equipment [1981, p.648-670] MP 1446 Application of removal and control methods. Section 1:	tation of horizontal c axes of ice crystals (1978, p.60)7-	(1916, 46p.) CR 36-17
Rhilways: Section 2: Highways: Section 3: Airports (1981, p.671-706) MP 1447	Remote detection of massive ice in permafrost along the	Framework for control of dynamic ice breakup by river regu- lation [1939, 14p.] CR 89-12
Effects of see on coal movement via the inland waterways [1981, 72p.] SR 81-13	Alyeska pipeline and the pump station feeder gas pipeline (1979, p.268-279) MP 1175 Remote detection of a freshwater pool off the Sagavanirktok	Mulherin, N.D. Removal of atmospheric ice from broadcast towers using low- from thick constants of the line of the first
Optimizing deicing chemical application rates [1982, 55p.) CR 82-18	River delta, Alaska (1979, p.161-164) MP 1224	frequency, high-amplitude vibrations (1988, 69.) MP 2530
Proceedings of the First International Workshop on Atmo- spheric Icing of Structures, 1-3 June 1982, Hanover, New	Anisotropic properties of sea ice in the 50- to 150-Mffx range (1979, p. 5749-5759) MP 1236	Framework for control of dynamic ice breakup by river regu- lation (1989, p.79-92) MP 2537
Hampshire (1983, 366p.) SR 83-17 How effective are icephobic coatings (1983, p.93-95)	Anisotropic properties of sea see in the 50-150 MHz range (1979, p.324-353) MP 1620 Investigations of sea ice anisotropy, electromagnetic proper-	Evaluation of shear strength of freshwater see adhered to icephobic castings (1990, p.149-154) MP 2578 Muller, A.
MP 1634 Ice observation program on the semisubmersible drilling ves-	ties, strength and under-ice current orientation (1900, p.109-153) MP 1323	Frazil ice formation in turbulent flow ¿1973, p.219-234; MP 1135
sel SEDCO 708 [1984, 14p.; SR 84-02 Assessment of ice accretion on offshore structures [1984,	Investigations of sea ice anisotropy, electromagnetic proper- ties, strength, and under-ice current orientation (1980,	Measurement of the shear stress on the underside of simulated ice covers [1990, 11p.]
12p.; SR 84-04 Strategies for winter maintenance of pavements and roadways	18p.; CR 90-20 Pooling of oil under sea ice (1981, p.912-922)	Monis, R.H. Red and near-infrared spectral reflectance of snow (1975).
g1984, p.155-167; MP 1964 Measurement of icing on offshore structures g1985, p.287-	MP 1459 High-resolution impulse radar measurements for detecting	p.345-360; MP 872 Detecting structural heat lesses with mobile infrared thermog-
2923 MP 2010 Chemical solutions to the chemical problem (1985, p.238-	sea ice and current almement under the Ross Ice Shelf (1981, p.96-97) MP 1543	raphy Part 4: Estimating quantifative heat loss at Dart- mouth College, Hanover, New Hampshire (1976, 92.)
244 ₁ MP 2224 Snow and ice prevention in the United States (1986, p.37-	Effects of conductivity of high-resolution impulse radar sounding, Ross Ice Shelf, Antarctics (1982, 12p.) CR 82-42	CR 76-33 Infrared thermography of buildings: qualitative analysis of
423 MP 1874 Military snow removal problems (1987, p.452-453) MP 2268	Brine zone in the McMurdo Ice Shelf, Antarctica (1982, 28p.) CR 82-39	window infiltration loss, Federal Office Building, Burling- ton, Verment (1977, 17p.) SR 77-21
MP 2268 Miyares, P.H.	Detection of cavities under concrete pavement (1983, 41p.) CR 83-18	Infrared thermography of buildings: Qualitative analysis of five buildings at Rickenbacker Air Force Base, Columbus Ohio [1977, 21p.] SR 77-20
Improved RP-HPLC method for determining nitroaromatics and nitramines in water (1988, 36p.) SR 88-23	Electromagnetic properties of sea see (1984, 32p.) CR 84-02	Comparative testing system of the applicability for various thermal scanning systems for detecting heat losses in build-
Development of an analytical method for the determination of explosive residues in soil. Part 3. Collaborative test re-	Electromagnetic properties of sea ice (1984, p.53-75) MP 1776	ings (1978, p.B71-B90) MP 1212 Roof response to soing conditions (1979, 40p.)
suits and final performance evaluation (1989, 29p.) CR 29-09	Authors' response to discussion on. Electromagnetic peoper- ties of sea ice (1984, p.95-97) MP 1822	CR 79-17 Thermal patterns in see under dynamic toading (1983, p. 240-
Liquid chromatographic method for determination of extract- able nitroaromatic and nitramine residues in soil (1919, p. 190-199) 34P 2586	Measuring multi-year sea ice thickness using impulse radar [1985, p.55-67] MP 1916	24) ₁ MP 1742 Thermal (2-5 6 micros) emittance of diathermanous materials
_ • _ • • • • • • • • • • • • • • • • •	Impulse radar sounding of frozen ground (1985, p.28-40) MP 1952	as a function of optical depth, critical angle and temperature [1984, p.209-220] MP 1863
Salting-out solvent extraction for preconcentration of neutral organic solutes from water (1990, p.1355-1356) MP 2743 MIZEX—a program for mesocale sir-ice-scenn interaction	Analysis of wide-angle reflection and refraction measure- ments (1985, p.53-40) MP 1953	Time-layse thermography a unique electronic imaging ap- pheation [1984, p.84-53] MP 2103
experiments in Arctic marginal ice zones. 4: Initial resolts and analysis from MIZEX 83	Investigation of the electromagnetic properties of multi-year sea ice [1985, p.151-167] MP 1902	Emittance, a lettle understood image deception in thermal imaging applications (1985, p. 72-78) MP 1962
MIZEX—a program for mesoscale air-ice-ocean interaction experiments in Arctic marginal ice zones. 4 Initial results	Electromagnetic measurements of multi-year sea nee using impulse radar (1985, 16p.) CR 85-13	Thermal emissivity of duthermanous materials (1985, p.872-878) MP 1963
and analysis from MIZEX 23 (1924, 56p.) SR 84-28 MIZEX—a program for mesoscale sir-ice-ocean interaction	Electromagnetic measurements of multi-year sea see using impulse radar [1916, p.67-93] MP 2020	Reference guide for building diagnostics equipment and tech- inques [1986, 148]: MP 2226
experiments in Arctic marginal ice zones. MIZEX bulletin	Modeling the electromagnetic property trends in sea ace and example impulse radar and frequency-domain electromag-	Test of a prototype advanced thermal imaging system (1939, p. 81-82). MP 2645
MIZEX—a program for mesoscale air-see-ocean interaction experiments in Arctic marginal ice zones MIZEX bulletin	netic see thickness sounding results (1994, p.57-133) MP 2197	Reference guide for building diagnostics equipment and tech- inques (1919, 64p.) SR 89-27 Mardey, D.
7 (1916, 81p.) SR 86-03 Meck, S.J.	Electromagnetic property trends in sea ice, Part 1 (1987, 45p) CR 87-06	Field tests of the limetic friction coefficient of sea see (1985, 20p ; CR 85-87
Classification and variation of sea ice ridging in the Arctic basin (1974, p.127-146) MP 1022	Modeling the electromagnetic property trends in sea ice; Part 1 (1987, p. 207-235) MP 2330	Laboratory and field studies of see friction coefficient (1984).
20-yr oscillation in eastern North American temperature re- cords [1976, p.484-486] MP 889	Electromagnetic measurements of a second-year sea see fine [1933, p. 121-136] MP 2346	p 314-100; MP 2126 Murphey, B.R.
Geodetic positions of borehole sites of the Greenland Ice Sheet Program (1976, 7p.) CR 76-81	Estimating sea see thickness using time-of-light data from imputer radar soundings [1989, 10p.] CR 99-22	Chemical sugration in snowpack (1929, p.292-216) MP 2757
Topological properties of some trellis pattern channel net- works [1976, 54p] CR 76-46	Ser see thickness versus impulse radar time-of-fight data [1990, p.91,08] MP 2704	Macphy, B. Calibrating cylindrical hot-film anemometer sensors (1916)
Studies of the movement of coastal sea see near Profiles Ray	Morris, C.E. Dependence of criming specific energy on the aspect ratio	p 283-298 ₁ MP 1866 Fills transfer coefficients for heat and momentum over leady
Almka, U.S.A. ₂ 1977, p. 533-546 ₂ MP 1066 Moetler, W.R.	and the structure velocity (1934, p.363-374) MP 1706	and polynyas (1956, p. 1875-1851) MP 2187 Morphy, D.
Prevention of freezing and other cold weather problems at wastewater treatment facilities (1985, 49p.) SR 85-11	Crushing ace forces on cylindrical structures (1984, p. 1-9) MP 1834	U.S. tundra beene publication int (1983), 29p.; SR 83-29

Murray, B.M. Reconnaissance observations of long-term natural vegetation	Similarity solutions of the Cauchy problem of horizontal flow of water through porous media for experimental determina-	Newton, J.L. International Workshop on the Seasonal Sea Ice Zone, Mon
recovery in the Cape Thompson region, Alaska, and additions to the checklist of flora (1985, 75p 1 CR 85-11	tion of diffusivity (1985, p 26-31) MP 1881 Role of phase equilibrium in frost heave of fine-grained soil	terey, California, Feb. 26-Mar.1, 1979 [1980, 357p] MP 129
Murray, D.F.	under negligible overburden pressure [1985, p 50-68] MP 1896	Ng, E.
Tundra disturbances and recovery following the 1949 exploratory drilling, Fish Creek, Northern Alaska (1978,	Transport of water in frozen soil 6. Effects of temperature	Thermal properties and regime of wet tundra soils at Barrow Alaska (1978, p.47-53) MP 109
81p. ₁ CR 78-28 Coastal tundra at Barrow (1980, p 1-29) MP 1356	[1987, p.44-50] MP 2213 Method for measuring the rate of water transport due to tem-	Niedoroda, A.
Reconnaissance observations of long-term 1 atural vegetation	perature gradients in unsaturated frozen soils [1988, p 412-417) MP 2362	Preliminary simulation of the formation and infilling of sea ic gouges [1986, p 259-268] MP 221
recovery in the Cape Thompson region Alaska, and additions to the checklist of flora [1985, 7.02]	commear problems in the study of water movement in frozen	Niedoroda, A.W. Preliminary simulation study of sea ice induced gouges in th
Murrmann, R.P. Trace gas analysis of Arctic and subarctic atmosphere [1971,	soils (1989, p 383-393) MP 2719 Quasi-steady problems in freezing soils: 1. analysis on the	sea floor (1985, p.126-135) MP 191
p.199-203 ₁ MP 908	steady growth of an ice layer (1990, p.207-226) MP 2695	Numerical simulation of ice gouge formation and infilling of the shelf of the Beaufort Sea (1985, p.393-407)
Land treatment of wastewater—cars studies of existing dis- posal systems at Quincy, Was' and Manteca, Cali-	Transport of water due to a temperature gradient in unsaturat-	MP 190 lce gouge hazard analysis (1986, p.57-66) MP 210
fornia [1976, 36p.] MP 920 Effect of sediment organic matter on migration of various	ed frozen clay (1990, p.57-75) MP 2701 Nakato, T.	Niedringhaus, E.L.
chemical constituents during disposal of dredged material	Laboratory investigation of the mechanics and hydraulics of river ice jams [1976, 97p] MP 1060	Prevention of freezing and other cold weather problems a wastewater treatment facilities [1985, 49p.] SR 85-1
[1976, 183p.] MP 967 Composition of vapors evolved from military TNT as in-	Laboratory investigation of the mechanics and hydraulics of	Niedringhaus, L.
fluenced by temperature, solid composition, age and source [1977, 25p] SR 77-16	river ice jams (1977, 45p) CR 77-09 Unconventional power sources for ice control at locks and	Maintaining frosty facilities (1985, p.9-15) MP 194 Cold weather O&M (1985, p.10-15) MP 207
Evaluation of existing systems for land treatment of wastewa- ter at Manteca, California, and Quincy, Washington (1977,	dams [1989, p.107-126] MP 2572 Nakazawa, N.	Nielsen, K.G. Investigation of the snow adjacen to Dye-2, Greenlan
34p ₁ CR 77-24	Results from indentation tests on freshwater ice [1988,	[1981, 23p] SR \$1-0
Nadeau, P.H. UV radiational i firsts on: Martian regolith water (1977,	p.341-350 ₁ MP 2495 Narita, S.	Nigam, D. Flexure and fracture of macrocrystalline S1 type freshwate
89p. ₁ MP 1072 Nakano, Y.	Comparative model tests in ice of a Canadian Coast Guard R- class icebreaker [1989, p.1/1-1/18] MP 2751	ice [1988, p.39-46] MP 231 Nixon, J.F.
Prediction and validation of temperature in tundra soils	Comparative model tests in ice of a Canadian Coast Guard R-	Design implications of subsoil thawing (1984, p 45-103)
[1971, p.193-197] MP 907 Theory and numerical analysis of moving boundary problems	class icebreaker (1990, p.31-52) MP 2762 National Research Council. Ad Hoc Study Group on Ice	MP 170 Nobles, L.H.
in the hydro-dynamics of porous media (1978, p. 125-134) MP 1343	Segregation and Frost Heaving [1984, 72p]	Influence of irregularities of the bed of an ice sheet on deposition rate of till (1971, p.117-126) MP 100
Soil lysimeters for validating models of wastewater renovation	MP 1809	Nolen-Hoeksems R.C.
by land application (1978, 11p) SR 78-12 Evaluation of the moving boundary theory in Darcy's flow	National Research Council. Committee on Arctic Seafloor Engineering	Measurement o the resistance of imperfectly elastic rock to the propagation of tensile cracks [1985, p.7827-7836]
through porous media [1978, p 142-151] MP 1147 Simulation of the movement of conservative chemicals in soil	Understanding the Arctic sea floor for engineering purposes (1982, 141p) SR 82-25	MP 205 Novick, M.A.
solution (1978, p.371-380) MP 1156	National Research Council. Polar Research Board.	Losses from the Fort Wainwright heat distribution system
Water movement in a land treatment system of wastewater by overland flow [1979, p.185-206] MP 1285	Committee on Permafrost Opportunities for permafrost-related research associated with	[1981, 29p] SR 81-1 Nylund, J.R.
Application of recent results in functional analysis to the problem of water tables [1979, p.185-190] MP 1269	the Trans-Alaska Pipeline System [1975, 37p] MP 1122	Engineering aspects of an experimental system for land reno
Traveling wave solutions of saturated-unsaturated flow	Neave, K.G.	vation of secondary effluent (1978, 26p. ₁ SR 78-2 O'Brien, H.
through porous media [1980, p 117-122] MP 278 Application of recent results in functional analysis to the	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1979, p.93-125) MF 1287	Atmospheric conditions and concurrent snow crystal observations during SNOW-ONE-A [1983, p.3-18]
problem of wetting fronts [1980, p 314-318] MP 1307	Delineation and engineering characteristics of permafrost beneath the Beautort San [1981, p.125-157] MP 1428	MP 175
Particular solutions to the problem of horizontal flow of water	Hyperbolic reflections on Beaufort Sea seismic records [1981, 26p] CR 81-02	Snow-cover characterization. SADARM support (1984, p 409-411) MP 209
and air through porous media near a wetting front (1980, p 81-85) MP 1341	Delincation and engineering characteristics of permafrost	Thermal measurements in snow (1986, p.183-193) MP 266
Particular solutions to the problem of vertical flow of water and air through porous media near a water table (1980,	beneath the deaufort Sea [1981, p.137-156] MP 1600 Subsea permafrost in Harrison Bay, Alaska, an interpretation	Overview of obscuration in the cold environment (1988,
p.124-1331 Mr 1342 Traveling wave solution to the problem of simultaneous flow	from Stismic data (1982, 62p) CR 82-24 Seismic velocities and subsea permafrost in the Beaufort Sea.	Snow as a thermal background preliminary results from th
of water and air through homogeneous porous media	Alaska (1983, p.894-898) MP 1665	1987 field test [1989, p.5-24] MP 262 O'Brien, H.W.
[1981, p 57 64] MP 1419 Relationship between the ice and unfrozen water phases in	Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data (1984, p. 237-	Red and near-infrared spectral reflectance of snow (1975,
frozen soil as determined by pulsed nuclea: magnetic resonance and physical description data 1982, 851	258) MP 1839 Some aspects of interpreting seismic data for information on	Observations of the ultraviolet spectral reflectance of snov
CR \$2-15 Mobility of water in frozen soils [1982, 215p]	shallow subsea permafrost [1985, p.61-65] MP 1954	[1977, 19p] CR 77-2 Near-infrared reflectance of snow-covered substrates [1981,
MP 2012	Nell, C.R. O. erview of Tanana River monitoring and research studies	17p) CR \$1-2
Use of rimitarity solutions for the problem of a wetting front - a question of unique representation [1982, p.156-166]	ncar Fairbanks, Alaska (1984, 98p. + 5 appends) SR 84-37	Snow cover characterization (1982, p.559-577)
MP 1840 Transport of water in frozen soil 1 Experimental determi-	Nelson, F. Observations on ice-cored mounds at Sukakpak Mountain.	MP 156 Problems in snow cover characterization (1982, p 139-147)
nation of soil-water diffusivity under isothermal coadition, (1982, p.221-226) MP 1629	south central brooks Pange, Alaska (1983, p 91-96)	MP 198
Transport of water in frozen soil. 2. Effects of ice on the	1/1? 1653 Nemarich, J.	Catalog of smoke/obscurant characterization instrument [1984, p 77-82] MP 186
transport of water under cothermal conditions (1983, p.15-26) MP 1601	Comparative near-milimeter wave propagation properties of snow or rain (1983, p *15-1291 MP 1690	Overview of meteorological and snow cover character at SNOW-TWO [1984, p 171-191] 186
Relationship between the ice and unfrozen water phases in frozen soils andetermined by pulsed nuclear resonance and	Attenuation and tackscatter for snow and sleet at 96, 140, and	Meteorological and snow cover measurements at Grayling
physical desorption data (1983, p.37-46) MP 1632	225 GHz (1984, p 41-52) MP 1864 Nevel, D.E.	Odar, F.
Asymptotic behaviour of solutions to the problem of wetting fronts in one-dimensional, horizontal and infinite porous	Ice forces on vertical piles [1972 p 104-114] MP 1024 Ice fo.ces on model structures [1975, p.400-407]	IMPACT OF SPHERES ON ICE CLOSURE (1972, p.473) MP 98
media (1983, p 71-78) MP 1720 Soil-water diffusivity of prosaturated frozen soils at subzero	MP 363	Oeschger, H.
temperatures (1983, p.889-893) MP 1664 Water migration due to a temperature gradient in frozen soil	I, e forces on simulated structures (1975, p.387-396) MP 864	C-14 and other isotope studies on natural ice [1972, p D70- D92] MP 105
(1983, p.951-956) MP 1666	Interpretation of the tensile strength of ice under triaxial stress (1576, p.375-387) MP 996	Ohstrom, E.G. Cantilever beam tests on reinforced ice [1976, 12p]
Transport of water in frozen soil 1. Experimental determination of soil-water diffusivity under isothermal conditions	Interpretation of the tensile strength of ice under triaxial	CR 76-0
(1983, 8p.) CR 83-22 Similarity solutions to the second boundary value problem of	stresses [1976, 90] CR 76-05 Creep theory for a floating ice sheet [1976, 98p]	O'Keefe, J. Laboratory experiments on using of rotating blades [1979]
unsaturated flow through perous media (1933, p 205-213)	SR 76-04 Ice forces on vertical piles (1977, 9p.) CR 77-10	p 85-92; MP 123 Studies of high-speed rotor using under natural condition
MP 1721 Transport of water in frozen soil 3 Experiments on the ef-	scebreaker simulation (1977, 9p) CR 77-16	(1983, p 117-123 ₁ MP 163
fects of ice content (1984, p 28-3/3) MP 1841 Role of heat and water transport in fro t heaving of fine-	Concentrated loads in a floating are sheet (1977, p 237- 245) MP 1062	Oleskiw, M.M. Computer modeling of time-dependent time using in the a
grained porous media under negligible overburden pressilie (1984, p. 93-102) MF 1842	Bearing capacity of river ice for vehicles [1978, 22p.] CR 78-03	mosphere (1983, 74p) CR 33-0
Transport of water in frozen soil: 4 Analysis of experimental	Safe ice loads computed with a pocket calculator (1979,	Oliphant, J.L. Relationship between the ice and unfrozen water phases i
results on the effects of ice content (1984, p 58-66) MP 1843	p 205-2231 MP 1249 Rending and buckling of a wedge on an electic foundation	frozen soil as determined by puried nuclear magnetic resonance and physical desorption data (1982, 8p)
Transport of water in frozen soil 5, Method for measuring the vapor diffusivity when ice is absent (1984, p 172-179)	(1980, p 278-288) MP 1303 Review of buckling analyses of ice sheets (1980, p 131-146)	CR 82-1 Comparison of unfrozen water contents measured by DS
MP 1819	MP 1322	and NMR (1982 n 115-121, MP 159

Mobility of water in frozen soils (1982, c15p) MP 2012	Expl: ition of a rigid ice model of frost heave [1985, p.281-276] MP 1880	Overgaard, S. lee properties in the Greenland and Barents Seas during sum-
Method for measuring enriched levels of deuterium in soil water [1982, 12p] SR 82-25	Thermal convection in snow [1985, 61p.] CR 85-09	mer (1983, p.142-164) MP 2062 Oxton, A.
Transport of water in frozen soil. 1. Experimental determination of soil-water diffusivity under isothermal conditions	473 MP 2006 Finite element simulation of ice crystal growth in subcooled	Computer interfacing of meteorological sensus in a severe weather and high RFI environment [1985, p 205-21]. MP 2175
r1982, p.221-226; MP 1629 Assessment of the treatability of toxic organics by overland	sodium-chloride solutions (1985, p.527-532) MP 2100 Transient two-dimensional phase change with convection,	Reliable, inexpensive radio telemetry system for the transfer of meteorological and atmospheric data from mountain-top
flow [1983, 47p.] CR 83-03 Transport of water in frozen soil. 2. Effects of ice on the transport of water under isothermal conditions [1983,	using deforming finite elements [1985, p 229-243]	sites (1986, 6p) MP 2107 Page, P.W.
p.15-261 MP 1601 Relationship between the ice and unfrozen water phases in	Theory of rat ral convection in snow (1985, p 10,641-10,-649) MP 1957	Geochemistry of subsea permafrost at Prudhoe Bay, Alaska (1978, 70p) SR 78-14
frozen soils as determined by pulsed nuclear resonance and physical desorption data [1983, p.37-46] MP 1632	using finite elements with transitinite mappings [1900,	Palazzo, A.J. Effects of wastewater application on the growth and chemical
Effect of unconfined loading on the unfrozen water content of Manchester silt [1983, 17p.] SR 83-18	p 591-607; MP 2159 Natural convection in sloping porous layers (1986, p.697-	composition of forages (1976, 8p) CR 76-39 Reclamation of acidic dredge soils with sewage sludge and
Soil-water diffusivity of unsaturated frozen soils at subzero temperatures [1983, p 889-893] MP 1664	710 ₁ MP 2158 Finite element simulation of planar instabilities during	lime at the Chesapeake and Delaware Canal [1977, 24p.] SR 77-19
Water migration due to a temperature gradient in frozen soil (1983, p.951-956) MP 1666	solidification of an undercooled melt [1987, p.81-111] MP 2585	Land application of wastewater forage growth and utilization of applied nitrogen, phosphorus and potassium (1977,
Transport of water in frozen soil. 1. Experimental determination of soil-water diffusivity under isothermal conditions	Information systems planning study (1987, 48p.) SR 87-23	p 171-180; MP 975 Utilization of sewage sludge for terrain stabilization in cold
(1983, 8p.) CR 83-22 Isothermal compressibility of water mixed with Na-saturated	XYFREZ.4 user's manual [1987, 55p.] SR 87-28 Signal-processing algorithm for the extraction of thin freshwa-	regions (1977, 45p) SR 77-37 Uptake of nutrients by plants irrigated with municipal was-
montmortilonite (1983, p 45-50) MP 2066 Transport of water in frozen soil 3. Experiments on the ef-	ter-ice thickness from short pulse radai data (1990, p 137- 145) MP 2698	tewater effluent (1978, p 395-404) MP 1151 Growth and nutrient uptake of forage grasses when receiving
fects of ice content (1984, p.28-34) MP 1841 Effects of low temperatures on the growth and unfrozen water	Onstott, R.G. Surface-based scatterometer results of Arctic sea ice (1979)	various application rates of wastewater (1978, p 157-163) MP 1153
content of an aquatic plant (1984, 8p) CR 84-14 Transport of water in frozen soil: 4 Analysis of experimental	p.78-85 ₁ MP 1260 100 MHz dielectric constant measurements of snow cover	Effects of wastewater and sewage sludge on the growth and
results on the effects of ice content (1984, p.58-66) MP 1843	dependence on environmental and snow pack parameters (1985, p 829-834) MP 1913	chemical composition of turfgrass (1978, 11p) SR 78-20
Effects of soluble salts on the unfrozen water contents of the	Radar backscatter measurements over saline ice 1990, p 603-6151 MP 2741	Five-year performance of CRREL land treatment test cells; water quality plant yields and nutrient uptake [1978, 24p. SR 78-26
Effects of magnetic particles on the unfrozen water content of	Opitz, B.K. Environmental factors and standards for atmospheric obscu-	Land treatment systems and the environment (1979, p.201-
frozen soils determined by nuclear magnetic resonance [1984, p 63-73] MP 1790	rants, climate and terrain (1987, 137p) MP 2309 Orcutt, J.A.	225 ₁ MP 1414 International and national developments in land treatment of
Deuterium diffusion in a soil-water-ice mixture [1984, 11p] SR 84-27	Observations of low-frequency acoustic-to-seismic coupling in the summer and winter (1989, p.352-359)	wastewater (1979, 28p) MP 1420 Utilization of sewage sludge for terrain stabilization in cold
Experimental measurement of channeling of flow in porous media [1985, p.394-399] MP 1967	MP 2654 Acoustic pulse propagation above grassland and snow com-	regions, Part 2 (1979, 36p) SR 79-28 Land application of wastewater effect on soil and plant potas-
Effects of soluble saits on the unfrozen water contents of the Lanzhou, PRC, silt [1985, p.99-109] MP 1933	parison of theoretical and experimental waveforms [1990.	sium [1979, p 309-312] MP 1228 Utilization of sewage sludge for terrain stabilization in cold
Water migration in unsaturated frozen morin clay under lin- ear temperature gradients [1985, p.111-122]	Ormsby, J.P.	regions. Pt. 3 (1979, 33p) SR 79-34 Revegetation at two construction sites in New Hampshire and
MP 1934 Experimental study on factors affecting water migration in	Landsat digital analysis of the initial recovery of the Kokolik River tundra fire area, Alaska [1979, 15p] MP 1638	Alaska [1980, 21p] CR 80-03
frozen morin clay [1985, p.123-128] MP 1897	LANDSAT digital analysis of the initial recovery of burned tundra at Kokolik River, Alaska [1980, p 263-272]	Wastewater treatment in cold regions by overland flow (1980, 14p) CR 80-07
Model for dielectric constants of frozen soils [1985, p 46-	MP 1301	m 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
57 ₁ MP 1926	O'Rourke, M.	Forage grass growth on overland flow systems [1980, p.347-354] MP 1402
57 ₁ MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method [1985, p 83-87 ₁ MP 1929	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] MP 2427	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal
57 ₁ MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method [1985, p 83-87] MP 1929 Soil-water potential and unfrozen water content and tempera- tue [1985, p.1-14] MP 1932	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends.) MP 2427 Analysis of roof snow load case studies; uniform loads, 1983, 29p.) CR 83-01	354) MP 1402. Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68) MP 1425. Plant growth on a gravel soil greenhouse studies [1981, 80]
Frediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tue (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111	O'Rourke, M. Snow load data analysis, winter 1976-77 t1977, 9p + appends 7 MP 2427 Analysis of roof snow load case studies; uniform loads t1983, 29p CR 83-01 Proposed code provisions for drifted snow loads t1986, p 2080-2092, MP 2148	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] MP 1425 Plant growth on a gravil soil greenhouse studies [1981, 8p] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irri-
77, MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-z (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 18p) CR 87-09	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads [1986, p 2080-2092] O'Rourke, M.J. Snow loads on structures [1978, p 418-428] MP 1801	354) MP 1402 Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a gravel soil greenhouse studies (1981, 8p.) Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p.) CR 81-08 Seven-year performance of CRREL slow-rate land treatment
573 MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- ture (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Olsea, R.O. Comparative near-millimeter wave propagation properties of	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends) Analysis of roof snow load case studies; uniform loads (1983, 29p.) CR 83-01 Proposed code provisions for drifted snow loads (1986, p. 2080-2092, MP 2148 O'Rourke, M.J.	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a gravel soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12
57] MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-: (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p.) CR 87-09 Olsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K.	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads [1986, p 2080-2092] O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alas-	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] MP 1425 Plant growth on a gravel soil greenhouse studies [1981, 825] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 199] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 259] SR 81-12 Wastewater treatment by a prototype slow rate land treatment system [1981, 449] CR 81-18
57) MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-: [1985, p.1-14] MP 1932 Toxic organics removal kinetics in overland flow land treat- ment [1985, p.707-718] MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] CR 83-01 Proposed code provisions for drifted snow loads [1986, p 2080-2092] O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of membrane roofs in Alaska [1986, p 277-290] MP 2003	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a grav-1soil greenhouse studies (1981, 8p, SR 81-04) Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511
77) MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) Soil-water potential and unfrozen water content and tempera- tu-z (1985, p.1-14) Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) Numerical solutions for rigid-ice model of secondary frost heave (1980, p.636-669) MP 1454	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p. + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] CR 83-01 Proposed code provisions for drifted snow loads (1986, p. 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p. 418-428] MP 1801 Uniform snow loads on structures [1982, p. 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) MP 2003 O'Steen, D.A. Ice engineering [1980, p.41-47] MP 1602	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a gravel soil greenhouse studies (1981, 8p.) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p.) Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p.) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p.) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p.) SR 82-04
573 MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) Soil-water potential and unfrozen water content and tempera- tu-e (1985, p.1-14) Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Olsen, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Nelll, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) Numerical solutions for rigid-ice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1980,	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads (1986, p 2080-2092) O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-inbrane roofs in Alaska [1986, p 277-290] O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] MP 960	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] MP 1425 Plant growth on a grav-1 soil greenhouse studies [1981, 82] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-14 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05
77] MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tue (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Olsen, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-nee model of secondary frost heave (1980, p.636-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) Bottom heat transfer to water bodies in winter (1981, 8p)	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends) Analysis of roof snow load case studies; uniform loads (1983, 29p.) Proposed code provisions for drifted snow loads (1986, p. 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures (1978, p. 418-428) Uniform snow loads on structures (1982, p. 2781-2798) MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) MP 2003 O'Steen, D.A. Ice engineering (1980, p.41-47) Osterkamp, T.E. Yukon River breakup 1976 (1977, p.592-596) Chemistry of interstitial water from subsea permafrost. Prudhoe Bay, Alaska (1978, p.9-98) MP 1385	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a gravil soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-18 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation (1982, p.198-301) MP 1735
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu: 2 (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Olsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p) SR 81-18 Hably afficient, oscillation free solution of the transport	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1801 Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p 277-290) O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p 92-98) Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves] MP 1317	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68). MP 1425 Plant growth on a gravel soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-05 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation (1982, p.198-301) MP 1735 Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime (1983, 11p)
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-: (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.636-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p. 1655- 1675) MP 1497	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends) Amp 2427 Analysis of roof snow load case studies; uniform loads (1983, 29p) CR 83-01 Proposed code provisions for drifted snow loads (1986, p. 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures (1978, p. 418-428) MP 1801 Uniform snow loads on structures (1982, p. 2781-2798) MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) MP 2003 O'Steen, D.A. Ice engineering (1980, p.41-47) MP 1602 Osterkamp, T.E. Yukon River breakup 1976 (1977, p.592-596) Prudhoe Bay, Alaska (1978, p. 92-98) MP 138 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 (1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 (1979, c50 leaves) MP 1318	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] MP 1425 Plant growth on a grav-1 soil greenhouse studies [1981, 82] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems [1982, p.135-154] MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation [1982, p.198-301] MP 1735 Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime [1983, 11p] CR 83-28 Effects of low temperatures on the growth and unfrozen water
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- ture (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Olsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) Bottom heat transfer to water bodies in winter (1981, 8) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p.1665- 1675) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1489	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends) Analysis of roof snow load case studies; uniform loads (1983, 29p) CR 83-01 Proposed code provisions for drifted snow loads (1986, p. 2080-2092) O'Rourke, M.J. Snow loads on structures (1978, p. 418-428) Uniform snow loads on structures (1982, p. 2781-2798) MP 1574 Osgood, S. Lessons learned from examination of membrane roofs in Alaska (1986, p. 277-290) O'Steen, D.A. Ice engineering (1980, p.41-47) Osterkamp, T.E. Yukon River breakup 1976 (1977, p.592-596) Chemistry of intersittial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p. 92-98) Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 (1979, c50 leaves) MP 1315 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 (1979, c50 leaves) MP 1315 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p, + Figs) MP 1315	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a grav-1 soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-18 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation (1982, p.198-301) MP 1735 Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime (1983, 11p) CR 83-28 Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 84-18 Effect and disposition of TNT in a terrestrial plant (1986,
57] MP 1926 Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tute (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p.) R 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p. 1665- 1675) One-dimensional transport from a highly concentrated, transfer type source (1982, p.27-36) MP 1489 Numerical solutions for a rigid-ice model of secondary frost heave (1982, 11p) CR 82-13	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p. + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p.] Proposed code provisions for drifted snow loads [1986, p. 2080-2092] O'Rourke, M.J. Snow loads on structures [1978, p. 418-428] Uniform snow loads on structures [1982, p. 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of membrane roofs in Alaska [1986, p. 277-290] O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p. 592-596] Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska [1978, p. 92-98] Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves] Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves] Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs.) MP 1315 Ott, R. Prevention of freezing and other cold weather problems at	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] MP 1425 Plant growth on a gravel soil greenhouse studies [1981, 8p] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-12 Wastewater treatment by a prototype slow rate land treatment system [1981, 44p] CR 81-14 Vegetation selection and management for overland flow systems [1982, p.135-154] MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 82-05 Plant growth and management for wastewater treatment in overland flow systems [1982, 21p] SR 82-05 Sewage sludge aids revegetation [1982, p.198-301] Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime [1983, 11p] Effects of low temperatures on the growth and unfrozen waster content of an aquatic plant [1984, 8p] CR 84-14 Effect and disposition of TNT in a terrestrial plant and valida- Effect and disposition of TNT in a terrestrial plant and valida- Effect and disposition of TNT in a terrestrial plant and valida- Effect and disposition of TNT in a terrestrial plant and valida-
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.636-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p. 165- 1675) MP 1497 One-dimensional transport from a highly concentrated, transfer type source (1982, p.27-36) MP 1497 Numerical solutions for a rigid-ice model of secondary frost heave (1982, 11p) CR 82-13 Mobility of water in frozen soils (1982, c15p)	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p 277-290) MP 2003 O'Steen, D.A. Ice engineering [1980, p.41-47] MP 1602 Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] Prudhoe Bay, Alaska (1978, p 92-98) MP 1385 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves] MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tana, 1833-1978 [1979, c50 leaves] MP 1318 Break-up of the Yukon River, Pt 2 Alakanuk to Tana, 1833-1978 [1979, c50 leaves] MP 1318 Break-up of the Yukon River, Pt 2 Alakanuk to Tana, 1833-1978 [1979, c50 leaves] MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs) MP 1315 Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities [1985, 49p] SR 85-11 Outcalt, S.I.	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68). MP 1425 Plant growth on a gravel soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation (1982, p.198-301) Long-term plant persistence and restoration of acide dredge soils with sewage sludge and lime (1983, 11p) Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 83-28 Effect and disposition of TNT in a terrestrial plant and validation of analytical methods (1986, 17p) Effect of temperature and species on TNT injury to plants Effects of temperature and species on TNT injury to plants
Prediction of unfrozen water contents in frozen soils by a two-point or one-point method [1985, p 83-87] MP 1929 Soil-water potential and unfrozen water content and temperature [1985, p.1-14] MP 1932 Toxic organics removal kinetics in overland flow land treatment [1985, p.707-718] MP 2111 Factors affecting water migration in frozen soils [1987, 16p] CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of snow or rain [1983, p.115-129] MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil [1979, p.304-309] MP 1259 Numerical solutions for rigid-ice model of secondary frost heave [1980, p.636-669] MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change [1981, p.81-96] Bottom heat transfer to water bodies in winter [1981, 8p] SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces [1981, p.1655-1675] One-dimensional transport from a highly concentrated, transfer type source [1982, p.27-36] MP 1497 One-dimensional transport from a highly concentrated, transfer type source [1982, p.27-36] MP 1499 Numerical solutions for a rigid-ice model of secondary frost heave [1982, 11p] Mobility of water in frozen soils [1982, c15p] Simple fixed mesh finite element solution of two-dimensional phase change problems [1983, p.653-658] MP 1584	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends) Analysis of roof snow load case studies; uniform loads (1983, 29p) CR 83-01 Proposed code provisions for drifted snow loads (1986, p. 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures (1978, p. 418-428) MP 1801 Uniform snow loads on structures (1982, p. 2781-2798) MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) MP 2003 O'Steen, D.A. Ice engineering (1980, p.41-47) Osterkamp, T.E. Yukon River breakup 1976 (1977, p.592-596) Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p. 92-98) MP 138 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 (1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 (1979, c50 leaves) MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs) Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities (1985, 49p) SR 85-11 Outcalt, S.1. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p. 709-715) MP 857	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] MP 1425 Plant growth on a grav-1 soil greenhouse studies [1981, 8p] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-14 Wastewater treatment by a prototype slow rate land treatment system [1981, 44p] CR 81-14 Vegetation selection and management for overland flow systems [1982, p.135-154] MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 82-04 Plant growth and management for wastewater treatment in overland flow systems [1982, 21p] SR 82-05 Sewage sludge aids revegetation [1982, p.198-301] Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime [1983, 11p] CR 83-28 Effects of low temperatures on the growth and unfrozen water content of an aquatic plant [1984, 8p] CR 84-14 Effect and disposition of TNT in a terrestrial plant [1986, p 49-52] Effect of analytical methods [1986, 17p] CR 86-15 Effects of temperature and species on TNT injury to plants [1988, 7p] Effects of soil covers on late-fall seedings of four tail fescue
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-e (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) Bottom heat transfer to water bodies in winter (1981, 8) KR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p.1665- 1675) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1497 Numerical solutions for a rigid-ice model of secondary frost heave (1982, 11p) Simple fixed mesh finite element solution of two-dimensional phase change problems (1983, p.653-658) MP 1584 Physics of mathematical frost heave models a review (1983, p.275-291) MP 1588	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p. 4p. pends] Analysis of roof snow load case studies; uniform loads [1983, 29p.] Proposed code provisions for drifted snow loads (1986, p. 2080-2092) O'Rourke, M.J. Snow loads on structures [1978, p. 418-428] MP 2148 O'Rourke, M.J. Snow loads on structures [1982, p. 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p. 592-596] Chemistry of intersittial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p. 92-98) Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves] Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves] Break-up of the Yukon River at the Haul Road Bindge 1979 (1979, 22p. + Figs.) Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities [1985, 49p.] SR 85-11 Outcalt, S.I. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p. 709-715) Computer modeling of terrain modifications in the arctic and subarctic (1977, p. 24-32) MP 971	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68). MP 1425 Plant growth on a grav-1 soil greenhouse studies (1981, 8p 1 SR 81-04). Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p 1 CR 81-08). Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p 1 SR 81-12). Wastewater treatment by a prototype slow rate land treatment system (1981, 44p 1 CR 81-14). Vegetation selection and management for overland flow systems (1982, p.135-154). MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p 1 SR 82-04). Seage sludge aids revegetation (1982, p.198-301). Seage sludge aids revegetation (1982, p.198-301). Long-term plant persistence and restoration of acide dredge soils with sewage sludge and lime (1983, 11p). CR 83-28. Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p). CR 84-14. Effect and disposition of TNT in a terrestrial plant (1986, p.49-52). MP 2098 Effect and disposition of TNT in a terrestrial plant and validation of analytical methods (1986, 17p). CR 86-15. Effects of temperature and species on TNT injury to plants (1988, 7p). SR 89-17.
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-z (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p. 165-1675) MP 1497 One-dimensional transport from a highly concentrated, transfer type source (1982, p.27-36) MP 1497 One-dimensional transport from a highly concentrated, transfer type source (1982, p.27-36) MP 1497 One-dimensional finite element solution of two-dimensional phase change problems (1983, p.53-658) MP 2012 Simple fixed mesh finite element solution of two-dimensional phase change problems (1983, p.53-658) MP 2012 Simple fixed mesh finite element solution of two-dimensional phase change problems (1983, p.53-658) MP 1584 Physics of mathematical frost heave models a review (1983, p.275-291) MP 1607 2012 4012	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p 277-290) MP 2003 O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] Chemistry of intersittial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p 92-98) MP 1385 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs) MP 1315 Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities [1985, 49p] SR 85-11 Outcalt, S.I. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1977, p 709-715) MP 877 Computer modeling of terrain modifications in the arctic, and subarctic (1977, p 24-32) MP 971 Thermal properties and regime of wet tundra soils at Barrow, Alaska (1975, p 47-53) MP 1096	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) Plant growth on a grav-1 soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation (1982, p.198-301) MP 1735 Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime (1983, 11p) CR 83-28 Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 84-14 Effect and disposition of TNT in a terrestrial plant (1986, p 49-52) Effect and disposition of TNT in a terrestrial plant and validation of analytical methods (1986, 17p) CR 86-15 Effects of temperature and species on TNT injury to plants (1988, 7p) Effects of synl covers on late-fall seedings of four tail fescue
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-: (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of anow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.636-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p. 1665- 1675) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1497 Simple fixed mesh finite element solution of two- heave (1982, 11p) CR 82-13 MP 2012 Simple fixed mesh finite element solution of two- dimensional phase change problems (1983, p 653-658) MP 1584 Physics of mathematical frost heave models a review (1983, p.275-291) MP 1582 Solution of 2-d axisymmetric phase change problems (1983, p.102-112) Solution of 2-d axisymmetric phase change problems on a	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Umform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p 277-290) MP 2003 O'Steen, D.A. Ice engineering [1980, p.41-47] MP 1602 Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] MP 960 Chemistry of intersittial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p 92-98) MP 1385 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Computer for the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p 709-715) Computer modeling of terrain modifications in the arctic and subarctic (1977, p 24-32) Thermal properties and regime of wet tundra soils at Barrow, Alaska (1978, p 47-53) Observations on rec-cored mounds at Sukakpak Mountain, south central Brooks Range, Alaska [1933, p 91-96)	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68]. MP 1425 Plant growth on a grav-1 soil greenhouse studies [1981, 8p] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-12 Wastewater treatment by a prototype slow rate land treatment system [1981, 44p] CR 81-14 Vegetation selection and management for overland flow systems [1982, p.135-154] MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 82-04 Plant growth and management for wastewater treatment in overland flow systems [1982, 21p] SR 82-05 Sewage sludge aids revegetation [1982, p.198-301] Long-term plant persistence and restoration of acide dredge soils with sewage sludge and lime [1983, 11p] Effects of low temperatures on the growth and unfrozen water content of an aquatic plant [1984, 8p) CR 84-14 Effect and disposition of TNT in a terrestrial plant and validation of analytical methods [1986, 17p] CR 86-15 Effects of temperature and species on TNT injury to plants [1988, 7p] Effects of soil covers on late-fall seedings of four tall fescue varieties [1989, 5p] SR 89-17 Palmer, R.A.
Prediction of unfrozen water contents in frozen soils by a two-point or one-point method [1985, p 83-87] MP 1929 Soil-water potential and unfrozen water content and temperature [1985, p.1-14] MP 1932 Toxic organics removal kinetics in overland flow land treatment [1985, p.707-718] MP 2111 Factors affecting water migration in frozen soils [1987, 16p] CR 87-09 Obea, R.O. Comparative near-millimeter wave propagation properties of snow or rain [1983, p.115-129] MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil [1979, p.304-309] MP 1259 Numerical solutions for rigid-ice model of secondary frost heave [1980, p.636-669] MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change [1981, p.81-96] Bottom heat transfer to water bodies in winter [1981, 8p, SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces [1981, p.1665-1675] One-dimensional transport from a highly concentrated, transfer type source [1982, p.27-36] MP 1497 One-dimensional transport from a highly concentrated, transfer type source [1982, p.27-36] MP 1489 Numerical solutions for a nigid-ice model of secondary frost heave [1982, 11p] CR 82-13 Mobility of water in frozen soils [1982, c15p] Simple fixed mesh finite element solution of two-dimensional phase change problems [1983, p.653-658] MP 1584 Physics of mathematical frost heave models a review [1983, p.275-291] MP 1588 Solution of 2-d axisymmetric phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change zone [1983, p.102-112]	O'Rourke, M. Snow load data analysis, winter 1976-77 (1977, 9p. + appends) Analysis of roof snow load case studies; uniform loads (1983, 29p) CR 83-01 Proposed code provisions for drifted snow loads (1986, p. 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures (1978, p. 418-428) MP 1801 Uniform snow loads on structures (1982, p. 2781-2798) MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) MP 2003 O'Steen, D.A. Ice engineering (1980, p.41-47) Osterkamp, T.E. Yukon River breakup 1976 (1977, p.592-596) Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p. 92-98) MP 138 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 (1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 (1979, c50 leaves) MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs) Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities (1985, 49p) SR 85-11 Outcalt, S.1. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p. 709-715) MP 857 Computer modeling of terrain modifications in the arctic and subarctic (1977, p. 24-32) Thermal properties and regime of wet tundra soils at Barrow, Alaska (1978, p. 47-53) Observations on rec-cored mounds at Sukakpak Mountain, south central Brooks Range, Alaska (1983, p. 91-96) Relationships between estimated mean annual air and perma-	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] Plant growth on a gravel soil greenhouse studies [1981, 8p] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-04 Wastewater treatment by a prototype slow rate land treatment system [1981, 44p] Vegetation selection and management for overland flow systems [1982, p.135-154] Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 82-05 Sewage sludge and management for wastewater treatment in overland flow systems [1982, 21p] SR 82-05 Sewage sludge and revegetation [1982, p.198-301] MP 1735 Long-term plant persistence and restoration of acide diedge soils with sewage sludge and lime [1983, 11p] Effects of low temperatures on the growth and unfrozen water content of an aquatic plant [1984, 8p) CR 84-14 Effect and disposition of TNT in a terrestrial plant and validation of analytical methods [1986, 17p] Effect of temperature and species on TNT injury to plants [1988, 7p) SR 88-16 Effects of soil covers on late-fall seedings of four tail fescue varieties [1989, 5p] Palmer, R.A. Clear improvement in obscuration [1985, p 476-477, MP 2067 Thermal m.odel for snow-covered terrain [1989, p 25-36, MP 2655
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-e (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-tice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, p.81-96) Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p.1665- 1675) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1489 Numerical solutions for a rigid-tice model of secondary frost heave (1982, 11p) MP 1489 Numerical solutions for a nigid-tice model of secondary frost heave (1982, 11p) MP 1489 Simple fixed mesh finite element solution of two-dimensional phase change problems (1983, p.653-658) MP 1584 Physics of mathematical frost heave models a review (1983, p.275-291) MP 1588 Solution of 2-d axisymmetric phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width ph	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p. 4 appends] Analysis of roof snow load case studies; uniform loads [1983, 29p.] Proposed code provisions for drifted snow loads (1986, p. 2080-2092) O'Rourke, M.J. Snow loads on structures [1978, p. 418-428] MP 12148 O'Rourke, M.J. Snow loads on structures [1982, p. 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p. 592-596] Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p. 92-98) Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves) Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs.) Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities [1985, 49p.) SR 85-11 Outcalt, S.I. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p. 709-715) MP 857 Computer modeling of terrain modifications in the arctic and subarctic (1977, p. 724-32) MP 971 Thermal properties and regime of wet tundra soils at Barrow, Alaska (1975, p. 709-715) NP 857 Computer modeling of terrain modifications in the arctic and subarctic (1977, p. 724-32) MP 971 Thermal properties and regime of wet tundra soils at Barrow, Alaska (1978, p. 47-53) Observations on rec-cored mounds at Sukakpak Mountain, south central Brooks Range, Alaska (1983, p. 91-96) MP 1658	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) MP 1425 Plant growth on a grav-1 soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-14 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge aids revegetation (1982, p.198-301) MP 1735 Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime (1983, 11p) Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 84-14 Effect and disposition of TNT in a terrestrial plant (1986, p.49-52) Effect and disposition of TNT in a terrestrial plant and validation of analytical methods (1986, 17p) CR 86-15 Effects of temperature and species on TNT injury to plants (1988, 7p) Effects of soil covers on late-fall seedings of four tall fescue varieties (1989, 5p) Palmer, R.A. Clear improvement in obscuration (1985, p.476-477) MP 2625
Prediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-z (1985, p.1-14) MP 1932 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Olsea, R.O. Comparative near-millimeter wave propagation properties of snow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.656-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) Bottom heat transfer to water bodies in winter (1981, 849) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p.1665- 1675) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1489 Numerical solutions for a rigid-ice model of secondary frost heave (1982, 119) CR 82-13 Mobility of water in frozen soils (1982, c15p) Simple fixed mesh finite element solution of two-dimensional phase change problems (1983, p.653-658) MP 1584 Physics of mathematical frost heave models a review (1983, p.275-291) Ad transient freezing in a pipe with turbulent flow, using a continually deforming mesh with finite elements (1983, p.102-112) Solution of 2-d axisymmetric phase change problems on a fixed mesh, with zero width phase change problems on a fixed mesh, with zero width phase change zone (1983, p.134-146) Boundary integral equation solution or moving boundary phase change problems (1983, p.185-1850) Use of transfinite mappings with finite elements on a moving	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p 277-290) MP 2003 O'Steen, D.A. Ice engineering [1980, p.41-47] MP 1602 Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] Prudhoe Bay, Alaska (1978, p 92-98) MP 1385 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs) MP 1315 Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities [1985, 49p] SR 85-11 Outcalt, S.I. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1977, p 709-715) Computer modeling of terrian modifications in the arctic and subarctic (1977, p 24-32) Thermal properties and regime of wet tundra soils at Barrow, Alaska (1978, p 47-53) Observations on ice-cored mounds at Sukakpak Mountain, south central Brooks Range, Alaska [1983, p 91-96) MP 1653 Relationships between estimated mean annual air and permafrost temperatures in North-Central Alaska [1983, p 91-96) AMP 1653 Potential responses of permafrost to climatic warming [1984, p 92-105]	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water (1981, p 64-68) Plant growth on a grav-1 soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 44p) CR 81-18 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-04 Plant growth and management for wastewater treatment in overland flow systems (1982, 21p) SR 82-05 Sewage sludge ands revegetation (1982, p.198-301) MP 1735 Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime (1983, 11p) Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 84-18 Effect and disposition of TNT in a terrestrial plant (1986, p.49-52) Effect and disposition of TNT in a terrestrial plant (1986, p.49-52) Effect and disposition of TNT in a terrestrial plant and validation of analytical methods (1986, 17p) CR 86-15 Effects of temperature and species on TNT injury to plants (1988, 7p) SR 88-16 Effects of soil covers on late-fall seedings of four tall fescue varieties (1989, 5p) SR 89-17 Palmer, R.A. Clear improvement in obscuration (1985, p.476-477) Thermal model for snow-covered terrain (1989, p.25-36) MP 2057 Pangburn, T. Use of Landsat data for predicting snowmelt runoff in the upper Saint John River basin (1983, p.519-533) MP 1694 Use of radio frequency selector for snow/soil moisture water
Frediction of unfrozen water contents in frozen soils by a two- point or one-point method (1985, p 83-87) MP 1929 Soil-water potential and unfrozen water content and tempera- tu-z (1985, p.1-14) MP 2131 Toxic organics removal kinetics in overland flow land treat- ment (1985, p.707-718) MP 2111 Factors affecting water migration in frozen soils (1987, 16p) CR 87-09 Obsa, R.O. Comparative near-millimeter wave propagation properties of anow or rain (1983, p.115-129) MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil (1979, p.304-309) MP 1259 Numerical solutions for rigid-ice model of secondary frost heave (1980, p.636-669) MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change (1981, p.81-96) MP 1493 Bottom heat transfer to water bodies in winter (1981, 8p) SR 81-18 Highly efficient, oscillation free solution of the transport equation over long times and large spaces (1981, p. 1665- 1675) MP 1497 One-dimensional transport from a highly concentrated, trans- fer type source (1982, p.27-36) MP 1499 Numerical solutions for a rigid-ice model of secondary frost heave (1982, 11p) CR 82-13 Mobility of water in frozen soils (1982, c15p) Simple fixed mesh fiinte element solution of two-dimensional phase change problems (1983, p.653-658) MP 1584 Physics of mathematical frost heave models a review (1983, p.275-291) MP 1593 Solution of 2-d axisymmetric phase change problems on a fixed mesh, with zero width phase change zone (1983, p.102-112) MP 1894 Boundary integral equation solution of moving boundary phase change problems (1983, p.1825-1850) MP 2093 Use of transfinite mappings with finite elements on a moving mesh for two-dimensional phase change (1983, p.85-110) MP 2093	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p + appends] Analysis of roof snow load case studies; uniform loads [1983, 29p] CR 83-01 Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148 O'Rourke, M.J. Snow loads on structures [1978, p 418-428] Uniform snow loads on structures [1982, p 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p 277-290) MP 2003 O'Steen, D.A. Ice engineering [1980, p.41-47] MP 1602 Osterkamp, T.E. Yukon River breakup 1976 [1977, p.592-596] Prudhoe Bay, Alaska (1978, p 92-98) MP 1385 Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves) MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River, Pt 2 Alakanuk to Tanana, 1833-1978 [1979, c50 leaves) MP 1318 Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska [1975, p 709-715) Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska [1975, p 709-715] Computer modeling of terrain modifications in the arctic and subarctic (1977, p 24-32) Thermal properties and regime of wet tundra soils at Barrow, Alaska (1978, p 47-53) Obervations on rec-cored mounds at Sukakpak Mountain, south central Brooks Range, Alaska [1983, p 19-96) Potential responses of permafrost to climatic warming [1984, p 92-105] Ovenshine, A.T. Subsidence, inundation, and sedimentation environmental	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal waste water [1981, p 64-68] Plant growth on a gravel soil greenhouse studies [1981, 8p] SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater [1981, 19p] CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes [1981, 25p] SR 81-04 Wastewater treatment by a prototype slow rate land treatment system [1981, 44p] Vegetation selection and management for overland flow systems [1982, p.135-154] MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment [1982, 15p] SR 22-05 Sewage sludge and revegetation [1982, p.198-301] Sewage sludge and revegetation [1982, p.198-301] Long-term plant persistence and restoration of acidic dredge soils with sewage sludge and lime [1983, 11p] Effects of low temperatures on the growth and unfrozen wastewater tonent of an aquatic plant [1984, 8p] CR 84-14 Effect and disposition of TNT in a terrestrial plant and validation of analytical methods [1986, 17p] CR 86-18 Effects of soil covers on late-fall seedings of four tail fescue varieties [1989, 5p] SR 88-16 Effects of soil covers on late-fall seedings of four tail fescue varieties [1989, 5p] Palmer, R.A. Clear improvement in obscuration [1985, p 476-477] MP 2067 Thermal model for snow-covered terrain [1989, p 25-36, MP 2625 Pangburn, T. Use of Landsat data for predicting snowmelt runoff in the upper Saint John River basin [1983, p 519-533] MP 1694 Use of radio frequency sensor for snow/soil moisture water content measurement [1983, p 33-342] Hydrologic forecasting using Landad data [1983, p 159-494] Hydrologic forecasting using Landad and a [1983, p 159-494] Hydrologic forecasting using Landad and a [1983, p 159-494]
Prediction of unfrozen water contents in frozen soils by a two-point or one-point method [1985, p 83-87] MP 1929 Soil-water potential and unfrozen water content and temperature [1985, p.1-14] MP 1932 Toxic organics removal kinetics in overland flow land treatment [1985, p.707-718] MP 2111 Factors affecting water migration in frozen soils [1987, 16p] CR 87-09 Obea, R.O. Comparative near-millimeter wave propagation properties of snow or rain [1983, p.115-129] MP 1690 O'Neill, K. Analysis of coupled heat and moisture flow in an unsaturated soil [1979, p.304-309] MP 1259 Numerical solutions for rigid-ice model of secondary frost heave [1980, p.636-669] MP 1454 Continuously deforming finite elements for the solution of parabolic problems, with and without phase change [1981, p.81-96] Bottom heat transfer to water bodies in winter [1981, 8p, SR 81-18] Highly efficient, oscillation free solution of the transport equation over long times and large spaces [1981, p.1665-1675] MP 1497 One-dimensional transport from a highly concentrated, transfer type source [1982, p.27-36] MP 1489 Numerical solutions for a rigid-ice model of secondary frost heave [1982, 11p] CR 82-13 Mobility of water in frozen soils [1982, c15p] Simple fixed mesh finite element solution of two-dimensional phase change problems [1983, p.653-658] MP 1894 Physics of mathematical frost heave models a review [1983, p.102-112] Solution of 2-d axisymmetric phase change problems on a fixed mesh, with zero width phase change problems (1983, p.134-146) Boundary integral equation solution of moving boundary phase change problems [1983, p.185-1850] Use of transfinite mappings with finite elements on a moving mesh for two-dimensional phase change in a moving mesh for two-dimensional phase change in a moving mesh for two-dimension and make of the moving mesh for two-dimension and make means and make means of the moving boundary integral equation solution of a moving boundary mesh for two-dimensional phase change 1983, p.185-110)	O'Rourke, M. Snow load data analysis, winter 1976-77 [1977, 9p. 4 appends] Analysis of roof snow load case studies; uniform loads [1983, 29p.] Proposed code provisions for drifted snow loads (1986, p. 2080-2092) O'Rourke, M.J. Snow loads on structures [1978, p. 418-428] MP 12148 O'Rourke, M.J. Snow loads on structures [1982, p. 2781-2798] MP 1574 Osgood, S. Lessons learned from examination of me-nbrane roofs in Alaska (1986, p. 277-290) O'Steen, D.A. Ice engineering [1980, p.41-47] Osterkamp, T.E. Yukon River breakup 1976 [1977, p. 592-596] Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska (1978, p. 92-98) Break-up dates for the Yukon River, Pt 1 Rampart to Whitehorse, 1896-1978 [1979, c50 leaves) Break-up dates for the Yukon River, Pt 2 Alakanuk to Tanana, 1883-1978 [1979, c50 leaves) MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979 (1979, 22p. + Figs.) Ott, R. Prevention of freezing and other cold weather problems at wastewater treatment facilities [1985, 49p.) SR 85-11 Outcalt, S.I. Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska (1975, p. 709-715) MP 857 Computer modeling of terrain modifications in the arctic, and subarctic (1977, p. 24-32) Thermal properties and regime of wet tundra soils at Barrow, Alaska (1978, p. 47-53) Observations on tec-cored mounds at Sukakpak Mountain, south central Brooks Range, Alaska (1983, p. 91-96) MP 1658 Relationships between estimated mean annual air and permafrost temperatures in North-Central Alaska (1984, p. 91-96) MP 1659 Overshine, A.T.	Seasonal growth and accumulation of nitrogen, phosphorus, and potassium by orchardgrass irrigated with municipal wate water (1981, p 64-68) Plant growth on a gravel soil greenhouse studies (1981, 8p) SR 81-04 Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater (1981, 19p) CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p) SR 81-04 Seven-year performance of CRREL slow-rate land treatment system (1981, 25p) SR 81-12 Wastewater treatment by a prototype slow rate land treatment system (1981, 25p) SR 81-12 Vegetation selection and management for overland flow systems (1982, p.135-154) MP 1511 Preliminary assessment of the nutrient film technique for wastewater treatment (1982, 15p) SR 82-05 Sewage sludge ands revegetation (1982, p.198-301) MP 1735 Long-term plant persistence and restoration of acide dredge soils with sewage sludge and lime (1983, 11p) CR 83-28 Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 84-14 Effect and disposition of TNT in a terrestrial plant and validation of analytical methods (1986, 17p) CR 86-15 Effects of temperature and species on TNT injury to plants (1988, 7p) Effects of soil covers on late-fall seedings of four tall fescue varieties (1989, 5p) Palmer, R.A. Clear improvement in obscuration (1985, p 476-477, MP 2067 Thermal model for snow-covered terrain (1989, p 25-36) MP 2625 Pangburn, T. Use of Landsat data for predicting snowmelt runoff in the upper Saint John River basin (1983, p 519-533) MP 1659 Use of radio frequency selection for snow/soil monsture water content measurement (1983, p, 33-42) MP 1659

Pangburn, T. (cont.) WMO solid precipitation measurement intercomparison at	Payne, J.O., Jr. Full-depth and granular base course design for frost areas	Oceanic heat flux in the Fram Strait measured by a drifting buoy [1990, p 291-296] MP 2740
Sleepers River Research Watershed (1987, p.1-7) MP 2396	(1983, p 27-39) MP 1492 Pazsint, D.A.	Treatment of shortwave radiation and open water in large-
Forecasting of snowmelt runoff using water temperature data	Insulating and load-supporting properties of sulfur foam for	scale models of sea-ice decay [1990, p.242-246] MP 2759
[1987, p.108-113] MP 2398 Data reduction of GOES information from DCP networks	expedient roads in cold regions [1979, 21p] CR 79-18	Theoretical estimates of light reflection and transmission by spatially complex and temporally varying sea ice covers
(1989, 15p) SR 89-29 Accuracy and precision of GOES data collection platforms	Peck, L. Review of methods for generating synthetic seismograms	(1990, p 9557-9567) MP 2761 Perron, N.
for temperature measurements [1989, 14p.] SR 89-37 Paquette, R.G.	(1985, 39p) CR 85-10	Mechanical properties of multi-year sea ice. Phase 2. Test results (1985, 81p) CR 85-16
"Pack ice and icebergs"—report to POAC 79 on problems of	Measurement of the resistance of imperfectly elastic rock to the propagation of tensile cracks (1985, p.7827-7836)	Triaxial testing of first-year sea ice [1986, 41p]
the seasonal sea ice zone: an overview [1979, p 320-337] MP 1320	MP 2052 Microstructure and the resistance of rock to tensile fracture	CR 86-16 Mechanical properties of multi-year sea ice Phase 1: Ice
Parker, B.C. Ross Ice Shelf Project environmental impact statement July.	[1985, p 11,533-11,546] MP 2157 Acoustic-to-seismic coupling through a snow layer [1987,	structure analysis [1987, 30p] Mechanical properties of multi-year sea ice Phase II. Ice
19/4 [19/8, p /-36] MP 1075	p 47-55) MP 2294	structure analysis [1988, 27p] CR 88-05 Perry, L.B.
Planetary and extraplanetary event records in polar ice caps (1980, p.18-27) MP 1461	Ground motion induced by an acoustic pulse, and its winter- time variations (1988, p 361-385) MP 2597	Experimental methods for decontaminating soils by freezing
Nitrogenous chemical composition of antarctic ice and snow [1981, p 79-81] MP 1541	Acoustically induced ground motion in sand under winter conditions (1989, p.37-54) MP 2626	(1988, 12p) MP 2513 Prototype testing facilities for field evaluation of contaminant
Nitrate fluctuations in antarctic snow and firm potential sources and mechanisms of formation [1982, p 243-248]	Seismic/acoustic experiments at SNOW IV [1989, p 155- 157] MP 2646	transport in freezing soils [1988, 29p.] MP 2514 Use of innovative freezing technique for in-situ treatment of
MP 1551 Parker, L.	Contrast and visibility under winter conditions with applica- tion to motion detection systems [1989, 8p.]	contaminated soils (1989, p 489-498) MP 2515 Fate and transport of contaminants in frozen soils (1990,
Surface changes in well casing pipe exposed to high concen-	CR 89-17	p.202-211) MP 2679
trations of organics in aqueous solution (1990, 14p) SR 90-07	Peirent, R. Prevention of freezing and other cold weather problems at	Comparison of four volatile organic compounds in frozen and unfrozen silt (1990, 9p) SR 90-13
Parker, L.V. Disinfection of wast:water by microwaves (1980, 15p.)	wastewater treatment facilities (1985, 49p) SR 85-11 Penner, E.	Peters, R.E. Rational design of overland flow systems (1980, p.114-121)
SR 80-01	Designing for frost heave conditions [1984, p 22-44]	MP 1400 Toxic volatile organics removal by overland flow land treat-
Dynamics of NH4 and NO3 in cropped soils irrigated with wastewater (1993, 20p) SR 80-27	Perham, R.E. MP 1705	ment (1981, 14p) MP 1421
Effect of soil temperature and pH on nitrification kinetics in soils receiving a low level of ammonium enrichment (1981,	Ice forces on vertical piles [1972, p 104-114] MP 1024 Forces on an ice boom in the Beauharnois Canal [1975,	Petraska, J.W. SNOW III WEST field experiment report Volume 1
27p ₂ SR 81-33 Baseline water quality measurements at six Corps of Engi-	p.397-407; MP 858 St Marys River ice booms Design force estimate and field	(1988, 170p) SR 88-28 Petroski, M.E.
neers reservoirs, Summer 1981 (1982, 55p) SR 82-30	measurements (1977, 26p) CR 77-04	Simulation of oil slick transport in Great Lakes connecting channels: theory and model formulation (1990, 29p)
Assessment of the treatability of toxic organics by overland flow [1983, 47p] CR 83-03	Ice forces on vertical piles [1977, 9p] CR 77-10 Some economic benefits of ice booms [1977, p 570-591]	CR 90-01
Corps of Engineers land treatment of wastewater research program an annotated bibliography (1983, 82p)	MP 959 Ice and ship effects on the St Marys River ice booms (1978,	Standardized testing methods for measuring mechanical prop-
SR 83-09 Impact of dredging on water quality at Kewaunee 1 arbor	p 222-230- MP 1617	erties of ice (1981, p.245-254) MP 1556 4th report of working group on testing methods in ice (1984,
Wisconsin [1984, 16p] CR 84-41	regulting moment in a rectangular ice boom timber or pontoon [1978, p 273-289] MP 1136	p.l-41; MP 1886 Petzko, D.R.
Impact of slow-rate land treatment on groundwater quality: toxic organics (1984, 36p) CR 84-30	Performance of the St. Marys River ice booms, 1976-77 (1978, 13p) CR 78-24	SNOW III WEST field experiment report. Volume 1
Toxic organics removal kinetics in overland flow land treat- ment [1985, p 707-718] MP 2111	Harnessing frazil ice (1981, p 227-237) MP 1398 lee control arrangement for winter navigation (1981, p. 1096-	(1988, 170p) SR 88-28 Thermal model for snow-covered terrain (1989, p 25-36)
Ice nucleation activity of antarctic marine microorganisms (1985, p 126-128) MP 2217	1103) MP 1449	Péwé, T.L. MP 2625
Suitability of polyvinyl chloride pipe for monitoring TNT, RDX, HMX and DNT in groundwater [1985, 27]	Tests of frazil collector lines to assist ice cover formation (1981, p.442-448) MP 1488	ORIGIN AND PALEOCLIMATIC SIGNIFICANCE OF LARGE-SCALE PATTERNED GROUND IN THE
SR 85-12	Ice sheet retention structures [1983, 33p] CR 83-30 Effectiveness and influences of the navigation ice booms on	DONNELLY DOME AREA, ALASKA (1969, 87p) MP 1180
Suitability of polyvinyl chloride well casings for monitoring munitions in ground water (1986, p.92-98) MP 2171	the St. Marys (1984, 12p) CR 84-04	Phetteplace, G.
Removal of trace-level organics by slow-rate land treatment (1986, p 1417-1426) MP 2170	Observations during BRIMFROST '83 [1984, 36p] SR 84-10	Long distance heat transmission with steam and hot water (1976, 39p) MP 938
Decontamination of chemical agents on the winter battlefield. A literature review and preliminary assessment [1988,	Ice sheet retention structures [1984, p.339-348] MP 1832	Heat transmission with steam and hot water [1978, p 17-23] MP 1956
48p.) CR 88.07	Determining the effectiveness of a navigable ice boom (1985, 28p) SR 85-17	Waste heat recovery for heating purposes [1978, p 30-33] MP 1256
influence of well casing materials on chemical species in ground water (1988, p 450-461) MP 2456	Preliminary study of a structure to form an ice cover on river rapids during winter [1986, p 439-450] MP 2128	Losses from the Fort Wainwright heat distribution system (1981, 29p) SR 81-14
Alternative methods of using STB for decontamination at low :-mperatures (1989, 13p.) SR 89-33	Short-pulse radar investigations of freshwater ice sheets and	Effects of ice on coal movement via the inland waterways
influence of ground water monitoring well casings on metals and organic compounds in well water (1989, 9p.)	brash ice [1986, 10p] CR 86-06 Floating debris control, a literature review [1987, 22p. +	Transient analysis of heat transmission systems [1981,
MP 2717	41p. of append 1 MP 2252 Inventory of ice problem sites and remedial ice control struc-	53p ₁ CR 81-24 Evaluating the heat pump alternative for heating enclosed
Evaluation of four well casing materials for monitoring selected trace level organics in ground water (1989, 292)	tures (1988, 9p.) SR 88-07 Preliminary results of an experiment using a 16 ft x 50 ft long	wastewater treatment facilities in cold regions (1982, 23p) SR 82-10
CR 89-18 CBR operations in cold weather, a bibliography, Vol 1 (1989,	frazil collector line array [1988, p 139-156] MP 2474	Analysis of heat losses from the central heat distribution sys- tem at Fort Wainwright [1982, 20p] MP 1980
88p 1 MP 2574 Influence of casing materials on trace-level chemicals in well	Modeling ice restraint forces in an ice boom (1988, p.198- 206) MP 2596	Heating enclosed wastewater treatment to littles with heat pumps (1982, p.262-280) MP 1976
water (1990, 11p) MP 2720 Parrish, S.	Ice control in river harbors and fleeting areas [1988, 7p] SR 88-12	Heat losses from the central heat distribution system at Fort
Selected climatic and soil thermal characteristics of the	Elements of floating-debris control systems (1988, 54p + appends.) MP 2453	Wainwright [1982, p 308-328] MP 2310 Computer models for two-dimensional steady-state heat con-
Prudhoe Bay region (1975, p.3-12) MP 1054 Parrott, W.H.	Imjin River ice boom [1988, 10p] SR 88-22	duction [1983, 90p] CR 83-10 Comparative field testing of buried utility locators [1984,
Portable instrument for determining snow characteristics related to trafficability (1972, p.193-204) MP 886	Salmon River ice jam control studies: interim report (1990, 8p) SR 90-06	25p; MP 1977 Heat recovery from primary effluent using heat pumps
Some effects of air cushion vehicle operations on deep snow (1972, p 214-241) MP 887	Perman, C.D. Wastewater stabilization pond linings (1978, 116p)	(1985, p 199-203) MP 1978 Simplified design procedures for heat transmission system
Parssinen, N.	SR 78-28 Perovich, D.K.	piping (1985, p 451-456) MP 1979
Regelation and the deformation of wet snow (1978, p 639- 650) MP 1172	Optical properties of ice and snow in the polar oceans 1	Simple design procedure for heat transmission system piping (1985, p 1748-1752) MP 1942
Patrick, W.H., Jr. Water movement in a land treatment system of wastewater by	Observations (1986, p 232-241) MP 2255 Optical properties of ice and snow in the polar oceans 2.	Snow in the construction of ice bridges (1985, 12p.) SR 85-18
overland flow (1979, p 185-206) MP 1285	Theoretical calculations (1986, p 242-251) MP 2256 Field observations of thermal convection in a subarctic snow	Thermal analysis of a shallow utilidor (1986, 10p) MP 2021
Nitrogen transformations in a simulated overland flow was- tewater treatment system (1980, 33p) SR 80-16	cover (1987, p. 105-118) MP 2439 Microcomputer-based image-processing system (1988,	Heat distribution research (1986, p 2-3) MP 2150
Patterson, W.A., III Tussock replacement as a means of stabilizing fire breaks in	p 249-252 ₁ MP 2385	Contribution of snow to ice bridges (1987, p 133-137,
tundra vegetation (1981, p 188-189) MP 1804 Paulson, C.A.	Two-stream multilayer, spectral radiative transfer model for sea ice (1989, 17p.) CR 89-15	Phase change heat transfer program for microcomputers
Turbulent heat flux from Arctic leads (1979, p.57-91)	Oceanic heat flux in the Fram Strait measured by a drifting buoy [1989, p 995-998] MP 2531	(1988, p 645-650) MP 2383 Simulation of district heating systems for piping design
MP 1340 Observations of condensate profiles over Arctic leads with a	Theoretical estimates of light reflection and transmission by spatially inhomogeneous and temporally varying ice covers	[1989, 27p.] MP 2746 Optimal sizing of district heating pipes [1989, 25p.]
hot-film anemometer (1981, p.437-460) MP 1479	(1990, p 45-49) MP 2729	MP 2747

Phetteplace, G.E. Primary effluent as a heat source for heat pumps [1988,	Patterns of vegetation recovery after tundra fires in north- western Alaska, U.S.A. [1987, p.461-469] MP 2374	Extending the useful life of DYE-2 to 1986, Part 1: Prelimi-
p.141-146 ₁ MP 2445	Effects of all-terrain vehicle traffic on tundra terrain near	nary findings and recommendations (1979, 15p) SR 79-27
Primary effluent as a heat source for heat pumps (1989, p 12- 17) MP 2760	Anaktuvuk Pass, Alaska [1988, 12p] SR 88-17 Racine, C.H.	New 2 and 3 inch diameter CRREL snow samplers [1980, p.199-200] MP 1430
Pidgeon, D.	Disturbance and recovery of arctic Alaskan tundra terrain	Uniform snow loads on structures [1982, p.2781-2798]
Experimental methods for decontaminating soils by freezing [1988, 12p] MP 2513	(1987, 63p) CR 87-11 Use of off-road vehicles and mitigation of effects in Alaska	MP 1574 Analysis of roof snow load case studies; uniform loads (1983),
Prototype testing facilities for field evaluation of contaminant	permafrost environments: a review [1990, p.63-72]	29p) CR 83-01
transport in freezing soils [1988, 29p] MP 2514 Pitelka, F.A.	MP 2682 Radke, L.F.	Ground snow loads for structural design [1983, p.950-964] MP 1734
Word model of the Barrow ecosystem (1970, p 41-43)	Lidar detection of leads in arctic sea ice [1990, p.119-123]	Redfield, R.K.
Pottle, D.S.	MP 2733	Probability models for annual extreme water-equivalent
Prevention of freezing and other cold weather problems at	Raikovskii, IU.V. Core drilling through Ross Ice Shelf [1979, p 63-64]	ground snow [1984, p.1153-1159] MP 1823 Snow-Two/Smoke Week VI field experiment plan [1984,
wastewater treatment facilities [1985, 49p] SR 85-11 Pound, C.E.	MP 1337	85p) SR 84-19
Land treatment present status, future prospects (1978, p 98-	Sea ice on bottom of Ross Ice Shelf [1979, p 65-66] MP 1336	Tank E/O sensor system performance in winter an overview [1985, 26p.] MP 2073
102 ₃ MP 1417	Ramseier, R.O.	SNOW IV field experiment data report: overview [1989, p 1- 31 MP 2639
Power, J.M. Snow cover mapping in northern Maine using LANDSAT	Growth and mechanical properties of river and lake ice (1972, 243p) MP 1883	3 ₁ MP 2639 Reed, S.C.
digital processing techniques (1979, p.197-198) MP 1510	Results of the US contribution to the Joint US/USSR Bering	Land disposal state of the art [1973, p 229-261] MP 1392
Snowpack estimation in the St. John River basin [1980]	Sea Experiment [1974, 197p] MP 1032 lee dynamics in the Canadian Archipelago and adjacent Arc-	Land treatment of wastewaters [1974, p.12-13]
p 467-486 ₁ MP 1799 Powers, D.	tic basin as determined by ERTS-1 observations (1975,	MP 1036
Experiments on thermal convection in snow (1985, p.43-	p.853-877; MP 1585 Integrated approach to the remote sensing of floating ice	Land treatment of wastewaters for rural communities (1975, p 23-39) MP 1399
47 ₃ MP 2006	(1977, p 445-487) MP 1069	Field performance of a subarctic utilidor [1977, p 448-468] MP 930
Theory of natural convection in snow [1985, p.10,641-10,-649] MP 1957	Visual observations of floating ice from Skylab [1977, p 353-379] MP 1263	Municipal sludge management: environmental factors
Powers, D.J.	Rancourt, K.	[1977, Var. p] MP 1406
Thermal convection in snow [1985, 61p] CR 85-09 Natural convection in sloping porous layers [1986, p 697-	Computer interfacing of meteorological sensors in a severe weather and high RFI environment [1985, p.205-211]	Ross Ice Shelf Project environmental impact statement July, 1974 (1978, p.7-36) MP 1075
710 ₃ MP 2158	MP 2175	Land treatment present status, future prospects (1978, p 98-
Powers, J.P. Freezing a temporary roadway for transport of a 3000 ton	Rancourt, K.L. Reliable, inexpensive radio telemetry system for the transfer	102 ₁ MP 1417 Cold climate utilities delivery design manual (1979, c300
dragline (1988, p 357-365) MP 2378	of meteorological and atmospheric data from mountain-top	leaves; MP 1373
Pratt, B. Deicing a satellite communication antenna (1980, 14p)	sites (1986, 6p) MP 2107 Rand, J.H.	Health aspects of water reuse in California [1979, p.434-435] MP 1404
SR 80-18	USA CRREL shallow drill [1976, p 133-137] MP 873	Health aspects of land treatment [1979, 43p] MP 1389
Price, A.G. Generation of runoff from subarctic snowpacks [1976,	Ross Ice Shelf Project drilling, October-December 1976 (1977, p 150-152) MP 1061	Cost-effective use of municipal wastewater treatment ponds [1979, p 177-200] MP 1413
P.677-685 ₁ MP 883	Danish deep drill; progress report: February-March 1979	Cost of land treatment systems [1979, 135p] MP 1387
Energy balance and runoff from a subarctic snowpack (1976, 29p) CR 76-27	[1980, 37p] SR 80-03 1979 Greenland Ice Sheet Program. Phase 1: casing opera-	EPA policy on land treatment and the Clean Water Act of 1977 [1980, p.452-460] MP 1418
Prowse, T.D.	tion [1980, 18p] SR 80-24	Aquaculture systems for wastewater treatment an engineer-
Techniques for measurement of snow and ice on freshwater [1986, p.174-222] MP 2000	New 2 and 3 inch diameter CRREL snow samplers [1980, p.199-200] MP 1430	ing assessment (1980, 127p) MP 1422 Engineering assessment of aquaculture systems for wastewa-
Qamar, A.	CRREL 2-inch frazil ice sampler (1982, 8p) SR 82-09	ter treatment: an overview (1980, p 1-12) MP 1423
Hydraulic transients: a seismic source in volcanoes and gla- ciers [1979, p 654-656] MP 1181	Liquid sampler (1982, 4 col) MP 2334	Energy and costs for agricultural reuse of wastewater (1980, p.339-346) MP 1401
Comparison of thermal observations of Mount St Helens	Developing a water well for the ice backfilling of DYE-2 [1982, 19p] SR 82-32	Aquaculture for wastewater treatment in cold climates
before and during the first week of the initial 1980 eruption [1980, p 1526-1527] MP 1482	Simple boom assembly for the shipboard deployment of air-	[1981, p 482-492] MP 1394 Incidental agriculture reuse application associated with land
Fluid dynamic analysis of volcanic tremor (1982, 12p)	SR 83-28 Operation of the U.S. Combat Support Boat (USCSBMK 1)	treatment of wastewater-research needs [1982, p.91-
CR 82-32 Source mechanism of volcanic tremor (1982, p 8675-8683)	on an ice-covered waterway [1984, 28p] SR 84-05	123) MP 1947 Design, operation and maintenance of land application sys-
MP 1576	Simple boom assembly for the shipboard deployment of air- sea interaction instruments [1984, p 227-237]	tems for low cost wastewater treatment (1983, 26p. +
Qiu, G. Ion and moisture migration and frost heave in freezing Morin	MP 1752 Method of detecting voids in rubbled ice [1984, p 183-188]	figs.; MP 1946 Nitrogen removal in wastewater stabilization ponds (1983,
clay (1986, p 1014) MP 1970	MP 1772	13p + figs1 MP 1943
Quarry, S.T. Methodology for nitrogen isotope analysis at CRREL (1978,	ice drilling technology (1984, 142p) SR 84-34	Engineering systems (1983, p.409-417) MP 1948 Accumulation, characterization, and stabilization of sludges
57p ₁ SR 78-08	Ice drilling and coring systems—a retrospective view [1984, p.125-127] MP 1999	for cold regions lagoons (1984, 40p) SR 84-08
Distribution and properties of road dust and its potential im- pact on tundra along the northern portion of the Yukon	Ice-coring augers for shallow depth sampling [1985, 22p]	Water supply and waste disposal on permanent snow fields (1984, p 401-413; MP 1714
River-Prudhoe Bay Haul Road. Chemical composition of	CR 85-21 Camp Century survey 1986 [1987, p 281-288]	On-site utility services for remote military facilities in the cold
dust and vegetation [1978, p 110-111] MP 1116 Five-year performance of CRREL land treatment test cells,	MP 2331	regions (1984, 66p) SR 84-14 Nitrogen removal in wastewater ponds (1984, 26p)
water quality plant yields and nutrient uptake [1978,	High-flow air screens reduce or prevent ice-related problems at navigation locks (1988, p 34-43) MP 2496	CR 84-13
Blank corrections for ultratrace atomic absorption analysis	Methods to reduce ice accumulation on miter gate recess	Problems with rapid infiltration—a post mortem analysis (1984, 17p + figs) MP 1944
(1979, 5p) CR 79-03 Documentation of soil characteristics and climatology during	walls (1989, 5p) MP 2723 Reduced winter leakage in gates with J-seals (1989, 3p)	Wetlands for wastewater treatment in cold climates [1984, 9p + figs] MP 1945
five years of wastewater application to CRREL test cells	MP 2724 Development of an underwater frazil-ice detector (1990,	Maintaining frosty facilities (1985, p 9-15) MP 1949
(1979, 82p) SR 79-23 Use of 15N to study nitrogen transformations in land treat-	p.77-82 ₁ MP 2702	Water supply and waste disposal on permanent snowfields [1985, p.344-350] MP 1792
ment (1979, 32p) SR 79-31	Rangachari, R.	Prevention of freezing and other cold weather problems at
Quinn, W.F. Revegetation and erosion control observations along the	Snow hydrology in the upper Yamuna basin, India (1988, p.84-93) MP 2633	wastewater treatment facilities (1985, 49p.) SR 85-11 Cold weather O&M (1985, p.10-15) MP 2070
Trans-Alaska Pipeline-1975 summer construction season	Rasmussen, L.A.	Nitrogen removal in cold regions trickling filter systems
(1977, 36p) SR 77-08 Use of a light-colored surface to reduce seasonal thaw pene-	Continuum sea ice model for a global climate model (1980, p 187-196) MP 1622	(1986, 39p) SR 86-02
tration beneath embankments on permafrost #1977, p. 36.	Ray, M.	Cold climate utilities manual (1986, var.p.) MP 2135 Initial assessment of the 600-gallon-per-hour Reverse Osmo-
99) MP 954 Experimental scaling study of an annular flow ice-water heat	Proceedings of a Meeting on Modeling of Snow Cover Run- off, 26-28 September 1978, Hanover, New Hampshire	sis Water Purification Unit. Field water supply on the win- ter battlefield (1986, 6p.) SR 86-20
sink (1977, 34p) CR 77-15	(1979, 432p) SR 79-36	Problems and opportunities with winter wastewater treatment
Design procedures for underground heat sink systems (1979, 186p in var pagns) SR 79-08	Rearic, D.M. Statistical aspects of ice gouging Alaskan Shelf of the	(1986, p.16-20) MP 2205
Foundation technology in cold regions [1987, p 305-310]	Beaufort Sea (1983, 34p + CR 83-21	Technology and costs of wastewater application to forest sys- tems [1986, p 349-355] MP 2266
MP 2425 Response of pavement to freeze-thaw cycles Lebanon, New	Some probabilistic aspectof the Beaufort Sea [170 and 13-236] MP 1838	Forest land treatment with municipal wastewater in New England (1986, p 420-430) MP 2280
Hampshire, Regional Airport (1989, 31p) SR 89-02	Redfield, R.	Nitrogen control in wastewater treatment systems for military
Racicot, L. Forces on an ice boom in the Beauharnois Canal (1975).	CRREL is developing new snow load design criteria for the United States (1976, p 70-72) MP 947	facilities in cold regions (1986, 23p.) CR 86-07 Treatment and disposal of alum and other metallic hydroxide
p.397-407 ₁ MP 858	Update on snow load research at CRREL (1977, p 9-13)	sludges (1987, 40p + plates) SR 87-05
Racine, C. Effects of a tundra fire on soils and plant communities along	MP 1142 Estimated snow, ice, and rain load prior to the collapse of the	Waste management practices in Antarctica (1989, p 122- 130) MP 2464
a hillslope in the Seward Peninsula, Alaska (1980, 21p) SR 80-37	Hartford Civic Center arena roof [1979, 32p]	Waste management practices of the United States Antarctic
SK 8U-37	SR 79-09	Program (1989, 28p) SR 89-3

Reed, S.C. (cont.)	Tensile strength of multi-year pressure ridge sea ice samples
New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712	(1985, p.186-193) MP 1856 Structure, salinity and density of multi-year sea ice pressure
Reid, J.R.	ridges (1985, p.194-198) MP 1857
Shoreline erosion processes Orwell Lake, Minnesota (1984, 101p.) CR 84-32	Effect of sample orientation on the compressive strength of multi-year pressure ridge ice samples [1985, p 465-475]
Reimaitz, E.	MP 1877
Statistical aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea [1983, 34p. + map] CR 83-21	Triaxial compression testing of ice [1985, p.476-488] MP 1878
Some probabilistic aspects of ice gouging on the Alaskan Shelf	Mechanical properties of multi-year pressure ridge samples
of the Beaufort Sea (1984, p.213-236) MP 1838 Monitoring seasonal changes in seafloor temperature and	[1985, p 244-251] MP 1936 Tensile strength of multi-year pressure ridge sea ice samples
salinity [1986, p.110-114] MP 2147	[1985, p 375-380] MP 1908
Seafloor temperature and conductivity data from coastal waters of the U.S. Beaufort Sea (1989, 19p.) CR 89-01	Mechanical properties of multi-year sea ice Phase 2. Test results [1985, 81p] CR 85-16
REPORT ON COLD ROOM AND EQUIPMENT FOR	Structure, salinity and density of multi-year sea ice pressure
FROST INVESTIGATION REPORT ON COLD ROOM AND EQUIPMENT FOR	ridges (1985, p 493-497) MP 1965 Confined compressive strength of multi-year pressure ridge
FROST INVESTIGATION (1950, 25p.)	sea ice samples (1986, p 365-373) MP 2035
ACFEL MP BL 1 Resta, J.	Comparison of two constitutive theories for compressive deformation of columnar sea ice (1986, p 241-252)
Treatment and disposal of alum and other metallic hydroxide	MP 2124
sludges [1987, 40p. + plates] SR 87-05 Reuss, J.O.	Evaluation of the rheological properties of columnar ridge sea ice (1986, p 55-66) MP 2177
Soil microbiology [1981, p.38-44] MP 1753	Comparison of the compressive behavior of naturally and
Reynolds, C.M. Influence of ground water monitoring well casings on metals	laboratory-grown saline ice (1986, p.331-350) MP 2200
and organic compounds in well water (1989, 9p)	Triaxial testing of first-year sea ice (1986, 41p)
MP 2717 Low-temperature effects on systems for composting of explo-	CR 86-16 Confined compressive strength of horizontal first-year sea ice
sives-contaminated soils. Part 1: Literature review (1989,	samples (1987, p.197-207) MP 2193
18p.j SR 89-38 Ricard, J.	Mechanical properties of multi-year sea ice. Phase 1. Ice structure analysis (1987, 30p.) CR 87-03
Moisture gain and its thermal consequence for common roof	Mechanical properties of multi-year sea ice [1987, p.121-
insulations (1980, p.4-16) MP 1361 Ricard, J.A.	MP 2428 Mechanical properties of multi-year pressure ridge ice (1987).
Flexural strength of ice on temperate lakes-comparative	p.108-119; MP 2299
tests of large cantilever and simply supported beams (1978, 14p ₁ CR 78-09	Mechanical properties of multi-year sea ice. Phase II. Ice structure analysis (1988, 27p) CR 88-05
Rice, E.	Confined compressive strength of multi-year pressure ridge
Waste management in the north (1974, p 14-21) MP 1048	sea ice samples [1988, p 295-301] MP 2403 Mechanical properties of multi-year sea ice [1988, p.54-61]
Rice, J.E.	MP 2619
SNOW III WEST field experiment report. Volume 1 SR 88-28	Vector analysis of ice petrographic data (1989, p 129-141) MP 2754
Thermal model for snow-covered terrain [1989, p 25-36]	Elastic properties of frazil ice from the Weddell Sea, Antarc-
MP 2625	tica (1989, p 208-217) MP 2620 Comparison of the compressive strength of antarctic frazil ice
Laboratory studies of compressed air seeding of supercooled	and columnar saline ice grown in the laboratory (1989,
fog (1977, 19p.) SR 77-12 Richmond, P.W.	p 269-278 ₁ MP 2621 Proceedings (1989, 475p ₁ SR 89-39
Influence of nose shape and L/D ratio on projectile penetra-	Use of the mechanical properties of ice in the development of
tion in frozen soil (1980, 21p) SR 80-17 Impact fuse performance in snow (Initial evaluation of a new	predictive models [1989, p 87-99] MP 2687
test technique) (1980, p.31-45) MP 1347	Comparison of the compressive strength of antarctic frazilice and laboratory-grown columnar ice [1990, p.79-84]
Dynamic testing of free field stress gages in frozen soil (1980, 26p) SR 80-30	Richter, W.A.
Small caliber projectile penetration in frozen soil [1980,	Evaluation of Vaisala's MicroCORA Automatic Sounding
p 801-823; MP 1490 Macroscopic view of snow deformation under a vehicle	System (1982, 17p) CR 82-28 Richtsmeier, S.C.
(1981, 20p) SR 81-17	Pavement icing detector—final report [1987, 26p. + ap-
Deceleration of projectiles in snow (1982, 29p.) CR 82-20	pend j MP 2263 Riek, L.
Frozen soil characteristics that affect land mine functioning	Signal-processing algorithm for the extraction of thin freshwa-
[1983, 18p] SR 83-05 Effect of seasonal soil conditions on the reliability of the M15	ter-ice thickness from short pulse radar data (1990, p.137- 145) MP 2698
land mine (1984, 35p) SR 84-18	Riley, J.
Review of antitank obstacles for winter use (1984, 12p) CR 84-25	Mesoscale measurement of snow-cover properties (1973,
Conventional land mines in winter: Emplacement in frozen soil, use of trip wires and effect of freezing rain (1984,	p 624-643; MP 1029 Riley, K.W.
23p) SR 84-30	Bank recession and channel changes in the area near the North Pole and floodway sill gross, Tanana River, Alaska
Thermal analysis of a shallow utilidor (1986, 10p) MP 2021	(1984, 98p) MP 1747
Antitank obstacles for winter use [1988, 11p]	Rindge, S.D.
SR 88-19 Considerations for winter use of the Ground Emplaced Mine	Utilization of sewage sludge for terrain stabilization in cold regions, Part 2 (1979, 36p) SR 79-28
Scattering System (1988, 13p) SR 88-27	Utilization of sewage sludge for terrain stabilization in cold regions Pt. 3 (1979, 33p) SR 79-34
Land mines in winter (1989, 10p) SR 89-11 Experiments on the heat transfer from water flowing through	Revegetation at two construction sites in New Hampshire and
a chilled-bed open channel (1989, p 51-58) MP 2649	Alaska (1980, 21p.) CR 80-03 Chena River Lakes Project revegetation study—three-year
Richter, J.A. Summary of the strength and modulus of ice samples from	summary (1981, 59p) CR 81-18
multi-year pressure ridges [1984, p 126-133]	Roach, D.A. Buried seed and standing vegetation in two adjacent tundra
MP 1679 Preliminary examination of the effect of structure on the com-	habitats, northern Alaska (1983, p 359-364) MP 2064
pressive strength of ice samples from multi-year pressure	Roberca, A.
On small-scale horizontal variations of salinity in first-year	Photoelastic instrumentation—principles and techniques (1979, 153p) SR 79-13
sea ice (1984, p 6505-6514) MP 1761 Summary of the strength and medulus of ice samples from	Roberts, R.
multi-year pressure ridges (1985, p.93-98) MP 1848	Geotechnical investigation of surficial soils to support hard mobile launcher (HML) studies frozen strength characteri-
Preliminary examination of the effect of structure on the com- pressive strength of ice samples from multi-year pressure	zation of WES CRREL NH&S test sites in Montana (1988, var. p.) MP 2617
ridges (1985, p 99-102) MP 1849	Roberts, W.S.
Richter-Menge, J A. Mechanical properties of multi-year sea see Phase 1. Test	Regionalized feasibility study of cold weather earthwork [1976, 190p] SR 76-02
results (1984, 105p) CR 84-09	Robin, G. de Q.
Static determination of Young's modulus in sea ice (1984,	Depth of water-filled crevasses that are closely spaced (1974, p 543-544) MP 1038
p.283-286 ₁ MP 1789	p 343-344) MP 1038

Robinson, D. Computer file for existing land application of wastewater sys-
tems: a user's guide [1978, 24p] SR 78-22 Robinson, J.H.
Environmental factors and standards for atmospheric obscurants, climate and terrain (1987, 137p) MP 2309
Robinson, S.W. Buried valleys as a possible determinant of the distribution of
deeply buried permafrost on the continental shelf of the Beaufort Sea (1979, p 135-141) MP 1288
Roeloffs, E.A. Measurements of radar wave speeds in polar glaciers using a
down-hole radar target technique [1983, p.199-208] MP 2057
Geophysical survey of subglacial geology around the deep- drilling site at Dye 3, Greenland (1985, p.105-110)
Roethlisberger, H. MP 1941
Seismic exploration in cold regions (1972, 138p) M II-A2a
Rogers, T. Performance of highway and all-season radial tires and trac-
tion aids on ice and in snow [1986, 20p] SR 86-07 Rogne, C.O.
Pneumatically de-iced ice detector—final report, phase 2, part 1 (1986, 9p. + appends) MP 2249
Roguski, E.A. Ice-cratering experiments Blair Lake, Alaska (1966, Various
pagings; MP 1034 Rosenberg, T.J.
Polar communications: status and recommendations. Report of the Science Working Group [1987, 29p] MP 2322
Ross, B.
Model simulation of 20 years of northern hemisphere sea-ice fluctuations (1984, p.170-176) MP 1767
Numerical simulation of Northern Hemisphere sea ice variability, 1951-1980 [1985, p 4847-4865] MP 1882 Ross, D.B.
Ross, D.B. Results of the US contribution to the Joint US/USSR Bering Sca Experiment (1974, 197p.) MP 1032
Ross, M.D. Direct filtration of streamborne glacial silt [1982, 17p.]
CR \$2-23 Rossiter, J.R.
Airborne measurement of sea ice thickness using electromagnetic induction during LIMEX 89 [1990, p.309-315] MP 2590
MP 2590 Rothrock, D.A.
Science program for an imaging radar receiving station in Alaska (1983, 45p) MP 1884
Ruggles, R.W. Field investigation of St. Lawrence River hanging ice dams,
winter of 1983-84 [1984, 85p.] MP 2178 Runstadler, P.W.
Vibrating wire technology for settled dust monitoring (1988, p. 71-82) MP 2516
Russell-Head, D.S. Compacted-snow runways: guidelines for their design and
construction in Antarctica (1989, 68p.) SR 89-10 Rutford, R.H.
Ross fee Shelf Project environmental impact statement July, 1974 (1978, p 7-36) MP 1075 Ryan, J.R.
Site selection methodology for the land treatment of wastewater [1981, 74p] SR 81-28
Ryan, W.L. On-site utility services for remote military facilities in the cold
regions (1984, 66p ₁ SR 84-14 Ryden, J.C.
Evaluation of a simple model for predicting phosphorus re- moval by soils during land treatment of wastewater (1982,
12p ₁ SR 82-14 Ryerson, C.C.
Rime meteorology in the Green Mountains [1987, 46p] CR 87-01
Climatology of rime accretion in the Green and White Mountains (1987, p 267-272) MP 2284
Prediction of winter battlefield weather effects (1988, p 357- 362) MP 2402
New England mountain icing climatology (1988, 35p) CR 88-12
Atmospheric icing and broadcast antenna reflections (1988, 13p) CR 88-11
Atmospheric icing climatologies of two New England moun- tains (1988, p 1261-1281) MP 2669 Synontic meteorology crystal babit, and spowfall rates in
Synoptic meteorology, crystal habit, and snowfall rates in Northeastern snowstorms (1989, p 335-345) MP 2599
Atmospheric icing rates with elevation on northern New England mountains, U.S.A. (1990, p. 90-97; MP 2589
Rzentkowski, G. investigation into the post-stable behavior of a tube array in
cross-flow (1989, p 457-465) MP 2361 Sabourin, L.

Rosenberg, T.J. Polar communications: status and recommendat port of the Science Working Group [1987, 29p	ions. MP	Re- 2322
Ross, B. Model simulation of 20 years of northern hemisph fluctuations (1984, p.170-176)		
Numerical simulation of Northern Hemisphere se bility, 1951-1980 [1985, p 4847-4865]	a ice v	varia-
Ross, D.B. Results of the US contribution to the Joint US/US Sca Experiment (1974, 197p.)		
Ross, M.D. Direct filtration of streamborne glacial silt (1982)	17p.;	2-23
Rossiter, J.R. Airborne measurement of sea ice thickness using enetic induction during LIMEX 89 [1990, p.309]	lectro	mag-
Rothrock, D.A.	MP	2590
Science program for an imaging radar receiving Alaska [1983, 45p] Ruggles, R.W.	static MP	on in 1884
Field investigation of St. Lawrence River hanging winter of 1983-84 [1984, 85p.]	ice d	lams, 2178
Runstadler, P.W. Vibrating wire technology for settled dust monitor p 71-82;		
Russell-Head, D.S.		
Compacted-snow runways: guidelines for their construction in Antarctica [1989, 68p.] Rutford, R.H.		
Ross ice Shelf Project environmental impact state 1974 [1978, p 7-36] Ryan, J.R.	ment MP	July. 1075
Site selection methodology for the land treatment of ter [1981, 74p]	f wast	ewa-
Ryan, W.L. On-site utility services for remote military facilities regions (1984, 66p)	in the	cold 14-14
Ryden, J.C. Evaluation of a simple model for predicting phosmoval by soils during land treatment of wastewa 12p ₁	phoru	18 re-
Dyarenn CC		
Rime meteorology in the Green Mountains (1987)	CR I	7-01
Climatology of rime accretion in the Green and Wittains [1987, p 267-272]	MP	oun- 2284
Prediction of winter battlefield weather effects (191 362)	8, p 3	57- 2402
New England mountain icing climatology (1988,		
Atmospheric icing and broadcast antenna reflection 13pg		
Atmospheric icing climatologies of two New Engli tains (1988, p 1261-1281)	MP:	oun- 2669
Synoptic meteorology, crystal habit, and snowfa Northeastern snowstorms (1989, p 335-345)	MP :	es in
Atmospheric icing rates with elevation on northern land mountains. USA (1990, p 90-97) Rzentkowski, G.		
investigation into the post-stable behavior of a tul cross-flow (1989, p 457-465)	MP :	y in 2561
Sabourin, L. Fracture behavior of ice in Charpy impact testin 13p 1	ig (19 CR 8	80, 0-13
Salomonson, V.V. Landsat-4 thematic mapper (TM) for cold env {1983, p 179-186}	ironm MP	ents 1651
	- '	

Saltzman, E.	Schmugge, T.J. Survey of methods for soil moisture determination (1979,	Seki, N. Proceedings [1987, 270p] MP 2302
Dominion Range ice core, Queen Maud Mountains, Antarc- tica—general site and core characteristics with implications	74p ₁ MP 1639	Proceedings (1989, 314p) MP 2636
(1990, p.11-16 ₁ MP 2707 Senderson, T.J.O.	Schneiter, R.W. Lime stabilization and land disposal of cold region wastewater	Selim, H.M. Evaluation of N models for prediction of No3-N in percolate
Working group on ice forces. 3rd state-of-the-art report	lagoon sludge [1982, p.207-213] MP 1696	water in land treatment (1978, p.163-169) MP 1148
[1987, 221p] SR 87-17 Sanger, F.J.	Accumulation, characterization, and stabilization of sludges for cold regions lagoons (1984, 40p) SR 84-08	Nitrogen behavior in land treatment of wastewater: a simplified model (1978, p 171-179) MP 1149
FOUNDATIONS OF STRUCTURES IN COLD RE-	Schnell, R.C.	Simplified model for prediction of nitrogen behavior in land
GIONS (1969, 91p) M III-C4 Thermal and rheological computations for artificially frozen	Lidar detection of leads in Arctic sea ice [1989, p 530-532] MP 2602	Modeling nitrogen transport and transformations in soils: 1.
ground construction [1978, p 95-117] MP 1624	Lidar detection of leads in arctic sea ice [1990, p.119-123]	Theoretical considerations (1981, p 233-241) MP 1440
Thermal and rheological computations for artificially frozen ground construction (1979, p. 311-337) MP 1227	MP 2733 Lidar-derived particle concentrations in plumes from arctic	Modeling nitrogen transport and transformations in soils: 2
Designing for frost heave conditions (1984, p 22-44)	leads (1990, p.9-12) MP 2758	Validation (1981, p 303-312) MP 1441
MP 1705	Schraeder, R.L. Rapid detection of water sources in cold regions—a selected	Mathematical simulation of nitrogen interactions in soils [1983, p 241-248] MP 2051
Santeford, H.S. High-latitude basins as settings for circumpolar environmen-	bibliography of potential techniques (1979, 75p) SR 79-10	WASTEN, a model for nitrogen behaviour in soils irrigated
tal studies [1975, p.IV/57-IV/68] MP 917	Schulson, E.M.	Retention and release of metals by soils-evaluation of sever-
Sargent, B.C Energy conservation at the West Dover, Vermont, water pol-	Study on the tensile strength of ice as a function of grain size	al models (1986, p.131-154) MP 2186 Modeling the transport of chromium (VI) in soil columns
lution control facility (1982, 18p.) SR 82-24	[1983, 38p] CR 83-14 Schumacher, P.W.	(1989, p 996-1004) MP 2070
Sater, J.E. Analysis of environmental factors affecting army operations	Microbiological aerosols from a field source during sprinkler	Correlation of Freundlich Kd and n retention parameters with soils and elements (1989, p 370-379) MP 2570
in the Arctic Basin (1962, 11p) MP 984	irrigation with wastewater [1978, p 273-280] MP 1154	Sellmann, P.V.
Satterwhite, M.B. Rapid infiltration of primary sewage effluent at Fort Devens.	Five-year performance of CRREL land treatment test cells;	Airborne E-phase resistivity surveys of permafrost - central Alaska and Mackenzie River areas (1974, p 67-71)
Massachusetts (1976, 34p.) CR 76-48	water quality plant yields and nutrient uptake 1978, 24p ₁ SR 78-26	MP 1046
Treatment of primary sewage effluent by rapid infiltration (1976, 15p.) CR 76-49	Bacterial aerosols from a field source during multiple-sprin- kler irrigation: Deer Creek Lake State Park, Ohio (1979,	Snow accumulation for arctic freshwater supplies (1975, p.218-224) MP 860
Sayed, M.	64p. ₁ SR 79-32	Delineation and engineering characteristics of permafrost
Static and dynamic ice loads on the Yamachiche Bend lightpi- er, 1984-86 (1986, p.115-126) MP 2389	Seven-year performance of CRREL slow-rate land treatment prototypes (1981, 25p.) SR 81-12	beneath the Beaufort Sea [1976, p 391-408] MP 1377 General considerations for drill system design [1976, p.77-
Sayles, F.H.	Microbiological aerosols from a field-source wastewater irri-	111 ₁ MP 856
Thermal and rheological computations for artificially frozen ground construction (1978, p.95-117) MP 1624	gation system (1983, p 65-75) MP 1578 TNT, RDX and HMX explosives in soils and sediments.	Airborne resistivity and magnetometer survey in northern Maine for obtaining information on bedrock geology
Thermal and rheological computations for artificially frozen	Analysis techniques and drying losses [1985, 11p.]	(1976, 19p) CR 76-37
ground construction (1979, p 311-337) MP 1227 General report session 2. mechanical properties (1979, p.7-	CR 85-15 Comparison of methanol and tetraglyme as extraction sol-	Operational report. 1976 USACRREL-USGS subsea perma- frost program Beaufort Sea, Alaska [1976. 20p.]
18 ₁ MP 1726	vents for determination of volatile organics in soil (1987,	SR 76-12 Delineation and engineering characteristics of permafros
Strength of frozen silt as a function of ice content and dry unit weight (1980, p.109-119) MP 1451	26p 3 SR 87-22 Development of an analytical method for the determination	beneath the Beaufort Sea (1976, p.53-60) MP 915
Regulated set concrete for cold weather construction (1980,	of explosive residues in soil. Part II: Additional develop- ment and ruggedness testing [1988, 46p.] CR 88-08	Selected examples of radiohm resistivity surveys for geotech nical exploration (1977, 16p) SR 77-01
p 291-314 ₁ MP 1359	Development of an analytical method for the determination	Delineation and engineering characteristics of permafros
Excavation of frozen materials (1980, p 323-345) MP 1360	of explosive residues in soil. Part 3 Collaborative test results and final performance evaluation (1989, 89p)	beneath the Beaufort Sea [1977, p 234-237] MP 92. Interesting features of radar imagery of ice-covered North
Embankment dams on permafrost in the USSR (1980, 59p) SR 80-41	CR 89-09	Slope lakes [1977, p.129-136] MP 923
Acoustic emissions during creep of frozen soils [1982, p 194-	Liquid chromatographic method for determination of extract- able nutroaromatic and nutramine residues in soil (1989,	Delineation and engineering characteristics of permafros beneath the Beaufort Sea [1977, p.385-395] MP 107
2061 MP 1495 Design and performance of water-retaining embankment, in	p 890-899 ₁ MP 2586	Preliminary evaluation of new LF radiowave and magnetic
permafrost (1984, p.31-42) MP 1850	Comparison of four volatile organic compounds in frozen and unfrozen silt [1990, 9p] SR 90-13	induction resistivity units over permafrost terrain (1977, p 39-42) MP 92
Mitigative and remedial measures for chilled pipelines in dis- continuous permafrost [1984, p 61-62] MP 1974	Schuster, R.L. Geobotanical studies on the Taku Glacier anomaly (1954.	Delineation and engineering characteristics of permafros beneath the Beaufort Sea [1977, p 432-440] MP 107
Foundations in permafrost and seasonal frost; Proceedings	p 224-2391 MP 1215	1977 CRREL-USGS permafrost program Beaufort Sea, Alas
(1985, 62p) MP 1730 Creep of a strip footing on ice-rich permafrost (1985, p 29-	Schwarz, J. Investigation of ice forces on vertical structures (1974,	ka, operational report [1977, 19p] SR 77-4 Delineation and engineering characteristics of permafros
51) MP 1731	153p ₁ MP 1041	beneath the Beaufort Sea (1977, p.518-521) MP 120
Classification and laboratory testing of artificially frozen ground [1987, p.22-48] MP 2227	Engineering properties of sea ice (1977, p 499-531) MP 1065	Large mobile drilling rigs used along the Alaska pipelin (1978, 23p.) SR 78-0
Embankment dams on permafrost, design and performance	Standardized testing methods for measuring mechanical prop-	Shallow electromagnetic geophysical investigations of perma
summary, bibliography and an annotated bibliography [1987, 109p.] SR 87-11	erties of ice (1981, p.245-254) MP 1556 Comparative model tests in ice of a Canadian Coast Guard R-	frost (1978, p 501-507) MP 110 Engineering properties of subsea permafrost in the Prudho
State of the art. mechanical properties of frozen soil (1988,	class icebreaker (1989, p.1/1-1/18) MP 2751	Bay region of the Beaufort Sea [1978, p 629-635] MP 110
p.143-165 ₁ MP 2377 Saylor, C.P.	Comparative model tests in ice of a Canadian Coast Guard R- class icebreaker (1990, p 31-52) MP 2762	Delineation and engineering characteristics of permafron
Report on ice fall from clear sky in Georgia October 26, 1959	Schwarz, M.J.	beneath the Beaufort Sea (1978, p 50-74) MP 120
(1960, 31p. plus photographs) MP 1017 Sayward, J.M.	Water vapor adsorption by sodium montmorillonite at -5C (1978, p 638-644) MP 981	MP 126
Evaluation of MESL membrane-puncture, stiffness, temper-	Scott, R.F.	Permafrost beneath the Beaufort Sea, near Prudhoe Bay Alaska [1979, p 1481-1493] MP 121
ature, solvents [1976, 60p] CR 76-22 Seeking low ice adhesion [1979, 83p] SR 79-11	HEAT EXCHANGE AT THE GROUND SURFACE (1964, 49p plus append) M II-A1	Electromagnetic geophysical survey at an interior Alaska pe
Small-scale testing of soils for frost action (1979, p 223-	FREEZING PROCESS AND MECHANICS OF FROZEN	
231 ₁ MP 1309 Small-scale testing of soils for frost action and water migration	GROUND (1969, 65p) M II-DI Scott, W.J.	[1979, 45p] CR 79-0
(1979, 17 p.) SR 79-17	Airborne E-phase resistivity surveys of permafrost - central	
Sait action on concrete (1984, 69p) SR 84-25 Schnefer, D.	Alaska and Mackenzie River areas (1974, p 67-71) MP 1046	MP 171
Protected membrane roofs in cold regions (1976, 27p)	Geophysics in the study of permafrost (1979, p 93-115) MP 1266	niques (1979, 30p) CR 79-1
CR 76-02 Water absorption of insulation in protected membrane roofing	Sear, C.B.	Field methods and preliminary results from subsea permafro investigations in the Beaufort Sea, Alaska (1979, p 207)
systems (1976, 15p) CR 76-38	Concurrent remote sensing of arctic sea ice from submarine	213 ₁ MP 159
Observation and analysis of protected membrane roofing sys- tems [1977, 40p] CR 77-11	Sector, P.W.	ic surveys of permafrost (1979, 24p) CR 79-2
Installation of loose-laid inverted roof system at Fort Wain-	Ice engineering facility heated with a central heat pump sys-	Delineation and engineering characteristics of permafro
wright, Alaska (1977, 27p) SR 77-18 Schaub, S.A.	Demonstration of building heating with a heat pump using	Buried valleys as a possible determinant of the distribution
Microbiological aerosols from a field source during sprinkler	thermal effluent (1977, 24p) SR 77-11	deeply buried permafrost on the continental shelf of the
irrigation with wastewater [1978, p.273-280] MP 1154	Seidenbusch, W. Study of water drainage from columns of snow (1979, 1994)	Permafrost beneath the Beaufort Sea, near Prudhoe Ba
Bacterial aerosols from a field source during multiple-sprin-	CR 79-01	Alaska (1980, p. 35-48) MP 134
kler irrigation. Deer Creek Lake State Park. Ohio (1979, 64p.) SR 79-32		Delineation and engineering characteristics of permafro beneath the Beaufort Sea (1980, p.103-110) MP 134
Microbiological acrosols from a field-source wastewater irri-	[1988, 16p] SR 88-04 Development of a membrane for in-situ optical detection of	Regional distribution and characteristics of bottom sedimen
gation system (1983, p 65-75) MP 1578 Schertler, R.J.	TNT (1988, 6p) SR 88-24	SR 80-
Ground-truth observations of ice-covered North Slope lakes	Single fiber measurements for remote optical detection of	Delineation and engineering characteristics of permafrond beneath the Beaufort Sea (1981, p 125-157) MP 143

ellmann, P.V. (cont.)	Shen, H.T.	Sediment load and channel characteristics in subarctic upland catchments (1981, p.39-48) MP 1518
Hyperbolic reflections on Beaufort Sea seismic records [1981, 16p.] CR 81-02	Mechanics of ice jam formation in rivers (1983, 14p) CR 83-31	Hydrology and climatology of the Caribou-Poker Creeks Re-
Delineation and engineering characteristics of permafrost	St Lawrence River freeze-up forecast [1984, p 177-190]	search Watershed, Alaska [1982, 34p.] CR 82-26
beneath the Beaufort Sea (1981, p.137-156) MP 1600	MP 1713	Constraints and approaches in high latitude natural resource sampling and research (1984, p.41-46) MP 2013
Improving electric grounding in frozen materials (1982, 12p) SR 82-13	Forecasting water temperature decline and freeze-up in rivers (1984, 17p.) CR 84-19	use of off-road vehicles and mitigation of effects in Alaska
Subsea permafrost in Harrison Bay, Alaska an interpretation	Computer simulation of ice cover formation in the Upper St.	permafrost environments a review (1990, p.63-72)
from seismic data (1982, 62p) CR 82-24	Lawrence River (1984, p.227-245) MP 1814	MP 2682
Radar profiling of buried reflectors and the groundwater table (1983, 16p) CR 83-11	Field investigation of St. Lawrence River hanging ice dams [1984, p 241-249] MP 1830	Sletten, R.S. Wastewater renovation by a prototype slow infiltration land
(1983, 16p.) CR 83-11 Seismic velocities and subsea permafrost in the Beaufort Sea.	Field investigation of St. Lawrence River hanging ice dams,	treatment system (1976, 44p) CR 76-19
Alaska (1983, p 894-898) MP 1665	winter of 1983-84 [1984, 85p] MP 2178	Overview of land treatment from case studies of existing sys-
Conductive backfill for improving electrical grounding in frozen soils (1984, 190) SR 84-17	Effect of ice cover on hydropower production (1984, p.231- 234) MP 1876	tems (1976, 26p.) MP 891 Feasibility study of land treatment of wastewater at a subarc-
frozen soils [1984, 19p] SR 84-17 Determining distribution patterns of ice-bonded permafrost in	Mathematical modeling of river ice processes [1984, p.554-	tic Alaskan location [1976, 21p] MP 868
the U.S. Beaufort Sea from seismic data (1984, p.237-	558 ₃ MP 1973	Wastewater treatment in cold regions (1976, 15p)
258 ₁ MP 1839	Unified degree-day method for river ice cover thickness simu- lation (1985, p. 54-62) MP 2065	MP 965 Feasibility study of land treatment of wastewater at a subarc-
Subsea permafrost distribution on the Alaskan shelf (1984, p 75-82) MP 1852	lation (1985, p 54-62) MP 2065 St. Lawrence River freeze-up forecast (1986, p 467-481)	tic Alaskan location (1977, p 533-547) MP 1268
Ice drilling and coring systems—a retrospective view (1984,	MP 2120	Wastewater treatment alternative needed [1977, p 82-87]
p 125-127 ₁ MP 1999	Simulation of oil slick transport in Great Lakes connecting	MP 968
Mapping resistive scabed features using DC methods (1985, p 136-147) MP 1918	channels theory and model formulation (1990, 29p) CR 90-01	Land application of wastewater in permafrost areas (1978, p. 911-917) MP 1110
Some aspects of interpreting seismic data for information on	Shen, J.	Energy and costs for agricultural reuse of wastewater (1980,
shallow subsea permafrost (1985, p 61-65) MP 1954	Bibliography of literature on China's glaciers and permafrost Part 1 1938-1979 (1982, 44p) SR 82-20	p.339-346 ₁ MP 1401
Galvanic methods for mapping resistive scabed features (1985, p. 91-92) MP 1955	Part 1 1938-1979 (1982, 44p) SR 82-20 Shin, R.T.	Lime stabilization and land disposal of cold region wastewater lagoon sludge (1982, p.207-213) MP 1696
Monitoring seasonal changes in seafloor temperature and	Correlation function study for sea ice (1988, p 14,055-14,-	Direct filtration of streamborne glacial silt (1982, 17p)
salinity (1986, p 110-114) MP 2147	063 ₁ MP 2511	CR 82-23
Drill bits for frozen fine-grained soils [1986, 33p.] SR 86-27	Shirkey, R.C. Environmental factors and standards for atmospheric obscu-	Accumulation, characterization, and stabilization of sludges for cold regions lagoons (1984, 40p) SR 84-08
Development of a frazil ice sampler (1986, 12p)	rants, climate and terrain (1987, 137p) MP 2309	Treatment and disposal of alum and other metallic hydroxide
SR 86-37	Shook, J.P.	sludges [1987, 40p + plates] SR 87-05
Auger bit for frozen fine-grained soil (1986, 13p) SR 86-36	Designing for frost heave conditions [1984, p 22-44]	Winter field testing of U.S. Navy fleet hospital [1988, 10p] MP 2512
Bit design improves augers [1987, p.453-454] MP 2269	MP 1705 Shoop, S.A.	Water quality changes caused by extension of the winter navi-
Fox permafrost tunnel a late Quaternary geologic record in	Thawing soil strength measurements for predicting vehicle	gation season on the Detroit-St. Clair river system (1988,
central Alaska (1988, p.948-969) MP 2355	performance (1989, 18p) MP 2749	56p.; SR 88-10
Evaluation of several auger bits in frozen fine-grained soils, asphalt, and concrete (1988, 10p) SR 88-08	Vehicle mobility on thawing soils [1989, 16p] SR 89-31	Waste management practices in Antarctica [1989, p.122- 130] MP 2464
Seasonal variations in resistivity and temperature in discon-	Shukla, S.S.	Waste management practices of the United States Antarctic
tinuous permafrost (1988, p.927-932) MP 2365	Limnological investigations Lake Koocanusa, Montana Pt.	Program (1989, 28p) SR 89-3
D.C. resistivity along the coast at Prudhoe Bay, Alaska (1988, p. 988-993) MP 2366	5. Phosphorus chemistry of sediments [1981, 9p] SR 81-15	Smallidge, P.D. Corps of Engineers research in Arctic and Arctic-related envi-
Seafloor temperature and conductivity data from coastal wa-	Simmons, C.L.	ronmental sciences (1987, p 81-87) MP 2411
ters of the U.S. Beaufort Sea (1989, 19p.) CR 89-01	Sensitivity of plant communities and soil flora to seawater	Arctic construction working group report (1987, p 311-
Coastal subsea permafrost and bedrock observations using de resistivity (1989, 13p.) CR 89-13	spills, Prudhoe Bay, Alaska (1983, 35p) CR 83-24	314 ₁ MP 2426
Strength of soils and rocks at low temperatures (1989, p 189-	Simoni, O.W. Construction and performance of the Hess creek earth fill	Smith, D.W. Cold climate utilities delivery design manual (1979, c300)
190 ₃ MP 2685	dam, Livengood, Alaska [1973, p 23-34] MP 859	leaves) MP 1373
Session con; Foundations in Permafrost and Seasonal Frost,		
	Survey of road construction and maintenance problems in	Rapid detection of water sources in cold regions—a selected
Denver, CO, Apr. 29, 1985	central Alaska (1976, 36p) SR 76-08	Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p) SR 79-10
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings [1985, 62p] MP 1730		bibliography of potential techniques (1979, 75p)
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Bexstone, A.	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) MP 2189 Proceedings, Vol.4 (1988, 348p) MP 2317	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A.
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings [1985, 62p] MP 1730	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) MP 2189 Proceedings, Vol.4 (1988, 348p) MP 2317 Proceedings of the eighth International Conference on Off-	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A.
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) MP 2189 Proceedings, Vol.4 (1988, 348p) MP 2317	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Bexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S Can reliet crevasse plumes on antarctic ice shelves reveal a	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) MP 2189 Proceedings, Vol.4 (1988, 348p) MP 2317 Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p) MP 2481 Proceedings Vol 4 (1990, 339p) MP 2584	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) Smith, J.
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Slaughter, C.W.	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Huminity and temperature measurements obtained from an
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Seastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y.	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) Proceedings, Vol.4 (1988, 348p) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p) Proceedings Vol 4 (1990, 339p) MP 2481 Proceedings Vol 4 (1990, 339p) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabtale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p 77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth international Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5.8) MP 876 FIRE IN THE NORTHERN ENVIRONMENT-A SYM-	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humicity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Seastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y.	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) Proceedings, Vol.4 (1988, 348p) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p) Proceedings Vol 4 (1990, 339p) MP 2481 Proceedings Vol 4 (1990, 339p) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p 5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYMPOSIUM (1971, 275p) MP 878	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humoity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296 Smith, J.E.
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabtale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p. 77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2481 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humicity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Beastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) Proceedings, Vol.4 (1988, 348p) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p) Proceedings Vol 4 (1990, 339p) MP 2481 Proceedings Vol 4 (1990, 339p) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p) MP 878 Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p) MP 991	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humicity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W.
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabtale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p. 77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-) Arctic and subarctic environmental analysis (1972, p.28-)	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils a com-
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Beastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) Proceedings, Vol.4 (1988, 348p) MP 2317 Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p) Proceedings Vol 4 (1990, 339p) MP 2481 Proceedings Vol 4 (1990, 339p) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p) MP 878 Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 39) Arctic and subarctic environmental analysis (1972, p.28-30) MP 991 Arctic and subarctic environmental analysis (1972, p.28-30) Seatonal regime and hydrological significance of stream ic-	bibliography of potential techniques (1979, 75p.) Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363)
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabtale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p. 77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt c-ment (1980, 55p) CR 80-05 Shaver, G.R.	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. MP 9172 (1972, 29.) Arctic and subarctic environmental analysis [1972, p.28-30] Seazonal regime and hydrological significance of stream cings in central Alaska (1973, p.528-540) MP 119	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils a comparison of NMR and TDR methods (1988, p.473-477), MP 2363 Measurement of the unfrozen water content of soils. compari-
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Beastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cament (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A.	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENTA SYMPOSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) MP 1119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540), MP 1026 Arctic and subarctic environmental analysis utilizing ERTS-1	bibliography of potential techniques (1979, 75p.) Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363)
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabitale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p. 77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt c.ment (1980, 55p) CR 80-05 Shave, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENTA SYMPOSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) MP 1119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540), MP 1026 Arctic and subarctic environmental analysis utilizing ERTS-1	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metalic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477), MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.)
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabtale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W.	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENTA SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) MP 1119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.)	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humoity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p.473-477) MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, p.473-477) MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Lise of explosives in removing ice iams (1970, 10p.)
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Appl 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt c.ment (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p. 185-192)	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2481 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Seasonal regime and hydrological significance of stream incings in central Alaska (1973, p.28-540) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct. 1973 (1975, 3p.) MP 1030	bibliography of potential techniques (1979, 75p.) Cold climate utilities manual (1986, var.p.) Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477), MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cament (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northeentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) MP 1272	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) MP 2317 Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p.28-340) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1975, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metalic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477) MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer pro-
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Seastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabitale, S. Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalit concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheeh, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) MP 1272 Annealing recrystallization in laboratory and naturally de-	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Seazonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540) MP 91026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1011 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct. 23 Dec. 1973 (1973, 3p.) MP 1030 MP 1031	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide studges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477), MC 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13) feaves; MP 1264
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cament (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northeentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) MP 1272	central Alaska (1976, 36p) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols) Proceedings, 1987, 4 vols) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p) Proceedings Vol 4 (1990, 339p) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p5-8) FIRE 1N THE NORTHERN ENVIRONMENT-A SYMPOSIUM (1971, 275p) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p) MP 1119 Seatonal regime and hydrological significance of stream icings in central Alaska (1973, p 528-540) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 3p) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 6p) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p)	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Huminity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabitale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transcet in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehly, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Sheemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth international Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dcc 1973 (1973, 3p.) MP 1031 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dcc 1973 (1974, 1974, 1974, 1974, 1974, 128p.) MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) MP 1047	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477), MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730 Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabitale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Ap 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northeentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p. 185-192) Annealing recrystallization in laboratory and naturally, deformed ice (1987, p.(Cl))271-(Cl)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1443	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, Vol.4 (1988, 348p.) MP 2317 Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery (1973, 5p.) MP 119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p. 528-540) MP 1072 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct. 23 Oct. 1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct. 23 Dec. 1973 (1973, 6p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct. 23 Dec. 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) MP 1047 Snow accumulation for arctic freshwater supplies (1975, 1975)	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Huminity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) Repetitive loading tests on membrane enveloped road cuton during freeze thaw (1977, 171-197) MP 962
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabitale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transcet in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehly, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Sheemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth international Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) MP 911 Seatonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct. 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct. 23 Dec. 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct. 23 Dec. 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 128p.) MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 128p.) MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 128p.) MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Huminity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363) Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p. 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and artifields in cold regions (1978, p. 360-
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northeentral Alaska (1984, p.10-11) Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p. 185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 233 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1443 Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, (1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p. 8.) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 1975), 1978-1978-1978-1978-1978-1978-1978-1978-	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humority and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477) MP 2363 Measurement of the unfrozen water content of soils: comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11 Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, 171-1-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and airfields in cold regions (1978, p. 560-570) MP 1089
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Resistone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Fate of crude and refined oils in North Slope soils (1978, p.399-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cament (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(Cl)271-(Cl)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(Cl)271-(Cl)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H. On the rheology of a broken ice field due to floc collision	central Alaska (1976, 36p.) SR 76-08 Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Seazonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540) MP 1119 Seazonal regime and hydrological significance of stream icings in central Alaska (1973, p.528-540) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1011 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct. 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct 23 Dec. 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct 23 Dec. 1973 (1973, 3p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 128p.) MP 1047 Snow accumulation for arctic freshwater supplies (1975, p.218-224) MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p.1175, 711768)	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477), MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11 Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p.171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and artifields in cold regions (1978, p. 560-570) Repetitive loading tests on membrane-enveloped road sec-
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabitale, S Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Applalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheeh, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1443 Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H. On the rheology of a broken tce field due to floe collision (1984, p.29-34)	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, (1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p. 8.) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 1975), 1978-1978-1978-1978-1978-1978-1978-1978-	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humority and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p. 115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477) MP 2363 Measurement of the unfrozen water content of soils: comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11 Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, 171-1-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and airfields in cold regions (1978, p. 560-570) MP 1089
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Seastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabitale, S. Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cament (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehj, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1443 Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1441 Shen, H. On the rheology of a broken ice field due to floe collision (1984, p.29-34) Effect of nonumiform size on internal stresses in a rapid, sim-	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1980, 338p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Aretic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) I magery (1973, 5p.) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) I magery (1973, 5p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) I magery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 5p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1974, 1975), p. 218-2241 MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p. 1975-17/68) MP 1047 Site access for a subarctic research effort (1976, 13p.) CR 76-09 Vehicle for the future (1976, p. 272-279) MP 1034	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide studges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477), MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p.171-197) Techniques for using MESL (membrane encapsulated soil layers) in roads and airfields in cold regions (1978, p. 560-570) Repetitive loading tests on membrane-enveloped road sections during freeze-thaw cycles (1978, 16p.) CR 78-12 Repetitive loading tests on membrane enveloped road sections during freeze-thaw cycles (1978, 16p.)
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabitale, S. Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shave, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheeh, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1273 Shem, H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H. On the rheology of a broken ice field due to floe colliving (1984, p.29-34) MP 1812 Shen, H.H. Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials. Part 1 Two grain ple shear flow of granular materials.	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, (1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p. 8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis (1972, p. 28-30) Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p. 528-540) MP 1019 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p. 528-540) MP 1016 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 3p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 138p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 198p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 198p.) Arctic and subarctic environmental analysis utilizing	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metaliic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-47); MP 2363 Measurement of the unfrozen water content of soils: comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13) leaves; Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11 Repetitive loading tests on membrane enveloped road sections during freeze tham (1977, p. 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and airfields in cold regions (1978, p. 560-570) MP 1089 Repetitive loading tests on membrane-enveloped road sections during freeze-tham cycles (1978, 16p.) CR 78-12
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Shabitale, S. Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt ecment (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt element (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheeh, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1443 Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H.H. Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 1 Two grain sizes (1985, 18p) Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Effect of nonuniform size on internal stresses in a rapid, simple Effect of nonuniform size on internal stresses in a rapid, simple Effect of nonuniform size on internal stresses in a rapid, simple Effect of nonuniform size on internal stresses in a rapid, simple Effect of nonuniform size on internal stresses in a rapid, simple sizes (1985, 18p)	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth international Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5.8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972, 1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) Imagery (1973, 5p.) MP 1016 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) Imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 3p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1975, p.218-224) MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p.17/57/17/68) MP 1047 Snow accumulation for arctic freshwater supplies (1975, p.218-224) MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p.17/57/17/68) SR 76-15 Kolyma water balance station. Magadan Oblast, northeast USSR United States-Soviet scientific exchange visit	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363) Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p. 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and artifields in cold regions (1978, p. 560-570) Repetitive loading tests on membrane-enveloped road sections during freeze-thaw cycles (1978, p. 1277-1285) Repetitive loading tests on membrane enveloped road sections during freeze-thaw cycles (1978, p. 1277-1285) Nondestructive testing of in service highway pavements in
Denver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt c.ment (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northeentral Alaska (1984, p.10-11) Shaw, K.A. Compression of wet snow (1978, 17p) Shaw, K.A. Compression of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p. 185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H.H. Cheffect of nonuniform size on internal stresses in a rapid, simples shear flow of granular materials Part 1 Two grain sizes (1985, 18p) Effect of nonuniform size on internal stresses in a rapid, simples shear flow of granular materials Part 2 Multiple grain is pleased in the part of Multiple grain ples shear flow of granular materials Part 2 Multiple grain pleased in the part of Multiple grain ples shear flow of granular materials Part 2 Multiple grain	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, (1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p. 8.) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p. 28-30) Arctic and subarctic environmental analysis (1972, p. 28-30) MP 1119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p. 528-540) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug - 23 Oct 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Crt23 Dec 1973 (1973, 6p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Crt23 Dec 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Crt23 Dec 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progr	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metalile hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477) MP 2363 Measurement of the unfrozen water content of soils: comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11 Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and artifields in cold regions (1978, p. 560-570) MP 1089 Repetitive loading tests on membrane-enveloped road sections during freeze-thaw cycles (1978, 16p.) CR 78-12 Repetitive loading tests on membrane enveloped road sections during freeze-thaw cycles (1978, p. 1277-1288) MP 1158 Nondestructive testing of in service highway pawements in Maine (1979, 22p.) CR 79-06
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Seastone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabtiale, S. Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cament (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(Cl)271-(Cl)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(Cl)271-(Cl)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H. On the rheology of a broken ice field due to floe collision (1984, p.29-34) Shen, H.H. Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 1 Two grain sizes (1985, 20p) Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 2 Multiple grain sizes (1985, 20p) CR 85-03	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth international Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5.8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972, 1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) Imagery (1973, 5p.) MP 1016 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) Imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec 1973 (1973, 3p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 128p.) Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1975, p.218-224) MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p.17/57/17/68) MP 1047 Snow accumulation for arctic freshwater supplies (1975, p.218-224) MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p.17/57/17/68) SR 76-15 Kolyma water balance station. Magadan Oblast, northeast USSR United States-Soviet scientific exchange visit	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363) Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p. 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and artifields in cold regions (1978, p. 560-570) Repetitive loading tests on membrane-enveloped road sections during freeze-thaw cycles (1978, p. 1277-1285) Repetitive loading tests on membrane enveloped road sections during freeze-thaw cycles (1978, p. 1277-1285) Nondestructive testing of in service highway pavements in
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Perstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabitale, S. Can reliet crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehy, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H.H. Heffect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 2 Multiple grain size (1985, 18p) CR 85-02 Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 2 Multiple grain sizes (1985, 18p) CR 85-02 CR 85-03 Constitutive relations for a planar, simple shear flow of orough disks (1985, 17p) CR 85-02	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, (1987, 4 vols.) Proceedings of the eighth International Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol 4 (1990, 339p.) MP 2481 Proceedings Vol 4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p. 8.) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972 (1972, 3p.) Arctic and subarctic environmental analysis (1972, p. 28-30) Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p. 528-540) MP 1119 Seasonal regime and hydrological significance of stream icings in central Alaska (1973, p. 528-540) MP 1026 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1611 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug23 Oct. 1973 (1973, 6p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct23 Dec. 1973 (1973, 6p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct23 Dec. 1973 (1973, 6p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct23 Dec. 1973 (1973, 6p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct23 Dec. 1973 (1973, 6p.) MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct23 Dec. 1974 (1974, 128p.) MP 1030 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct23 Dec. 1974 (1974, 128p.) MP 1031 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report,	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.115-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) SR 87-05 Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477) MP 2363 Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) MP 1021 Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) SR 76-11 Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p. 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and airfields in cold regions (1978, p. 560-570) MP 1089 Repetitive loading tests on membrane-enveloped road sections during freeze-thaw cycles (1978, 16p.) CR 78-12 Repetitive loading tests on membrane enveloped road sections during freeze-thaw cycles (1978, 16p.) CR 79-06 CR 79-16 CR 79-16 CR 79-16 CR 79-16 Invilating and load-vupporting properties of sulfur foam for
Penver, CO, Apr. 29, 1985 Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) Sexstone, A. Fate of crude and refined oils in North Slope soils (1978, p.339-347) MP 1186 Shabitale, S. Can relict crevasse plumes on antarctic ice shelves reveal a history of ice-stream fluctuation (1988, p.77-82) MP 2460 Shahin, M.Y. Projected thermal and load-associated distress in pavements incorporating different grades of asphalt cement (1978, p.403-437) MP 1209 Asphalt concrete for cold regions, a comparative laboratory study and analysis of mixtures containing soft and hard grades of asphalt cement (1980, 55p) CR 80-05 Shaver, G.R. Growth and flowering of cottongrass tussocks along a climatic transect in northcentral Alaska (1984, p.10-11) MP 1950 Shaw, K.A. Compression of wet snow (1978, 17p) CR 78-10 Sheehly, W. On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet (1979, p.185-192) Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 1272 Annealing recrystallization in laboratory and naturally deformed ice (1987, p.(C1)271-(C1)276) MP 2230 Shemdin, O.H. Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1443 Inlet current measured with Seasat-1 synthetic aperture radar (1980, p.35-37) MP 1481 Shen, H.H. Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 1 Two grain sizes (1985, 18p) Effect of nonuniform size on internal stresses in a rapid, simple shear flow of granular materials Part 2 Multiple grain sizes (1985, 20p) CR 85-03 Constitutive relations for a planar, simple shear flow of rough	central Alaska (1976, 36p.) Sinha, N.K. Proceedings (1987, 4 vols.) Proceedings, 1987, 4 vols.) Proceedings of the eighth international Conference on Offshore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p.) Proceedings Vol.4 (1990, 339p.) MP 2481 Proceedings Vol.4 (1990, 339p.) MP 2584 Slaughter, C.W. Spread of cetyl-1-C14 alcohol on a melting snow surface (1966, p.5-8) FIRE IN THE NORTHERN ENVIRONMENT-A SYM-POSIUM (1971, 275p.) Arctic and Subarctic environmental analyses utilizing ERTS-1 imagery, bimonthly progress report, 23 June - 23 Aug. 1972, 1972, 3p.) Arctic and subarctic environmental analysis (1972, p.28-30) Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1016 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1017 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery (1973, 5p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Aug. 23 Oct 1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Bimonthly progress report, 23 Oct - 23 Dec. 1973 (1973, 3p.) MP 1030 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1278), p.18-224, MP 1031 Arctic and subarctic environmental analysis utilizing ERTS-1 imagery Final report June 1972-Feb 1974 (1974, 1278), p.18-224, MP 860 High-latitude basins as settings for circumpolar environmental studies (1975, p.17-17-17/68), MP 917 Site access for a subarctic research effort (1976, 13p.) CR 76-09 Vehicle for the future (1976, p.272-279) MP 1384 L'S SR United States-Soviet scientific exchange visit (1977, 66p.) SR 77-15 Subarctic watershed research in the Soviet Union, 1978, p.195-313) MP 1273	bibliography of potential techniques (1979, 75p.) SR 79-10 Cold climate utilities manual (1986, var.p.) MP 2135 Smith, G.A. Rapid detection of water sources in cold regions—a selected bibliography of potential techniques (1979, 75p.) SR 79-10 Smith, J. Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293 Slant path extinction and visibility measurements from an unmanned aerial vehicle (1987, p.15-126) MP 2296 Smith, J.E. Treatment and disposal of alum and other metallic hydroxide sludges (1987, 40p. + plates) Smith, M.W. Measurement of the unfrozen water content of soils: a comparison of NMR and TDR methods (1988, p. 473-477, MP 2363) Measurement of the unfrozen water content of soils. comparison of NMR and TDR methods (1988, 11p.) CR 88-18 Smith, N. Use of explosives in removing ice jams (1970, 10p.) Analysis of flexible pavement resilient surface deformations using the Chevron layered elastic analysis computer program (1975, 13 leaves) MP 1264 Observations along the pipeline haul road between Livengood and the Yukon River (1976, 73p.) Repetitive loading tests on membrane enveloped road sections during freeze thaw (1977, p. 171-197) MP 962 Techniques for using MESL (membrane encapsulated soil layers) in roads and artifields in end dregions (1978, p. 560-570) Repetitive loading tests on membrane-enveloped road sections during freeze-thaw cycles (1978, 16p.) CR 78-12 Repetitive loading tests on membrane enveloped road sections during freeze-thaw cycles (1978, p. 1277-1288) Nondestructive testing of in service highway pavements in Maine (1979, 22p.) Construction and performance of membrane encapsulated soil layers in Alaska (1979, 27p.) CR 79-16

High-explosive cratering in frozen and unfrozen soils in Alas- ka r1980, 21pg CR 80-09	Ice forces on rigid, vertical, cylindrical structures 1984, 36p. ₁ CR 84-33	St. Germain, K. Multifrequency passive microwave observation of saline ice
Testing shaped charges in unfrozen and frozen silt in Alaska	Determining the characteristic length of floating ice sheets by	grown in a tank [1988, p 1687-1690] MP 2459
(1982, 10p.) SR \$2-02 Smith, S.J.	moving loads [1985, p.155-159] MP 1855 Sheet ice forces on a conical structure: an experimental study	St. Lawrence, W.F. Acoustic emissions in the investigation of avalanches [1977,
Observations of pack ice properties in the Weddell Sea	(1985, p 46-54) MP 1915	p VII/24-VII/33) MP 1630
[1982, p 105-106] MP 1608 Reports of the U.SU.S.S.R. Weddell Polynya Expedition,	Arctic ice and drilling structures [1985, p.63-69] MP 2119	Creep rupture at depth in a cold ice sheet [1978, p.733] MP 1168
October-November 1981, Volume 5, Sea ice observations	Sheet ice forces on a conical structure an experimental study (1985, p.643-655) MP 1906	Hydraulic transients a seismic source in volcanoes and gla- ciers (1979, p. 654-656) MP 1181
(1983, 6p. + 59p.) SR 83-2 Comparison of winter climatic data for three New Hampshire	Sea ice and the Fairway Rock icefoot (1985, p.25-32)	Phenomenological description of the acoustic emission re-
sites (1986, 78p) SR 86-05	MP 2145 Characteristic frequency of force variations in continuous	sponse in several polycrystalline materials (1979, p 223- 228) MP 1246
Snelling, M.A. Comparison of three compactors used in pothole repair	crushing of sheet ice against rigid cylindrical structures	Acoustic emission response of snow (1980, p.209-216)
(1984, 14p) SR 84-31	(1986, p.1-12) MP 2018 Some effects of friction on ice forces against vertical struc-	MP 1366 Comparison of thermal observations of Mount St. Helens
Snow Symposium, 1st, Hanover, NH, August 1981 (Proceedings) (1982, 324p) SR 82-17	tures (1986, p 528-533) MP 2036	before and during the first week of the initial 1980 eruption
Snow Symposium, 2nd, Hanover, NH, August 1982	Impact ice force and pressure An experimental study with urea ice (1986, p 569-576) MP 2037	(1980, p 1526-1527) MP 1482 Constitutive relation for the deformation of snow (1981, p.3-
Snow Symposium 2, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, Au-	Fracture toughness of model ice (1986, p 365-376) MP 2125	14 ₁ MP 1370
gust 1982, Vol.1 [1983, 295p] SR #3-04	Flexural and buckling failure of floating ice sheets against	Investigation of the acoustic emission and deformation response of finite ice plates [1981, 19p] CR 81-06
Snow Symposium, 3rd, Hanover, NH, Aug. 9-10, 1983 Proceedings, Vol.1 [1983, 241p] SR 83-31	structures (1986, p.339-359) MP 2134 Dynamic analysis of failure modes on ice sheets encountering	Investigation of the acoustic emission and deformation re-
Snow Symposium, 4th, Hanover, NH, Aug. 14-16, 1984	sloping structures (1987, p.281-284) MP 2194	sponse of finite ice plates [1981, p.123-133] MP 1436
Proceedings, Vol.1 [1984, 433p] SR 84-35 Snow Symposium, 5th, Hanover, NH, Aug. 13-15, 1985	Advances in ice mechanics—1987 (1987, 49p) MP 2207	On the acoustic emission and deformation response of finite ice plates [1981, p.385-394] MP 1455
Proceedings, Vol.1 [1986, 369p] SR 86-15	Advances in sea ice mechanics in the USA [1987, p 37-49] MP 2208	Preliminary investigation of the acoustic emission and defor-
Snow Symposium, 6th, Hanover, NH, Aug. 12-14, 1986 Proceedings, Vol 1 (1987, 207p.) SR 87-12	Measurement of characteristic length of floating ice sheets	mation response of finite ice plates (1982, p.129-139) MP 1589
Snow Symposium, 7th, Hanover, NH, Aug. 11-12, 1987	(1987, n.p. (Ch.7); MP 2480 Flexural and buckling failure of floating ice sheets against	Acoustic emissions from polycrystalline ice [1982, p.183- 1991 MP 1524
Proceedings [1989, 136p] SR 89-07 Solhi, D.S.	structures (1987, p.53-73) MP 2315	Acoustic emissions from polycrystalline ice (1982, 15p.)
Ice arching and the drift of pack ice through restricted chan-	Proceedings, Vol.4 (1988, 348p) MP 2317 Onshore ice pile-up and ride-up: observations and theoretical	CR 82-21
nels (1977, 11p) CR 77-18 Finite element formulation of a sea ice drift model (1977,	assessment (1988, p 108-142) MP 2336	Fluid dynamic analysis of volcanic tremor (1982, 12p) CR 82-32
p 67-76 ₁ MP 1165	Experimental determination of the fracture toughness of urea model ice [1988, p 289-297] MP 2348	Source mechanism of volcanic tremor [1982, p 8675-8683] MP 1576
Ice arching and the drift of pack ice through channels (1978, p 415-432) MP 1138	Verification tests of the surface integral method for calculat- ing structural ice loads r1988, p 449-4561 MP 2353	Study on the tensile strength of ice as a function of grain size
Ice pile-up and ride-up on Arctic and subarctic beaches 1979, p.127-146; MP 1230	Fracture of S2 columnar freshwater ice: floating double can-	(1983, 38p) CR 83-14 Observations of volcanic tremor at Mount St. Helens volcano
Buckling analysis of wedge-shaped floating ice sheets (1979,	Results from indentation tests on freshwater ice (1988,	(1984, p 3476-3484) MP 1770
p 797-810; MP 1232 Shore ice pile-up and ride-up field observations, models,	p 341-350 ₁ MP 2495	Stallings, E.S. Use and application of PRESTO in Snow-III West (1986,
theoretical analyses (1980, p 209-298) MP 1295	Fracture experiments on freshwater and urea model ice [1988, 152p] MP 2502	p 11-24 ₁ MP 2658
Review of buckling analyses of ice sheets (1980, p.131-146) MP 1322	Ice-induced vibrations of structures (1989, p.189-221) MP 2492	SNOW III WEST field experiment report. Volume 1 SR 88-28
Nonsteady ice drift in the Strait of Belle Isle [1980, p.177- 1861 MP 1364	Proceedings of the eighth International Conference on Off-	Stallion, M.
1861 MP 1364 Secrete piling at Fairway Rock, Bering Strait, Alaska: observa-	shore Mechanics and Arctic Engineering, 1989 Volume 4 (1989, 476p) MP 2481	Debris of the Chena River (1976, 14p) CR 76-26 Stallman, P.E.
tions and theoretical analysis [1981, p.985-1000] MP 1460	Interaction forces during vertical penetration of floating ice	Improved millivolt-temperature conversion tables for copper
Ice pile-up and ride-up on arctic and subarctic beaches	sheets with cylindrical indentors (1989, p 377-382) MP 2485	constantan thermocouples 32F reference temperature (1976, 66p) SR 76-18
(1981, p 247-273) MP 1538 Port Huron ice control model studies (1982, p 361-373)	Fracture toughness of columnar freshwater ice from large scale DCB tests [1989, p 7-20] MP 2545	Abnormal internal friction peaks in single-crystal ice (1977, 15p ₁ SR 77-23
MP 1530	Vertical lifting and penetration of floating ice sheets with	Stambach, G.
Model study of Port Huron ice control structure; wind stress simulation (1982, 27p) CR 82-09	cylindrical indentors (1989, p 104) MP 2688 Ice force measurements on a bridge pier in a small river	Results of the US contribution to the Joint US/USSR Bering Sea Experiment (1974, 197p) MP 1032
Bering Strait sea ice and the Fairway Rock icefoot [1982, 40p] CR \$2-31	(1989, p.1419-1427) MP 2764	Stanley, L.E.
Determining the characteristic length of model ice sheets	Dynamic analysis of a floating ice sheet undergoing vertical	Utilization of sewage sludge for terrain stabilization in cold regions (1977, 45p) SR 77-37
(1982, p.99-104) MP 1570 Hydraulic model study of Port Huron ice control structure	indentation (1990, p 195-203) MP 2579 Sommerfeld, R.A.	Utilization of sewage sludge for terrain stabilization in cold
[1982, 59p.] CR 82-34	Comments on "Theory of metamorphism of dry snow" by	regions, Part 2 (1979, 36p) SR 79-28 Stanton, T.K.
Experimental determination of the buckling loads of floating ice sheets (1983, p 260-265) MP 1626	S C. Colbeck (1984, p.4963-4965) MP 1800 Song, B.H.	Laboratory studies of acoustic scattering from the underside of sea ice (1985, p 87-91) MP 1912
Experiments on ice ride-up and pile-up [1983, p.266-270] MP 1627	Passive tracer gas measurement of air exchange in a large	Acoustical reflection and scattering from the underside of
Ice forces on model marine structures (1983, p.778-787)	multi-celled building in Alaska (1989, p 433-444) MP 2557	laboratory grown sea ice measurements and predictions (1986, p 1486-1494) MP 2222
MP 1606 Dynamic buckling of floating ice sheets [1983, p 822-833]	Soong, T.T. Dynamic ice-structure interaction analysis for narrow vertical	High frequency acoustical properties of saline ice (1989, p. 9- 23) MP 2686
MP 1607	structures (1981, p 472-479) MP 1456	Acoustical and morphological properties of undeformed sea
Measurement of ice forces on structures (1983, p.139-155)	Sowers, T. Dominion Range ice core, Queen Maud Mountains, Antarc-	ice: laboratory and field results (1990, p 67-75) MP 2730
MP 1641 fee action on two cylindrical structures (1983, p.159-166)	tica—general site and core characteristics with implications	Stark, J.
MP 1643	(1990, p.11-16) MP 2707 Spaine, P.A.	Performance of pavement at Central Wisconsin Airport (1989, p 92-103) MP 2463
lce action on pairs of cylindrical and conical structures (1983, 35p.) CR 83-25	Land treatment module of the CAPDET program (1977, 4p; MP 1112	Stark, K.L.
Ice force measurements on a bridge pier in the Ottauquechee	Computer procedure for comparison of land treatment and	Effects of inundation on six varieties of turfgrass (1982, 25p.) SR 82-12
River, Vermont (1983, 6p.) CR 83-32 Experimental determination of buckling loads of cracked ice	conventional treatment preliminary designs, cost analysis and effluent quality predictions (1978, p 335-340)	Stauffer, B. C-14 and other isotope studies on natural ice [1972, p D70-
sheets (1984, p 183-186) MP 1687	MP 1155 Sparrow, E.B.	D92 ₁ MP 1052
Ice action on two cylindrical structures (1984, p.107-112) MP 1741	Fate and effects of crude oil spilled on permafrost terrain	Stearns, S.R. SELECTED ASPECTS OF GEOLOGY AND PHYSIOG-
Dependence of crushing specific energy on the aspect ratio and the structure velocity (1984, p 363-374)	First year progress report (1976, 18p) SR 76-15 Fate and effects of crude oil spilled on permafrost terrain.	RAPHY OF THE COLD REGIONS (1965, 40p) M I-A1
MP 1708	Second annual progress report, June 1976 to July 1977	PERMAFROST (PERENNIALLY FROZEN GROUND)
Crushing ice forces on cylindrical structures (1984, p 1-9) MP 1834	[1977, 46p] SR 77-44 Fate and effects of crude oil spilled on subarctic permafrost	(1966, 77p) M I-A2
Structure of first-year pressure ridge sails in the Prudhoe Bay	terrain in interior Alaska (1980, 128p) MP 1310 Fate and effects of crude oil spilled on subarctic permafrost	Stephens, C.A. Break-up dates for the Yukon River, Pt 1 Rampart to White-
Forces associated with ice pile-up and ride-up (1984, p 239-	terrain in interior Alaska (1980, 67p) CR 80-29	horse, 1896-1978 (1979, c50 leaves) MP 1317
262; MP 1887 Computational mechanics in arctic engineering (1984.	Spencer, M.H. Dominion Range ice core, Queen Maud Mountains, Antarc-	Break-up dates for the Yukon River, Pt.2 Alakanuk to Tana- na, 1883-1978 (1979, c50 leaves) MP 1318
p 351-374 ₁ MP 2072	tica-general site and core characteristics with implications	Break-up of the Yukon River as the Haul Road Bridge 1979 (1979, 22p + Figs) MP 1315
lee forces on inclined model bridge piers (1984, p.1167- 1173) MP 2407	Spindler, M.	Stephens, J.B.
Buckling analysis of cracked, floating ice sheets (1984, 28p) SR 84-23	Sea ice a habitat for the foraminifer Neogloboquadrina pa chyderma? [1990, p 86-92] MP 2732	Mars soil water analyzer instrument description and status [1977, p 149-158] MP 912
P 1		

a		
Sterrett, K.F. Arctic environment and the Arctic surface effect vehicle	Sundberg, D.C.	Tantillo, T.
(1976, 28p) CR 76-01	Preliminary development of a fiber optic sensor for TNT (1988, 16p) SR 88-04	Prototype testing facilities for field evaluation of contaminar transport in freezing soils [1988, 29p] MP 251
Applications of thermal analysis to cold regions (1976, p.167-181) MP 890	Single fiber measurements for remote optical detection of	Tantillo, T.J.
p.167-181; MP 890 Unfrozen water contents of submarine permafrost determined	TNT (1989, 7p.) SR \$9-18 Sundberg, D.D.	Hydraulic model study of a water intake under frazil ice cor
by nuclear magnetic resonance (1980, p 400-412)	Development of a membrane for in-situ optical detection of	ditions [1981, 11p.] CR 81-0 Tate, C.L.
MP 1412 Snow/ice/frozen ground properties, working group report	TNT [1988, 6p.] SR 88-24	Utilization of Unmanned Aerial Vehicles in the ALBE Thrus
[1987, p 163-166] MP 2416	Swart, P. Information systems planning study (1987, 48p.)	(1986, p 249-257) MP 266
Stevens, H.W.	SR 87-23	Tatinclaux, J.C. Laboratory investigation of the mechanics and hydraulies of
Subsurface explorations in permafrost areas [1959, p 31-41] MP 885	Swift, C.T.	river ice jams (1976, 97p) MP 106
Design of foundations in areas of significant frost penetration	Multifrequency passive microwave observation of saline ice grown in a tank [1988, p.1687-1690] MP 2459	Laboratory investigation of the mechanics and hydraulics of
(1980, p.118-184) MP 1358 Steres, H.K.	Swift, R.N.	river ice jams [1977, 45p.] CR 77-0 Compressive and shear strengths of fragmented ice covers-
Small-scale projectile penetration in saline ice [1986, p.415-	Concurrent remote sensing of arctic sea ice from submarine and aircraft (1989, 20p) MP 2697	a laboratory study (1977, 82p.) MP 95
438 ₁ MP 2201	and aircraft (1989, 20p) MP 2697 Recent measurements of sea ice topography in the eastern	Mean characteristics of asymmetric flows: application to flow below ice jams [1981, p 342-350] MP 173
Saline ice penetration: a joint CRREL-NSWC test program [1987, 34p.] SR 87-14	Arctic (1990, p 132-136) MP 2735	In-situ measurements of the mechanical properties of ic
Stewart, D.M.	Swinzow, G.K. Report on ice fall from clear sky in Georgia October 26, 1959	[1982, p 326-334] MP 155
Physical measurement of ice jams 1976-77 field season (1978, 19p) SR 78-03	(1960, 31p plus photographs) MP 1017	Determination of the flexural strength and elastic modulus of ice from in situ cantilever-beam tests [1982, p.37-47]
Entrainment of ice floes into a submerged outlet (1978,	Apparent anomaly in freezing of ordinary water (1976, 23p) CR 76-20	MP 156
p 291-299 ₁ MP 1137	Projectile and fragment penetration into ordinary snow	Asymmetric plane flow with application to ice jams (1983, p 1540-1556) MP 164.
Force distribution in a fragmented ice cover [1982, p.374-387] MP 1531	(1977, 30p) MP 1750	Model tests on two models of WTGB 140-foot icebreake
Force distribution in a fragmented ice cover (1984, 16p)	Snow and snow cover in military science [1978, p 1-239-1- 262] MP 926	(1984, 17p) CR 84-0
CR 84-07 Stewart, G.L.	Alaska Good Friday earthquake of 1964 [1982, 26p]	Ice resistance tests on two models of the WTGB icebreake r1984, p 627-638; MP 171
Rapid infiltration of primary sewage effluent at Fort Devens,	CR 82-01 Swithinbank, C.	Model tests in ice of a Canadian Coast Guard R-class ice
Massachusetts (1976, 34p.) CR 76-48	Ice runways near the South Pole [1989, 42p] SR 89-19	breaker (1984, 24p) SR 84-0 Laboratory investigation of the kinetic friction coefficient of
Treatment of primary sewage effluent by rapid infiltration (1976, 15p.) CR 76-49	Airfields on antarctic glacier ice [1989, 97p] CR 89-21	ice [1984, p.19-28] MP 182
Stokely, J.L.	Syers, J.K.	Propulsion tests in level ice on a model of a 140-ft WTG
Watershed modeling in cold regions an application to the Sleepers River Research Watershed in northeastern Ver-	Effectiveness of land application for phosphorus removal from municipal waste water at Manteca, California (1980,	icebreaker (1985, 13p) CR 85-0 Kinetic friction coefficient of ice (1985, 40p) CR 85-0
mont (1980, 241p) MP 1471	p 616-621 ₃ MP 1444	Field tests of the kinetic friction coefficient of sea ice (1985,
Stolzenback, K.D.	Evaluation of a simple model for predicting phosphorus re- moval by soils during land treatment of wastewater (1982,	20p) CR 85-1
Dynamics of frazil ice formation [1984, p.161-172] MP 1829	12p.) SR 82-14	Level ice breaking by a simple wedge (1985, 46p) CR 85-2
Storm, P.C.	Symposium on Applied Glaciology, 2nd, West Lebanon, N.H., Aug. 23-27, 1982	Ice floe distribution in the wake of a simple wedge [1986,
Limnological investigations: Lake Koocanusa, Montana.	Proceedings (1983, 314p) MP 2054	p 622-629 ₁ MP 203
Part 3. Basic data, post-impoundment, 1972-1978 (1982, 597p) SR 82-23	Symposium on State of the Art of Pavement Response	Laboratory and field studies of ice friction coefficient (1986, p 389-400) MP 212
Strakler, A.H.	Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989	Design and model testing of a river ice prow [1986, p.137-
Extraction of topography from side-looking satellite systems—a case study with SPOT simulation data [1983, p 535-	State of the art of pavement response monitoring systems for	150) MP 213: Effect of ice-floe size on propeller torque in ship-model test
550 ₃ MP 1695	roads and airfields [1989, 401p] SR 89-23 Taguchi, S.	(1987, p.291-298) MP 228
Stubstad, J. Penetitiva landing tests on mambana annulus desired and annulus desired and annulus desired annu	Primary productivity in sea ace of the Weddell region (1978,	Development of a river ice prow [1988, 26p]
Repetitive loading tests on membrane enveloped road sections during freeze thaw [1977, p 171-197] MP 962	17p) CR 78-19	CR 88-09 Development of a river ice-prow. Part 2 [1988, p 44-52]
Repetitive loading tests on membrane enveloped road sec-	Sea ice and ice algae relationships in the Weddell Sea (1978, p 70-71) MP 1203	MP 249
tions during freeze-thaw cycles (1978, p 1277-1288) MP 1158	Standing crop of algae in the sea ice of the Weddell Sea region	Ship model testing in level ice. an overview (1988, 30p.)
Nondestructive testing of in-service highway pavements in	[1979, p 269-281] MP 1242	Cr 88-15 Comparative model tests in ice of a Canadian Coast Guard R
Maine (1979, 22p) CR 79-06 Operation of the U.S. Combat Support Boat (USCSBMK 1)	Takagi, S. Segregation-freezing temperature as the cause of suction force	class icebreaker (1989, p 1/1-1/18) MP 275
on an ice-covered waterway [1984, 28p] SR 84-05	(1977, p 59-66) M ≥ 901	Model tests on an icebreaker at two friction factors (1989, p 774-784) MP 262;
Stubstad, J.M.	Segregation freezing as the cause of suction force for ice lens formation (1978, p.45-51) MP 1081	Model tests in ice of a Canadian Coast Guard R-class ice
Experimental scaling study of an annular flow ice-water heat sink (1977, 54p) CR 77-15	In-plane deformation of non-coaxial plastic soil (1978,	breaker high friction model (1989, 41p) SR 89-25
Repetitive loading tests on membrane-enveloped road sec-	28p) CR 78-07	Effect of normal pressure on kinetic friction coefficient, mythor reality? (1989, p.127-134) MP 2680
tions during freeze-thaw cycles (1978, 16p) CR 78-12	Viscoelastic deflection of an infinite floating ice plate subjected to a circular load [1978, 32p] CR 78-05	Comparative model tests in ice of a Canadian Coast Guard R.
Design procedures for underground heat sink systems (1979,	Segregation freezing as the cause of suction force for ice lens	class icebreaker [1990, p 31-52] MP 2762 Taylor, R.A.
186p. in var pagns ; SR 79-08 Sturm, M.	formation (1978, 13p) CR 78-06 Buckling pressure of an elastic plate floating on water and	Effects of winter military operations on cold regions terrain
Observations of jökulhlaups from ice-dammed Strandline	stressed uniformly along the periphery of an internal hole	(1978, 34p.) SR 78-17
Lake, Alaska: implications for paleohydrology (1987, p.79-	(1978, 49p) CR 78-14	Taylor, S. Measurement and interpretation of electrical freezing poten-
941 MP 2307 Field observations of thermal convection in a subarctic snow	Fundamentals of ice lens formation (1978, p 235-242) MP 1173	tial of soils (1988, 9p) CR 88-10
cover (1987, p 105-118) MP 2439	Steady in-plane deformation of noncoaxial plastic soil [1979,	Ice-water partition coefficients for RDX and TNT (1989,
Recent glacier-volcano interactions on Mt Redoubt, Alaska [1988, 18p.; MP 2431	p.1049-1072; MP 1248 Some Bessel function identities arising in ice mechanics prob-	10p j CR 89-08 Fractographic analysis of graphite-epoxy composites subject
Jökulhlaups from Strandline Lake, Alaska, with special atten-	lems (1979, 13p) CR 79-27	ed to low temperature thermal cycling (1989, p.429-435)
tion to the 1982 event (1989, 19p) MP 2520	Summary of the adsorption force theory of frost heaving (1980, p 233-236) MP 1332	MP 2554
Unusual jökulhlaup involving potholes on Black Rapids Gla- cier, Alaska Range, Alaska, U.S.A. (1990, p.125-126)	(1980, p 233-236) MP 1332 Adsorption force theory of frost heaving (1980, p.57-81)	Surface changes in well casing pipe exposed to high concen- trations of organics in aqueous solution (1990, 14p.)
MP 2708	MP 1334	SR 90-07
Stutz, M.H. Influence of ground water monitoring well casings on metals	Initial stage of the formation of soil-laden ice lenses [1982, p 223-232] MP 1596	Comparison of four volatile organic compounds in frozen and unfrozen silt [1990, 9p] SR 90-13
Influence of ground water monitoring well casings on metals and organic compounds in well water [1989, 9p] MP 2717	Stefan's problem in a finite domain with constant boundary	Technology transfer opportunities for the construction
Sullivan, C.W.	and initial conditions: analysis (1985, 28p) SR 85-08 Approximate analytical solution of a Stefan's problem in a	engineering community: materials and diagnostics Technology transfer opportunities for the construction engi-
Ice nucleation activity of antarctic marine microorganisms	finite domain (1988, p 245-266) MP 2384	neering community: materials and diagnostics (1986,
(1985, p.126-128) MP 2217	Takekuma, K.	54p) SR 86-01
Sea ice microbial communities in Antarctica (1986, p 243- 250) MP 2026	Comparative model tests in see of a Canadian Coast Guard Reclass icebreaker (1989, p.1/1-1/18) MP 2751	Tedrow, J.C.F. Pedologic investigations in northern Alaska [1973, p.93-
Sullivan, J.M., Jr.	Comparative model tests in ice of a Canadian Coast Guard R.	108 ₁ MP 1005
Economics of ground freezing for management of uncon-	class icebreaker (1990, p.31-52) MP 2762	Templeton, M.K.
trolled hazardous waste sites (1985, 15p) MP 2030 Finite element simulation of ice crystal growth in subcooled	Tanji, K.K. Soil microbiology (1981, p 38-44) MP 1753	Numerical simulation of atmospheric ice accretion (1979, p 44-52) MP 1235
sodium-chloride solutions (1985, p 527-532)	Evaluation of a compartmental model for prediction of ni-	Computer modeling of atmospheric ice accretion (1979,
Finite element simulation of planar instabilities during	trate leaching losses [1981, 24p] CR 81-23	36p; CR 79-04 Thomas, R.E.
solidification of an undercooled melt [1987, p 81-111]	Mathematical simulation of nitrogen interactions in soils (1983, p 241-248) MP 2051	Cost of land treatment systems [1979, 135p] MP 1387
MP 2585	Tankin, R.S.	EPA policy on land treatment and the Clean Water Act of
Laboratory study of transverse velocities and ice jamming in	Computer simulation of hubbler-induced melting of ice covers using experimental heat transfer results (1978, p. 362-366)	1977 (1980, p.452-460) MP 1418 Thomas, R.H.
a river bend (1988, p 189-197) MP 2501	MP 1160	Rheology of electer ice .1045 n 1115.1117. AP 1844

Thompson, T.W. Progress report on 25 cm radar observations of the 1971 AID-	Factors affecting water migration in frozen soils (1987, 16p) CR 87-09	Roof leaks in cold regions: school at Chevak, Alaska (1980, 12p) CR 80-11 Extending the useful life of DYE-2 to 1986. Part 2: 1979
JEX studies [1972, p.1-16] MP 989 Thomson, C. Data reduction of GOES information from DCP networks	Method for measuring the rate of water transport due to tem- perature gradients in unsaturated frozen soils 1988, p 412- 417 MP 2362	findings and final recommendations (1980, 37p) SR 80-13
(1989, 15p.) SR 89-29 Thorndike, A.S.	Measurement of the unfrozen water content of soils: a com- parison of NMR and TDR methods [1988, p.473-477]	Roofs in cold regions: Marson's Store, Claremont, New Hampshire [1980, 13p.] SR 80-25
Snow and ice (1975, p.435-441, 475-487) MP 844	MP 2363 Comparison of soil freezing curve and soil water curve data	Moisture gain and its thermal consequence for common roof insulations (1980, p 4-16) MP 1361
Thurmond, V.L. Geochemistry of freezing brines Low-temperature properties of sodium chloride (1987, 11p.) CR 87-13	for Windsor sandy loam (1988, 37p.) CR 88-26 Measurement of the unfrozen water content of soils compari-	Roofs in cold regions (1980, 21p) MP 1408 Venting of built-up roofing systems (1981, p.16-21)
Tibuni, F.	son of NMR and TDR methods (1988, 11p.) CR 88-18	MP 1498 Roof moisture survey: Reserve Center Garage, Grenier Field,
Humidity and temperature measurements obtained from an unmanned aerial vehicle (1987, p.35-45) MP 2293	Unfrozen water contents of undisturbed and remolded Alaskan silt as determined by nuclear magnetic resonance	Manchester, N.H. (1981, 18p.) SR \$1-31 Roof moisture surveys (1982, p.163-166) MP 1505
Prediction of unfrozen water contents in frozen soils from liquid determinations (1976, 9p) CR 76-08	(1988, 17p) CR \$8-19 Unfrozen water contents of six antarctic soil materials [1989, p 353-366] MP 2470	Designing with wood for a lightweight air-transportable Arc- tic shelter; how the materials were tested and chosen for
Simple procedure to calculate the volume of water remaining unfrozen in a freezing soil [1976, p.114-122] MP 899	Comparison of soil freezing curve and soil water curve data for Windsor sandy loam (1989, p 2205-2210)	design (1982, p.385-397) MP 1558 Roof moisture surveys current state of the technology [1983, p 24-31] MP 1628
Mars soil-water analyzer instrument description and status [1977, p.149-158] MP 912	MP 2577 Unfrozen water contents of undisturbed and remoided Alas-	Locating wet cellular plastic insulation in recently construct-
Determination of unfrozen water in frozen soil by pulsed	kan silt (1989, p.103-111) MP 2683	Can wet roof insulation be dried out [1983, p 626-639]
nuc'ear magnetic resonance (1978, p.149-155) MP 1097	Predicting unfrozen water content behavior using freezing point depression data [1990, p.54-60] MP 2677	MP 1509 Comparison of serial to on-the-roof infrared moisture surveys
Water vapor adsorption by sodium montmorillonite at -5C (1978, p 638-644) MP 981	Transport of water due to a temperature gradient in unsaturated frozen clay [1990, p.57-75] MP 2701	[1983, p.95-105] MP 1709 Water supply and waste disposal on permanent snow fields
Phase composition measurements on soils at very high water contents by pulsed nuclear magnetic resonance technique	Tien, C. Approximate analysis of melting and freezing of a drill hole	[1984, p.401-413] MP 1714 Secondary stress within the structural frame of DYE-3. 1978-
(1978, p.11-14) MP 1210 Viking GCMS analysis of water in the Martian regoluth	through an ice shelf in Antarctica (1975, p.421-432) MP 861	1983 (1984, 44p) SR 84-26 Water supply and waste disposal on permanent snowfields
[1978, p.55-61] MP 1195 Analysis of water in the Martian regolith [1979, p 33-38]	Heat transfer characteristics of melting and refreezing a drill hole through an ice shelf in Antarctica (1976, 15p.)	(1985, p.344-350) MP 1792 Roof moisture surveys: yesterday, today and tomorrow
MP 1409 Low temperature phase changes in montmorillonate and non-	ČR 76-12 Tieszen, L.L.	(1985, p 438-443 + figs) MP 2044 Condensation control in low-slope roofs [1985, p 47-59]
tronite at high water contents and high salt contents (1980, p.139-144) MP 1330	Seasonal cycles and relative levels of organic plant nutrients under Arctic and alpine conditions (1971, p 55-57)	MP 2039 Aerial roof moisture surveys [1985, p.424-425]
Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance (1980, p 400-412)	MP 904 Ecological effects of oil spills and seepages in cold-dominated	MP 2022
MP 1412 Relationship between the ice and unfrozen water phases in	environments (1971, p 61-65) MP 905 Comparative investigation of periodic trends in carbohydrate	Lessons learned from examination of membrane roofs in Alas- ka (1986, p 277-290) MP 2003
frozen soil as determined by pulsed nuclear magnetic reso- nance and physical desorption data [1982, 8p]	and lipid levels in Arctic and alpine plants (1972, p.40-45) MP 1376	Airborne roof moisture surveys [1986, p 45-47] MP 2139
CR 82-15 Companion of unfrozen water contents measured by DSC	Vegetative research in arctic Alaska [1973, p 169-198] MP 1008	Protected membrane roofing systems [1986, p.49-50] MP 2140
and NMR [1982, p 115-121] MP 1594 Mobility of water in frozen soils [1982, c15p]	Arctic ecosystem: the coastal tundra at Barrow, Alaska (1980, 571p) MP 1355	Vapor drive maps of the U.S A [1986, 7p. + graphs] MP 2041
MP 2012	Analysis of processes of primary production in tundra growth	Vents and vapor retarders for roofs (1986, 11p) MP 2244
Method for measuring enriched levels of deuterium in soil water [1982, 12p.] SR 82-25	Tilton, P.	Proposed code provisions for drifted snow loads (1986, p 2080-2092) MP 2148
Transport of water in frozen soil 1 Experimental determination of soil-water diffusivity under isothermal conditions [1982, p.221-226] MP 1629	Extending the useful life of DYE-2 to 1986. Part 2, 1979 findings and final recommendations [1980, 37p] SR 80-13	Cold regions roof design (1987, p 457-458) MP 2243 Wetting of polystyrene and urethane roof insulations in the
Transport of water in frozen soil. 2. Effects of ice on the transport of water under isothermal conditions (1983,	Timco, G.W. Working group on ice forces. 4th state-of-the-art report	laboratory and on a protected membrane roof (1987, p 108-119) MP 2337
p.15-26; MP 1601 Relationship between the ice and unfrozen water phases in	[1989, 385p] SR \$9-05 Ting, J.M.	Vents and vapor retarders for roofs (1987, p 80-90) MP 2352 Buildings and utilities in very cold regions: overview and re-
frozen soils as determined by pulsed nuclear resonance and physical desorption data (1983, p 37-46) MP 1632	Application of the Andrade equation to creep data for ice and frozen soil (1979, p 29-36) MP 1802	search needs (1987, p 299-303) WP 2424 Vibration analysis of a DEW Line station (1988, p.1513-
Effect of unconfined loading on the unfrozen water content of Manchester silt (1982, 17p.) SR 83-18	Tobiasson, W. CRREL is developing new snow load design criteria for the	1518 ₁ MP 2341
Soil-water diffusivity of unsaturated frozen soils at subzero temperatures [1983, p 889-893] MP 1664	United States (1976, p.70-72) MP 947	Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof [1988, p 421-430]
Water migration due to a temperature gradient in frozen soil (1983, p.951-956) MP 1666	Life-cycle cost effectiveness of modular megastructures in cold regions (1976, p 760-776) MP 892	Wood-frame roofs and moisture (1988, p 33-37)
Transport of water in frozen soil 1 Experimental determi-	CRREL roof moisture survey, Pease AFB Buildings 33, 116, 122 and 205 (1977, 10p) SR 77-02	MP 2346 Method for conducting airborne infrared roof moisture sur-
nation of soil-water diffusivity under isothermal conditions (1983, 8p.) CR 83-22	Update on snow load research at CRREL (1977, p.9-13) MP 1142	veys [1988, p 50-61] MP 2436 Buildings and utilities in very cold regions, overview and re-
Transport of water in frozen soil: 3 Experiments on the effects of ice content [1984, p.28-34] MP 1841	Reinsulating old wood frame buildings with urea-formalde- hyde foam (1977, p 478-487) MP 958	search needs (1988, p 4-11) MP 2552 Changes coming in snow load design criteria (1989, p.413-
Effects of low temperatures on the growth and unfrozen water content of an aquatic plant (1984, 8p) CR 84-14	Hand-held infrared systems for detecting roof moisture [1977, p.261-271] MP 1390	418 ₃ MP 2612 Roof design in cold regions (1989, p.462-472 ₁
Transport of water in frozen soil: 4. Analysis of experimental results on the effects of ice content (1984, p 58-66)	Maintaining buildings in the Arctic [1977, p 244-251] MP 1508	MP 2613 Perspective ground loads and mapping (1989, p.512-513)
MP 1843 Effects of soluble salts on the unfrozen water contents of the	Infrared detective: thermograms and roof moisture [1977, p.41-44] MP 961	MP 2614 Changes coming in snow load design criteria (1989, p 918-
Lanzhou, P.R.C., silt [1984, 18p] CR 84-16 Effects of magnetic particles on the unfrozen water content of	Roof moisture survey, ten State of New Hampshire buildings	920) MP 2650 Roof design in cold regions [1989, p.1029-1037]
frozen soils determined by nuclear magnetic resonance (1984, p 63-73) MP 1790	CRREL roof moisture survey, Building 208 Rock Island Arse-	MP 2651 Roofer a management tool for maintaining built-up roof
Deuterium diffusion in a soil-water-ice mixture (1984, 11p.) SR 84-27	nal (1977, 6p) SR 77-43 Construction on permafrost at Longyearbyen on Spitisbergen r1978, p 884-890 MP 1108	(1989, p.6-10) MP 2481 Vapor retarders for membrane roofing systems (1989, p.31-
Transport of water in frozen soil. 5, Method for measuring the vapor diffusivity when ice is absent [1984, p.172-179]	[1978, p 884-890] MP 1108 Details behind a typical Alaskan pile foundation [1978, p 891-897] MP 1109	37 ₁ MP 2485 ROOFER, a management tool for maintaining built-up roofs
MP 1819 Experimental measurement of channeling of flow in porous	Detecting wet roof insulation with a hand-held infrared camera (1978, p A9-A15) MP 1213	(1989, 9p) MP 2576 Vapor retarders to control summer condensation (1989,
media (1985, p 394-399) MP 1967 Effects of soluble salts on the unfrozen water contents of the	Summary of Corps of Engineers research on roof moisture	p 566-572 ₁ MP 2556 Tobia, T.M.
Lanzhou, PRC, silt [1985, p 99-109] MP 1933 Water migration in unsaturated frozen morin clay under lin-	detection and the thermal resistance of wet insulation [1978, 6p] SR 78-29	Technique for producing strain-free flat surfaces on single crystals of ice comments on Dr. H. Bader's letter and Dr.
ear temperature gradients (1985, p 111-122) MP 1934	Estimated snow, ice, and rain load prior to the collapse of the Hartford Civic Center arena roof (1979, 32p) SR 79-09	K Itagaki's letter [1973, p.519-520] MP 1000 Mass transfer along ice surfaces observed by a groove relaxa
Experimental study on factors affecting water migration in frozen morin clay (1985, p 123-128) MP 1897	Roof moisture surveyUS Military Academy (1979, 8 refs) SR 79-16	tion technique (1977, p 34-37) MP 1091 Tomita, H.
Thawing of frozen clays (1985, p.1-9) MP 1923 Prediction of unfrozen water contents in frozen soils by a two-	Extending the useful life of DYE-2 to 1986, Part 1. Preliminary findings and recommendations (1979, 15p)	Survey of airport pavement distress in cold regions (1986, p 41-50) MP 2002
point or one-point method (1985, p.83-87) MP 1929 Soil-water potential and unfrozen water content and tempera-	SR 79-27 Snow studies associated with the sideways move of DYE-3	Statement of research needs to address airport pavement distress (1987, p. 981-1012) MP 2234
ture (1985, p.1-14) MP 1932	(1979, p 117-124) MP 1312	Townsend, R.A. Some observations on the character of snow [1987, p. 48-53]
Transport of water in frozen soil 6 Effects of temperature (1987, p 44-50) MP 2213	CRREL roof moisture survey, Pease AFB buildings 35, 63, 93, 112, 113, 120 and 220 (1980, 31p) SR 80-14	Some observations on the character of show [1987, p 48-23] MP 239

Trachier, G.M. USACRREL precise thermistor meter (1985, 34p)	Crystal structure of Fram Strait sea ice [1986, p.20-29] MP 2221	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea [1976, p.53-60] MP 919
SR 85-26	Variability of Arctic sea ice drafts [1986, p 237-256] MP 2198	Delineation and engineering characteristics of permafrost
Trivett, N.B.A. Snowpack estimation in the St. John River basin (1980).	Portable hot water see drill (1986, p 549-564) MP 2202	Haines-Fairbanks pipeline: design, construction and opera-
p 467-486 ₁ MP 1799 Troth, J.L.	Preliminary simulation of the formation and infilling of sea ice gouges [1986, p 259-268] MP 2218	tion (1977, 20p.) SR 77-04 Delineation and engineering characteristics of permafront
Upland aspen/birch and black spruce stands and their litter	Physical properties of sea ice discharged from Fram Strait	beneath the Beaufort Sea (1977, p 385-395) MP 1074
and soil properties in interior Alaska (1976, p.33-44) MP 867	(1987, p 436-439) MP 2204 Portable hot-water ice drill (1987, p 57-64) MP 2236	Lock wall deicing with high velocity water jet at Soo Locks, Mi (1977, p.23-35) MP 973
Tryde, P.	Physical properties of summer ses ice in the Fram Strait (1987, p.6787-6803) MP 2240	Canol Pipeline Project: a historical review (1977, 32p) SR 77-34
Intermittent ice forces acting on inclined wedges (1977, 26p.) CR 77-26	Ice detector measurements compared to meteorological	Delineation and engineering characteristics of permafrost
Standardized testing methods for measuring mechanical prop- erties of ice (1981, p 245-254) MP 1556	parameters in natural icing conditions (1987, p.31-37) MP 2277	beneath the Beaufort Sea (1977, p 432-440) MP 1077 1977 CRREL-USGS permafrost program Beaufort Sea, Alas-
Tucker, W.B.	Physical properties of summer sea ace in the Fram Strait, June- July 1984 (1987, 81p) CR 87-16	ka, operational report [1977, 19p] SR 77-41 Delineation and engineering characteristics of permafrost
Classification and variation of sea ice ridging in the Arctic basin (1974, p.127-146) MP 1022	Corps of Engineers research in Arctic and Arctic-related envi-	beneath the Beaufort Sea (1977, p.518-521) MP 1201
Measurement of sea ice drift far from shore using LANDSAT and aerial photographic imagery (1975, p 541-554)	ronmental sciences (1987, p.81-87) MP 2411 Information systems planning study (1987, 48p)	Flexural strength of ice on temperate lakes—comparative tests of large cantilever and simply supported beams (1978,
MP 849	SR 27-23 Evaluation of an operational ice forecasting model during	14p. ₃ CR 78-09 Investigation of the snow adjacent to Dye-2, Greenland
Techniques for using LANDSAT imagery without references to study sea ice drift and deformation (1976, p.115-135)	summer (1988, p.159-174) MP 2347	(1981, 23p.) SR 81-03
MP 1059 Techniques for studying sea ice drift and deformation at sites	Overview of the physical properties of sea ice [1988, p 71-85] MP 2635	Movement study of the trans-Alaska pipeline at selected sites (1981, 32p.) CR 81-04
far from land using LANDSAT imagery (1976, p 595- 6091 MP 866	Update on portable hot-water sea ice drilling [1989, p 175- 178] MP 2479	Collapsible restraint for measuring tapes (1983, 12 col) MP 2335
Seasonal variations in apparent sea ice viscosity on the geo-	Oceanic heat flux in the Fram Strait measured by a drifting	Secondary stress within the structural frame of DYE-3 1978-
physical scale (1977, p 87-90) MP 900 Computer routing of unsaturated flow through snow (1977,	buoy (1989, p 995-998) MP 2531 Concurrent remote sensing of arctic sea ice from submarine	Heat recovery from primary effluent using heat pumps
SR 77-10 Studies of the movement of coastal sea ice near Prudhoe Bay.	and aircraft (1989, 20p.) MP 2697 Proceedings (1989, 475p) SR 89-39	(1985, p.199-203) MP 1978 Temperature and structure dependence of the flexural
Alaska, U.S. A. (1977, p.533-546) MP 1066	Use of the mechanical properties of ice in the development of	strength and modulus of freshwater model ice [1988,
Examination of the viscous wind-driven circulation of the Arctic ice cover over a two year period (1977, p 95-133)	predictive models [1989, p 87-99] MP 2687 Ice strength estimates from submarine topsounder data	43p. ₃ CR 88-96 Primary effluent as a heat source for heat pumps [1988,
MP 983 Nearshore ice motion near Prudhoe Bay, Alaska (1977, p 23-	(1989, p 425-426) MP 2691 Recent measurements of sea ice topography in the eastern	p 141-146; MP 2445 Experiments on the cutting process in ice (1989, 36p)
31 ₁ MP 1162	Arctic (1990, p.132-136) MP 2735	CR 89-05
Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort	Oceanic heat flux in the Fram Strait measured by a drifting buoy (1990, p.291-296) MP 2740	Structure and temperature dependence of the flexural proper- ties of laboratory freshwater ice sheets (1989, p.249-270)
and Chukchi Seas [1977, p 32-41] MP 1163 Computer model of municipal snow removal [1977, 7p]	Sea ice in the polar regions (1990, p.47-122) MP 2750 Tulastra, R.L.	MP 2652 Primary effluent as a heat source for heat pumps [1989, p.12-
CR 77-30 Computer simulation of urban snow removal (1979, p 293-	Near real time hydrologic data acquisition utilizing the	17 ₁ MP 2760 Ugolini, F.C.
302 ₃ MP 1238	Landsat data collection platform at Devil Canyon site, upper	Ionic migration and weathering in frozen Antarctic soils
Sea ice ridging over the Alaskan continental shelf (1979, 24p) CR 79-08	Susitna Basin, Alaska—Performance and analysis of data (1979, 17 refs) SR 79-02	[1973, p.461-470] MP 941 Examining antarctic soils with a scanning electron micro-
Some results from a linear-viscous model of the Arctic ice cover [1979, p 293-304] MP 1241	Turner, G.A.	scope (1976, p.249-252) MP 931
Sea ice ridging over the Alaskan continental shelf (1979,	Attenuation and backscatter for snow and sleet at 96, 140, and 225 GHz (1984, p 41-52) MP 1864	Antarctic soil studies using a scanning electron microscope [1978, p.106-112] MP 1386
p.4885-4897 ₁ MP 1240 Preliminary results of ice modeling in the East Greenland area	Twickler, M.S. Dominion Range ice core, Queen Maud Mountains, Antarc-	Uiga, A. Let's consider land treatment, not land disposal [1976, p 60-
(1981, p 867-878) MP 1458 Morphological investigations of first-year sea ace pressure	tica—general site and core characteristics with implications	62 ₁ MP 869 Wastewater reuse at Livermore, California [1976, p 511-
ridge sails (1981, p 1-12) MP 1465	U.S. Arctic Construction and Frost Effects Laboratory	531 ₁ MP 870
Application of a numerical sea are model to the East Greenland area (1981, 109p) MP 1535	Approach roads, Greenland 1955 program (1959, 100p) MP 1522	Overview of land treatment from case studies of existing sys- tems (1976, 26p.) MP 891
Application of a numerical sea ice model to the East Green- land area (1982, 40p) CR 82-16	U.S. Army Corps of Engineers	Feasibility study of land treatment of wastewater at a subarc- tic Alaskan location (1976, 21p.) MP 868
Comparison of sea ice model results using three different wind	Building under cold climates and on permafrost; collection of papers from a U.SSoviet joint seminar, Leningrad, USSR	Wastewater treatment in cold regions (1976, 15p)
Comparison of different sea level pressure analysis fields in	(1980, 365p) SR 80-40 U.S. Army CRREL/WES/FESA Roof Moisture Research	MP 965 Preliminary evaluation of 88 years rapid infiltration of raw
the East Greenland Sea (1983, p.1084-1088) MP 1737	Team Recommendations for implementing roof moisture surveys in	municipal sewage at Calumet, Michigan (1977, p.489- 510 ₁ MP 976
CRREL investigations relevant to offshore petroleum produc- tion in ice-covered waters (1983, p 207-215)	the U.S. Army [1978, 8p] SR 78-01	Wastewater reuse at Livermore, California (1977, p 511- 531 ₁ MP 979
MP 2086	U.S. Department of Housing and Urban Development Building under cold climates and on permafrost; collection of	Feasibility study of land treatment of wastewater at a subarc-
Current procedures for forecasting aviation icing (1983, 31p) SR 83-24	papers from a U.SSoviet joint seminar, Leningrad, USSR [1980, 365p] SR 80-40	tic Alaskan location [1977, p 533-547] MP 1268 Ullerstig, A.
Atmospheric boundary-layer modification, drag coefficient, and surface heat flux in the antarctic marginal ice zone	U.S. Interagency Arctic Research Policy Committee	On modeling mesoscale ice dynamics using a viscous plastic constitutive law [1981, p.1317-1329] MP 1526
(1984, p 649-661) MP 1667	Arctic research of the United States, Vol.1 [1987, 121p] MP 2306	On forecasting mesoscale ice dynamics and build-up (1983.
Army research could reduce dangers posed by sea ice (1984, p.20-24) MP 2168	Arctic research of the United States, Vol 2 (1988, 76p) MP 2379	p 110-115; MP 1625 Ungar, S.G.
Some simple concepts on wind forcing over the marginal ice zone [1984, p 43-48] MP 1783	Arctic research in the United States, Vol 3 (1989, 72p) MP 2653	Preliminary analysis of water equivalent/snow characteristics using LANDSAT digital processing techniques (1977, 16
Variation of the drag coefficient across the Antarctic marginal ice zone [1984, p 63-71] MP 1784	Arctic research of the United States, Vol 3 (1989, 71p) MP 2530	leaves; MP 1113
On small-scale horizontal variations of salimity in first-year	Arctic research of the United States, Vol 4 (1990, 120p)	Snow cover mapping in northern Maine using LANDSAT digital processing techniques (1979, p 197-198)
sea ice (1984, p 6505-6514) MP 1761 Method of detecting voids in rubbled ice (1984, p 183-188)	MP 2765 U.SSoviet Joint Seminar on Building under Cold Climates	MP 1510 Extraction of topography from side-looking satellite systems
MP 1772 Structure of first-year pressure ridge sails in the Prudhoe Bay	and on Permafrost, Leningrad, June 24-27, 1979 Building under cold climates and on permafrost; collection of	-a case study with SPOT simulation data (1983, p 535-550) MP 1695
region (1984, p.115-135) MP 1837	papers from a U.SSoviet joint seminar, Leningrad, USSR	Integration of Landsat land cover data into the Saginaw River
Sea ice properties (1984, p. 82-83) MP 2136 Determining the characteristic length of floating ice sheets by	[1980, 365p] SR 80-40 Udin, I.	Basin geographic information system for hydrologic model- ing [1984, 19p] SR 84-01
moving loads (1985, p 155-159) MP 1855 Preliminary simulation study of sea ice induced gouges in the	On modeling mesoscale ice dynamics using a viscous plastic constitutive law (1981, p 1317-1329) MP 1526	Unterstelner, N. Using sea ice to measure vertical heat flux in the ocean
sea floor (1985, p 126-135) MP 1917	On forecasting mesoscale ice dynamics and build-up [1983.	[1982. p 2071-2074] MP 1521 Urban, N.W.
Kadluk ice stress measurement program (1985, p.88-100) MP 1899	Ueda, H.T.	Land treatment systems and the environment (1979, p 201-
Physical properties of sea ice in the Greenland Sea (1985, p 177-188) MP 1903	Portable instrument for determining snow characteristics related to trafficability (1972, p 193-204) MP 886	225 ₁ MP 1414 Utt, M.E.
Numerical simulation of ice gouge formation and infilling on the shelf of the Beaufort Sea (1985, p. 393-407)	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea (1976, p. 391-408) MP 1377	Ice properties in a grounded man-made ice island (1986, p. 135-142) MP 2032
MP 1904	Resurvey of the "Byrd" Station, Antarctica, drill hole (1976,	Valleau, N.C.
Pressure ridge morphology and physical properties of sea ice in the Greenland Sea (1985, p 214-223) MP 1935	p 29-34; MP 846 Operational report 1976 USACRREL-USGS subsea perma-	Modeling the electromagnetic property trends in sea ice and example impulse radar and frequency-domain electromag-
Numerical simulation of sea ice induced gouges on the shelves of the polar oceans [1985, p.259-265] MP 1939	frost program Beaufort Sea, Alaska (1976, 20p.) SR 76-12	netic ice thickness sounding results (1986, p 57-133) MP 2197

Electromagnetic property trends in sea ice, Part 1 (1987,	Definition of research needs to address airport pavement dis-	Model simulation of 20 years of northern hemisphere sea-ice
45p. ₃ CR 87-06 Airborne electromagnetic sounding of sea ice thickness and	tress in cold regions [1989, 142p] CR 89-10 Vinton, C.S.	fluctuations (1984, p 170-176) MP 1767 Numerical simulation of Northern Hemisphere sea ice varia-
sub-ice bathymetry [1987, p 289-311] MP 2332 Airborne electromagnetic sounding of sea ice thickness and	Pneumatically de-iced ice detector—final report, phase 2, part	bility, 1951-1980 (1985, p 4847-4865) MP 1882
sub-ice bathymetry [1987, 40p.] CR 87-23	1 (1986, 9p. + appends) MP 2249 Vlach, E.	Walsh, M. River ice and salmonids (1986, p D-4.1-D-4.26)
Airborne measurement of sea ice thickness and subice bath- ymetry [1988, p.111-120] MP 2345	Rapid infiltration of primary sewage effluent at Fort Devens,	MP 2477
Valliere, D.	Massachusetts [1976, 34p] CR 76-48 Von Bradsky, P.	Walsh, M.E. Losses of explosives residues on disposable membrane filters
Arctic research of the United States, Vol.3 (1989, 71p.) MP 2530	Uniform snow loads on structures [1932, p.2781-2798]	[1987, 25p] SR 87-02
United States arctic research plan biennial revision: 1990-	MP 1574 W.F. Weeks Sea Ice Symposium: Sea Ice Properties and	Development of an analytical method for explosive residues in soil [1987, 51p] CR 87-07
1991 (1989, 72p) MP 2544 Valliere, D.R.	Processes, San Francisco, CA, Dec. 1988	Analytical method for determining tetrazane in water (1987, 34p) SR 87-25
Arctic research of the United States, Vol 1 [1987, 121p]	Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium (1990, 299p) M 90-01	
MP 2306 Arctic research of the United States, Vol.2 (1988, 76p.)	Wadkams, P.	Evaluation of disposable membrane filter units for sorptive losses and sample contamination (1988, p.45-52) MP 2328
MP 2379	MIZEX—a program for mesoscale air-ice-ocean interaction; experiments in Arctic marginal ice zones 1. Research	Development of analytical methods for military-unique com-
Arctic research in the United States, Vol.3 (1989, 72p) MP 2653	strategy (1981, 20p) SR 81-19 MIZEX—a program for mesoscale air-ice-ocean interaction	pounds (1988, p 370-380) MP 2454 Development of an analytical method for the determination
Van Cleve, K.	experiments in Arctic marginal ice zones. 2. A science	of explosive residues in soil. Part II: Additional develop-
Revegetation in arctic and subarctic North America—a litera- ture review (1976, 32p.) CR 76-15	plan for a summer Marginal Ice Zone Experiment in the Fram Strait/Greenland Sea. 1984 (1983, 47p)	ment and ruggedness testing [1988, 46p.] CR \$8-08 Analytical method for determining tetrazene in soil [1988,
Van den Berg, A.	SR 83-12 Ice properties in the Greenland and Barents Seas during sum-	22p.) SR 88-15
Hand-held infrared systems for detecting roof moisture [1977, p.261-271] MP 1390	mer (1983, p 142-164) MI' 2062	Improved RP-HPLC method for determining nitroaromatics and nitramines in water (1988, 36p) SR 88-23
Van DeValk, W.A.	Marginal ice zones, a description of air-ice-ocean interactive processes, models and planned experiments (1984, p.133-	Development of an analytical method for the determination of explosive residues in soil. Part 3. Collaborative test re-
Field investigation of St. Lawrence River hanging ice dams (1984, p.241-249) MP 1830	146 ₁ MP 1673	sults and final performance evaluation (1989, 89p.)
Van Pelt, D.	MIZEX—a program for mesoscale air-ice-ocean interaction experiments in Arctic marginal ice zones 6- MIZEX-West	CR 89-09 Alternative methods of using STB for decontamination at low
Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1987,	(1985, 119p) SR 85-06	temperatures (1989, 13p) SR 89-33
p.108-119; MP 2337	Sea-ice investigations during the Winter Weddell Sea Project [1987, p 88-89] MP 2491	Ion-pairing RP-HPLC method for determining tetrazene in water and soil [1989, p.159-179] MP 2593
Wetting of polystyrene and urethane roof insulations in the laboratory and on a protected membrane roof (1988,	Ice thickness distribution across the Atlantic sector of the Antarctic Ocean in midwinter [1987, p.14,535-14,552]	Analytical methods for detecting military-unique compounds [1989, p.13-14] MP 2713
p.421-430; MP 2011 Van Wyhe, G.	MP 2314	Analytical methods for determining nitroguanidine in soil and
Ice-cratering experiments Blair Lake, Alaska [1966, Various	Development of sea ice in the Weddell Sea [1989, p.92-96] MP 2615	water (1989, 27p) SR 89-35 Liquid chromatographic method for determination of extract-
pagings; MP 1034 Vance, G.P.	Concurrent remote sensing of arctic sea ice from submarine	able nitroaromatic and nitramine residues in soil (1989,
Investigation of ice clogged channels in the St. Marys River	and aircraft (1989, 20p) MP 2697 Snow cover effects on antarctic sea ice thickness (1990, p.16-	p 890-899; MP 2586 Environmental transformation products of nitroaromatics
(1978, 73p) MP 1170	21 ₁ MP 2726	and nitramines: literature review and recommendations for
Evaluation of ice deflectors on the USCG icebreaker Polar Star [1980, 37p] SR 80-04	Walker, B.D. Tundra and analogous soils [1981, p.139-179]	analytical development (1990, 21p.) SR 90-02 Walsh, M.R.
Analysis of the performance of a 140-foot Great Lakes ice- breaker: USCGC Katmai Bay [1980, 28p] CR 80-08	MP 1405	Preliminary design guide for arctic equipment [1989, 35p.] SR 89-13
Characteristics of ice in Whitefish Bay and St. Marys River	Walker, D.A. Effects of low-pressure wheeled vehicles on plant communi-	Wang, L.RL.
during January, February and March 1979 (1980, 27p) SR 80-32	ties and soils at Prudhoe Bay, Alaska (1977, 49p) SR 77-17	Life-cycle cost effectiveness of modular megastructures in cold regions [1976, p 760-776] MP 892
Clearing ice-clogged shipping channels [1980, 13p]	Effects of low ground pressure vehicle traffic on tundra at	Wang, Q.
CR 80-28 State of the art of ship model testing in ice (1981, p 693-	Lonely, Alaska (1978, 63p) SR 78-16 Effects of crude and diesel oil spill on plant communities at	Radar backscatter measurements over saline ice (1990, p 603-615) MP 2741
706 ₁ MP 1573	Prudehoe Bay, Alaska, and the derivation of oil spill sen-	Wang, T.P.
VanDevender, J.P. Effect of X-ray irradiation on internal friction and dielectric	sitivity maps (1978, p 242-259) MP 1184 Geobotanical atlas of the Prudhoe Bay region, Alaska (1980,	Laboratory investigation of the mechanics and hydraulics of river ice jams [1976, 97p] MP 1060
relaxation of ice (1983, p 4314-4317) MP 1670	69p ₁ CR 80-14	Laboratory investigation of the mechanics and hydraulies of
VanPelt, D.J. Thermal diffusivity of frozen soil [1980, 30p]	Landsat-assisted environmental mapping in the Arctic National Wildlife Refuge, Alaska (1982, 59p. + 2 maps)	river ice jams [1977, 45p] CR 77-09 Wang, Y.S.
SR 80-38	CR 82-37	Proceedings (1987, 4 vols) MP 2189
Varotts, R. Approximate solution to Neumann problem for soil systems	Sensitivity of plant communities and soil flora to seawater spills, Prudhoe Bay, Alaska (1983, 35p) CR 83-24	Warren, G.C. Ski friction and thermal response [1989, p 223-225]
(1981, p.76-81) MP 1494	Vegetation and environmental gradients of the Prudhoe Bay region, Alaska [1985, 239p] CR 85-14	MP 2745
Vasil'evskaja, V.D. Tundra and analogous soils [1981, p 139-179]	Vegetation and a Landsat-derived land cover map of the Bee-	Thermal response of downhill skis (1989, 40p) CR 89-23
MP 1405	chey Point quadrangle, Arctic Coastal Plain, Alaska (1987, 63p) CR 87-05	Warren, J.L.
Vandrey, K. 4th report of working group on testing methods in ice (1984).	Disturbance and recovery of arctic Alaskan tundra terrain	Automatic finite element mesh generator [1987, 27p] CR 87-18
p.1-41; MP 1886	(1987, 63p) CR 87-11 Use of off-road vehicles and mitigation of effects in Alaska	Waterman, S.E.
Vandrey, K.D. Standardized testing methods for measuring mechanical prop-	permafrost environments: a review (1990, p 63-72) MP 2682	Snowpack estimation in the St. John River basin (1980, p 467-486) MP 1799
erties of ice (1981, p 245-254) MP 1556	Walker, H.J.	Waters, R.G.
Veal, D.L. Propene dispenser for cold fog dissipation system (1973).	Morphology of the North Siope (1973, p 49-52) MP 1004	Preliminary evaluation of 88 years rapid infiltration of raw municipal sewage at Calumet, Michigan (1977, p.489-
38p ₁ MP 1033	Walker, K.E.	510 ₃ MP 976
Veen, J.A. van Soil microbiology (1981, p 38-44) MP 1753	Suppression of ice fog from the Fort Wainwright, Alaska, cooling pond (1982, 34p.) SR 82-22	Watson, M.S. Dominion Range ice core, Queen Maud Mountains, Antarc-
Verville, W.P.	Observations during BRIMFROST '83 (1984, 36p)	tica-general site and core characteristics with implications [1990, p 11-16] MP 2707
Subsurface explorations in permafrost areas [1959, p.31-41] MP 485	Wallace, A.T.	Watts, J.
Vesilind, P.A.	Let's consider land treatment, not land disposal (1976, p 60-	U.S. tundra biome publication list [1983, 29p.] SR 83-29
Thermal conductivity of sludges (1989, p 241-245) MP 2632	62; MP 869 Problems with rapid infiltration—a post mortem analysis	Wayneberg, J.A.
Veum, A.K.	(1984, 17p. + figs) MP 1944	Visual observations of floating ice from Skylab (1977, p.353- 379) MP 1263
Soil properties of the International Tundra Biome sites (1974, p 27-48) MP 1043	Walsh, J. Comments on the characteristics of <i>in situ</i> snow at millimeter	Webber, P.J.
Viereck, L.	wavelengths (1986, p.317-320) MP 2666	Effects of low-pressure wheeled vehicles on plant communi- ties and soils at Prudhoe Bay, Alaska (1977, 49p.)
Recovery and active layer changes following a tundra fire in northwestern Alaska (1983, p.543-547) MP 1660	Scattering at mm wavelengths from in situ snow [1986, p 1 6 1-1 6 2] MP 2141	SR 77-17
Viereck, L.A.	Walsh, J.E.	Effects of crude and diesel oil spill on plant communities at Prudehoe Bay, Alaska, and the derivation of oil spill sen-
Patterns of vegetation recovery after tundra fires in north- western Alaska, U.S.A. (1987, p.461-469) MP 2374	Development of a simplified method for field monitoring of soil moisture (1978, p 40-44) MP 1194	sitivity maps (1978, p.242-259) MP 1184
Vincent, T.J.	Review of techniques for measuring soil moisture in situ	Tundra disturbances and recovery following the 1949 ex- ploratory drilling, Fish Creek, Northern Alaska (1978,
Mukluk ice stress measurement program (1988, p 457-463) MP 2354	(1980, 17p) SR 80-31 On modeling seasonal and interannual fluctuations of arctic	Rip j CR 78-28 Geobotanical atlas of the Prudhoe Bay region, Alaska (1980,
Vinten, T.S.	sea ice [1982, p 1514-1523] MP 1579	69pg CR 80-14
Survey of airport pavement distress in cold regions (1986, p.41-50) MP 2002	Use of radio frequency sensor for snow-soil moisture water content measurement [1983, p.33-42] MP 1689	Coastal tundra at Barrow (1980, p.1-29) MP 1356 Landsat-assisted environmental mapping in the Arctic Na-
Statement of research needs to address airport pavement dis-	hast Greenland Sea ice variability in large-scale model simu-	tional Wildlife Refuge, Alaska (1982, 59p + 2 maps)
tress (1987, p 981-1012) MP 22.4	lations (1984, p.9-14) MP 1779	CR #2-37

Webber, P.J. (cont.)	International Workshop on the Seasonal Sea Ice Zone, Mon-	Sea ice ridging in the Ross Sea, Antarctica, as compared with
Sensitivity of plant communities and soil flora to seawater	terey, California, Feb. 26-Mar.1, 1979 (1980, 357p.) MP 1292	sites in the Arctic (1989, p 4984-4988) MP 2490
spills, Prudhoe Bay, Alaska [1983, 35p] CR \$3-24 Reconnaissance observations of long-term natural vegetation	Overview [International Workshop on the Seasonal Sea Ice	Satellite-borne remote sensing and large-scale programs for the arctic seas in the 1990s [1989, p.510-530]
recovery in the Cape Thompson region, Alaska, and addi-	Zone ₁ (1980, p.1-35) MP 1293	MP 2699
tions to the checklist of flora (1985, 75p) CR 85-11	Iceberg water: an assessment (1980, p.5-10) MP 1365	Internal structure, composition and properties of brackish ice
Webster, W.J., Jr.	Dynamics of near-shore ice (1981, p.125-135)	from the Bay of Bothnia during the BEPERS-88 experiment
Results of the US contribution to the Joint US/USSR Bering	MP 1599	(1989, p.1318-1333) MP 2763
Sea Experiment (1974, 197p.) MP 1032	Sea ice: the potential of remote sensing [1981, p 39-48] MP 1468	Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium (1990, 299p.) M 90-01
Weeks, W.F. MECHANICAL PROPERTIES OF SEA ICE [1967, 80p.]	Ground-truth observations of ice-covered North Slope lakes	Internal structure, composition and properties of brackish ice
M II-C3	images by radar (1981, 17p.) CR 81-19	from the Bay of Bothnia (1990, p.5-15) MP 2725
Arctic marine navigation and ice dynamics-summary find-	Physical and structural characteristics of sea ice in McMurdo	Weertman, J.
ings (1973, p.86-99) MP 2274	Sound (1981, p 94-95) MP 1542	Influence of irregularities of the bed of an ice sheet on deposi-
Salinity variations in sea ice [1974, p 109-122]	Growth, structure, and properties of sea ice (1982, 130p.)	tion rate of till (1971, p.117-126) MP 1009
MP 1023	M 82-01	Can a water-filled crevasse reach the bottom surface of a
Towing icebergs (1974, p 2) MP 1020	Physical and structural characteristics of antarctic sea ice [1982, p.113-117] MP 1548	glacier? [1973, p 139-145] MP 1044
Meso-scale strain measurements on the Beaufourt sea pack	Equations for determining the gas and brine volumes in sea	Depth of water-filled crevasses that are closely speced [1974, p.543-544] MP 1038
ice (AIDJEX 1971) [1974, p.119-138] MP 1035 Remote sensing program required for the AIDJEX model	ice samples (1982, 11p.) CR 82-30	Stability of Antarctic ice [1975, p.159] MP 1042
(1974, p.22-44) MP 1040	Physical properties of the ice cover of the Greenland Sea	Glaciology's grand unsolved problem (1976, p 284-286)
Ice dynamics in the Canadian Archipelago and adjacent Arc-	[1982, 27p] SR #2-2#	MP 1056
tic basin as determined by ERTS-1 observations (1975,	Recent advances in understanding the structure, properties, and behavior of sea ice in the coastal zones of the polar	*fechanical properties of polycrystalline ice: an assessment of
p.853-877; MP 1585	oceans [1983, p.25-41] MP 1604	current knowledge and priorities for research (1979, 16p)
Remote sensing plan for the AIDJEX main experiment [1975, p.21-48] MP 862	Equations for determining the gas and brine volumes in sea-	Wei, Y. MP 1207
Measurement of sea ice drift far from shore using LANDSAT	ice samples (1983, p 306-316) MP 2055	Fracture of S2 columnar freshwater ice: floating double can-
and aerial photographic imagery (1975, p.541-554)	Spaceborne SAR and sea ice: a status report (1983, p.113-	tilever beam tests [1988, p.152-161] MP 2493
MP 849	115 ₁ MP 2225 Statistical aspects of ice gouging on the Alaskan Shelf of the	Fracture toughness of columnar freshwater ice from large
Techniques for using LANDSAT imagery without references	Beaufort Sea (1983, 34p. + map) CR 83-21	scale DCB tests (1989, p 7-20) MP 2545
to study sea ice drift and deformation (1976, p.115-135) MP 1059	Science program for an imaging radar receiving station in	Weill, G.
Thickness and roughness variations of arctic multiyear sea ice	Alaska (1983, 45p) MP 1884	Extraction of topography from side-looking satellite systems
(1976, 25p.) CR 76-18	Mechanical properties of ice in the Arctic seas (1984, p.235-	-a case study with SPOT simulation data (1983, p.535-550; MP 1695
Dynamics of near-shore ice (1976, p.9-34) MP 1380	259 ₁ MP 1674	Weinstein, A.I.
Techniques for studying sea ice drift and deformation at sites	Summary of the strength and modulus of ice samples from multi-year pressure ridges (1984, p.126-133)	Use of compressed air for supercooled fog dispersal [1976,
far from land using LANDSAT imagery (1976, p.595- 609) MP 866	MP 1679	p 1226-1231 ₁ MP 1614
Imaging radar observations of frozen Arctic lakes (1976,	Variation of ice strength within and between multiyear pres-	Weiser, J.R.
p.169-175 ₃ MP 1284	sure ridges in the Beaufort Sea (1984, p.134-139)	Modeling hydrologic impacts of winter navigation (1981, p.1073-1080) MP 1445
Dynamics of near-shore ice (1976, p 267-275) MP 922	MP 1680 Mechanical properties of multi-year sea ice. Phase 1: Test	Weiss, H.V.
Sea ice properties and geometry (1976, p 137-171)	results (1984, 105p.) CR 84-09	Vanadium and other elements in Greenland ice cores (1976,
MP 918	Offshore oil in the Alaskan Arctic (1984, p.371-378)	4p. ₁ CR 76-24
Sea ice conditions in the Arctic (1976, p.173-205) MP 910	MP 1743	Atmospheric trace metals and sulfate in the Greenland Ice
Dynamics of near-shore see [1977, p 106-112] MP 924	Mechanical properties of sea ice: a status report (1984,	Sheet (1977, p.915-920) MP 909
Interesting features of radar imagery of ice-covered North	p.135-198j MP 1808 Some probabilistic aspects of ice gouging on the Alaskan Shelf	Vanadium and other elements in Greenland ice cores (1977, p.98-102) MP 1092
Slope lakes (1977, p.129-136) MP 923	of the Beaufort Sea (1984, p.213-236) MP 1838	Welch, J.P.
Dynamics of near-shore ice (1977, p.151-163)	Sea ice properties (1984, p.82-83) MP 2136	Scientific challenges at the poles (1987, p 23-26)
MP 1073	Sea ice characteristics and ice penetration probabilities in the	MP 2228
Engineering properties of sea ice (1977, p.499-531) MP 1065	Arctic Ocean (1984, p.37-65) MP 1993	Wellen, E.W.
Studies of the movement of coastal sea ice near Prudhoe Bay,	Modeling of Arctic sea ice characteristics relevant to naval operations (1984, p.67-91) MP 1994	Sublimation and its control in the CRREL permafrost tunnel [1981, 12p] SR 81-06
Alaska, U.S.A. (1977, p.533-546) MP 1066	Summary of the strength and modulus of ice samples from	Weller, G.
Integrated approach to the remote sensing of floating ice [1977, p 445-487] MP 1069	multi-year pressure ridges (1985, p.93-98) MP 1848	Abiotic overview (1971, p 173-181) MP 906
Visual observations of floating ice from Skylab (1977, p.353-	Preliminary simulation study of sea ice induced gouges in the	Computer simulation of the snowmelt and soil thermal regime
379 ₁ MP 1263	sea floor (1985, p.126-135) MP 1917 Variation of ice strength within and between multiyear pres-	at Barrow, Alaska (1975, p.709-715) MP 857
Nearshore ice motion near Prudhoe Bay, Alaska (1977, p 23-	sure ridges in the Beaufort Sea (1985, p.167-172)	Problems of offshore oil drilling in the Beaufort Sea (1978,
31 ₁ MP 1162	MP 2121	p 4-11 ₁ MP 1250 Science program for an imaging radar receiving station in
Characterization of the surface roughness and floe geometry of the sea ice over the continental shelves of the Beaufort	Physical properties of sea ace in the Greenland Sea (1985,	Alaska (1983, 45p.) MP 1884
and Chukchi Seas (1977, p.32-41) MP 1163	p.177-188 ₁ MP 1903	Offshore oil in the Alaskan Arctic [1984, p.371-378]
Internal structure of fast ice near Narwahl Island, Beaufort	Numerical simulation of ice gouge formation and infilling on the shelf of the Beaufort Sea (1985, p. 393-407)	MP 1743
Sea, Alaska (1977, 8p) CR 77-29	MP 1904	Alaska synthetic aperture radar (SAR) facility project (1987.
Dynamics of near-shore ice (1977, p 411-424)	Pressure ridge morphology and physical properties of sea ice	p 593-596 ₁ MP 2468
MP 1076	in the Greenland Sea (1985, p.214-223) MP 1935	Alaska SAR facility: an update (1988, p.27-31) MP 2380
Dynamics of near-shore ice (1977, p 503-510) MP 1200	Numerical simulation of sea ice induced gouges on the shelves of the polar oceans [1985, p.259-265] MP 1938	Wellman, R.J.
Some elements of iceberg technology (1978, p 45-98)	Mechanical properties of multi-year sea ice. Phase 2: Test	Comparative near-millimeter wave propagation properties of
MP 1616	results (1985, 81p) CR 85-16	snow or rain (1983, p.115-129) MP 1690
Some elements of iceberg technology (1978, 31p)	Physical properties of the sea ice cover [1986, p 87-102]	Attenuation and backscatter for snow and sleet at 96, 140, and
CR 78-02	MP 2047	225 GHz (1984, p.41-52) MP 1864
Preferred crystal orientations in the fast ice along the margins of the Arctic Ocean (1978, 24p) CR 78-13	Remote sensing of the Arctic seas [1986, p 59-64] MP 2117	Welsh, J.P. Wind-generated polynyas off the coasts of the Bering Sea
Ice arching and the drift of pack ice through channels [1978,	Crystal structure of Fram Strait sea ice (1986, p.20-29)	islands (1990, p 126-132) MP 2734
p.415-432 ₁ MP 1138	MP 2221	Werner, R.A.
Dynamics of near-shore see (1978, p 11-22) MP 1205	Ice gouge hazard analysis (1986, p.57-66) MP 2106	Constraints and approaches in high latitude natural resource
Measurement of mesoscale deformation of Beaufort sea ice	Growth, structure, and properties of sea ice (1986, p. 9-164)	sampling and research (1984, p.41-46) MP 2013
(AIDJEX-1971) (1978, p 148-172) MP 1179 Dynamics of near-shore ice (1978, p 230-233)	MP 2209	West, H.W.
MP 1619	Changes in the salinity and porosity of sea-ice samples during shipping and storage (1986, p. 371-375) MP 2244	Environmental factors and standards for atmospheric obscurants, climate and terrain [1987, 137p.] MP 2309
Problems of offshore oil drilling in the Beaufort Sea [1978,	On the profile properties of undeformed first-year sea ice	Weyrick, P.B.
p 4-11; MP 1250	(1986, p 257-330) MP 2199	Nitrogen removal in cold regions trickling filter systems
Sea ice ridging over the Alaskan continental shelf (1979,	Preliminary simulation of the formation and infilling of sea ice	(1986, 39p) SR 86-02
24p) CR 79-08 Surface hand contenuence coults of Acous con to 1979	gouges (1986, p 259-268) MP 2218	Study of dynamic ice breakup on the Connecticut River near
Surface-based scatterometer results of Arctic sea ice (1979, p.78-85) MP 1260	Physical properties of summer ses ice in the Fram Strait (1987, p.6787-6803) MP 2240	Windsor, Vermont (1987, p.163-177) MP 2400 Options for management of dynamic ice breakup on the Con-
"Pack ice and icebergs" report to POAC 79 on problems of	Alaska synthetic aperture radar (SAR) facility project (1987.	necticut River near Windsor, Vermont (1988, 16p.)
the seasonal sea ice zone: an overview (1979, p 320-337)	p 593-596 ₃ MP 2406	CR 88-01
MP 1320	Physical properties of summer seasce in the Fram Strait, June-	Development of a dynamic ice breakup control method for
Sea ice ridging over the Alaskan continental shelf (1979, p.4885-4897) MP 1240	July 1984 (1987, 81p) CR 87-16	the Connecticut River near Windsor, Vermont (1988, p. 221, 233.
The iceberg cometh (1979, p 66-75) MP 1305	Alaska SAR facility: an update [1988, p 27-31] MP 2380	p 221-233; MP 2510 Dynamic ice breakup control for the Connecticut River near
Crystal alignments in the fast ice of Arctic Alaska (1979,	Alaska SAR facility (1988, p.103-110) MP 2344	Windsor, Vermont (1988, p 245-258) MP 2449
21p ₃ CR 79-22	Profile properties of undeformed first-year sea ice [1988,	Whillens, I.M.
Dynamics of near-shore ice (1979, p 181-207) MP 1291	57p ₁ CR 88-13	Ice flow leading to the deep core hole at Dye J, Greenland
Crystal alignments in the fast ice of Arctic Alaska (1980)	Numerical simulations of the profile properties of undeformed first-year sease during the growth season (1988, p. 12,449)	/1984, p 185-190; MP 1824 Folding in the Greenland we sheet -1987, p 485-493.
p 1137-1146; MP 1277	12,460; MP 2404	Folding in the Greenland ice sheet [1987, p 485-493] MP 2185

White, L.	Sewage sludge aids revegetation (1982, p 198-301)	Review of thermal properties of snow, ice and scalice (1981,
Mobility bibliography [1981, 313p.] SR 81-29	MP 1735 Land treatment research and development program, synthesis	27p ₁ CR 81-10 Second National Chinese Conference on Permafrost, Lanz-
Withelt, T.T. Results of the US contribution to the Joint US/USSR Bering	of research results (1983, 144p) CR 83-20 Frost action and its control (1984, 145p) MP 1704	hou, China, 12-18 October 1981 (1982, 58p.)
Sea Experiment (1974, 197p) MP 1032 Williams, L.M.	Proceedings [1919, 136p] SR 89-07	On the temperature distribution in an air-sentilated snow layer (1982, 10p.) CR 82-05
Snow and ice (1975, p.435-441, 475-487) MP 844 Willcockson, W.	SNOW IV field experiment data report (1989, 250p) SR 89-14	Aerosol growth in a cold environment (1984, 21p)
Computer file for existing land application of wastewater sys-	U.S. Federal arctic research [1989, p.65-74] MP 2671 Wu, HC.	Temperature structure and interface morphology in a melting
Willey, W.	Investigation of ice forces on vertical structures (1974, 153p) MP 1041	ice-water system (1984, p.305-325) MP 1727 Experimental determination of heat transfer coefficients in
Losses from the Fort Wainwright heat distribution system (1981, 29p.) SR 81-14	Wachben, J.L.	water flowing over a horizontal ice sheet (1986, \$1p.) CR 86-03
Williams, F.M. Comparative model tests in ice of a Canadian Coast Guard k-	ice removal from the walls of navigation locks (1976, p.1487- 1496) MP 888	Approximate solutions of heat conduction in a medium with variable properties (1987, 18p.) CR 87-19
class icebreaker (1989, p.1/1-1/18) MP 2751 Comparative model tests in ice of a Canadian Coast Guard R-	Physical measurement of ice jams 1976-77 field season (1978, 19p.) SR 78-83	Thermal instability and heat transfer characteristics in water-
class icebreaker (1990, p.31-52) MP 2762	Investigation of ice clogged channels in the St. Marys River [1978, 73p] MP 1170	On the effect of the 4 C density maximum on melting heat
Williams, R.M. Turbulent heat flux from Arctic leads (1979, p.57-91)	Hydraulic model investigation of drifting snow (1978, 29p.) CR 78-16	transfer (1988, p.362-367) MP 2382 On the pressure drop through a uniform snow layer (1988,
MP 1340 Observations of condensate profiles over Arctic leads with a	Ice and navigation related sedimentation (1978, p. 393-403) MP 1133	10p CR 88-14 Historical and recent developments in the research of cold
hot-film anemometer (1981, p 437-460) MP 1479 Williams, R.R.	Shoreline erosion and shore structure damage on the St.	regions heat transfer [1919, p.1-25] MP 2627 Approximate solutions of heat conduction in snow with finear
Explosive obscuration sub-test results at the SNOW-TWO field experiment [1984, p.347-354] MP 1872	Marys River (1983, 36p.) SR 83-15 Effect of vessel size on shoreline and shore structure damage	variation of thermal conductivity (1989, p.21-32) MP 2546
Williamson, T.	along the Great Lakes connecting channels (1983, 62p.) SR 83-11	Friction loss through a uniform snow layer (1990, p.83-90)
Gas inclusions in the Antarctic ice sheet and their glaciologi- cal significance (1975, p.5101-5106) MP 847	Rise pattern and velocity of frazil ice (1984, p.297-316) MP 1816	Yeketa, R.
Rheological implications of the internal structure and crystal fabrics of the West Antarctic ice sheet as revealed by deep	Data acquisition in USACRREL's flume facility (1945, p.1053-1058) MP 2009	Ice removal from the walls of navigation locks (1976, p. 1487- 1496; MP 808
core drilling at Byrd Station (1976, 25p.) CR 76-35 Rheological implications of the internal structure and crystal	Laboratory study of flow in an ice-covered sand bed channel [1986, p 3-14] MP 2123	Ice releasing block-copolymer coatings (1978, p.544-551) MP 1141
fabrics of the West Antarctic ice sheet as revealed by deep core drilling at Byrd Station (1976, p.1665-1677)	Morphology, hydraulics and sediment transport of an ice-	Yong, R.N.
MP 1382	covered river. Field techniques and initial data (1986, 37p) CR 86-11	Proceedings of a workshop on the properties of snow, 8-10 April 1981, Snowbird, Utah (1982, 135p.) SR 82-18
Wilson, C. RADIOACTIVE FALLOUT IN NORTHERN REGIONS	Preliminary study of scour under an ice jam (1988, p.177- 192) MP 2475	Proceedings of the ISTVS Workshop on Measurement and Evaluation of Tite Performance under Winter Conditions,
(1967, 35p.) M I-AM CLIMATOLOGY OF THE COLD REGIONS. INTRO-	Effects of an ice cover on flow in a movable bed channel 1988, p.137-1461 MP 2499	Alta, Utak, 11-14, April 1983 (1985, 177p.) SR 85-15
DUCTION. NORTHERN HEMISPHERE, PART I (1967, 141p.) M I-AJo	Woori, A.F.	Need for snow tire characterization and evaluation (1985, p.1-2) MP 2043
CLIMATOLOGY OF THE COLD REGIONS SOUTH- ERN HEMISPHERE (1968, 77p.) M I-AJC	Mechanical properties of snow used as construction material (1975, p 157-164) MP 1057	Young, S.A.
CLIMATOLOGY OF THE COLD REGIONS NORTH-	Foundations in permafrost and seasonal frost: Proceedings (1985, 62p.) MP 1730	Effects of phase III construction of the Chena Flood Control Project on the Tanara River near Fairbanks, Alaska—a
ERN HEMISPHERE. PART II (1969, 158p.) M I-A36	Improved techniques for construction of snow roads and air- strips (1988, 99p.) SR 88-18	preliminary analysis (1984, 11p. + figs.) MP 1745 Zobilonsky, L.J.
Wilson, K.L. Ice dynamics in the Canadian Archipelago and adjacent Arc-	Improving snow roads and airstrips in Antarctica (1989, 18p.) SR 89-22	Ice forces on model structures (1975, p.400-407) MP 863
tic basin as determined by ERTS-1 observations (1975, p.853-877) MP 1585	Xirouchakis, P.C. Investigation of the acoustic emission and deformation re-	Ice forces on simulated structures (1975, p.387-396) MP 864
Winlarski, M.E. Topical databases. Cold Regions Technology on-line (1985).	sponse of finite ice plates (1981, 199.) CR 81-06	Ice engineering facility (1983, 12p. + fig.) MP 2008
p.12-15 ₃ MP 2027	Investigation of the acoustic emission and deformation re- sponse of finite ice plates [1981, p.123-133] MP 1436	Review of experimental studies of splitting forces exerted by adfrozen ice on marina piles [1595, p.529-542]
Winters, W.J. Geotechnical properties and freeze'thaw consolidation	On the acoustic emission and deformation response of finite	MP 1905 Real-time measurements of uplifting see forces (1925, p.253-
behavior of sediment from the Beaufort Sea, Alaska (1985, 83p.) MP 2025	ice plates (1981, p.385-394) MP 1455 Preliminary investigation of the acoustic emission and defor-	259; MP 2092 Data acquisition in USACRREL's flume facility (1985,
Wolfe, D. Chemical migration in snowpack [1989, p 282-286]	mation response of finite ice plates (1982, p 129-139) MP 1509	p.1053-1058 ₁ MP 2009 Catenovia Creek Model data acquisition system (1985).
MP 2757 Welfe, S.H.	Xu, X. Water migration in unsaturated frozen morin clay under lin-	p.1424-1429; MP 2090 Instrumentation for an uplating see force model (1915,
Analysis of explosively generated ground motions using	ear temperature gradients (1985, p.111-122) MP 1934	p.1430-1435 ₁ MP 2091
Wood, E.	Experimental study on factors affecting water ingration in frozen morin clay (1985, p.123-128) MP 1897	Model study of ice forces on a single pile (1936, p.77-87) MF 2368
Proposed code provisions for drifted snow loads (1936, p.2080-2092) MP 2148	Prediction of unfrozen water contents in frozen suits by a two- point or one-point method (1935, p.83-37) MP 1929	Information systems planning study (1927, 48p.) SR 87-23
Woods, P.F. Limnological investigations. Lake Koocanusa, Montana.	Soil-water potential and unfrozen water content and tempera-	Computer-controlled data acquisition system for a hydrastic flume (1988, p.45)-460; MP 2349
Part 4 Factors controlling primary productivity (1982, 106p.) SR 82-15	ture (1985, p.1-14) MP 1932 Factors affecting water migration in frozen soils (1987,	Model study of uplifting see forces the intirumentation (1988, p.745,748) MP 2487
Workshop on Ice Penetration Technology, 2nd, Monterey, CA. June 16-19, 1986	16p ₁ CR 87-89 Yapa, P.D.	Salmon River see jam control studies antenun report (1990).
Second Workshop on Ice Penetration Technology, 1986	Computer simulation of ice cover formation in the Upper St. Lawrence River (1984, p.227-245) MP 1814	Zagorodnov, V.S.
(1916, 659p.) SR 36-30 Workshop on Ice Penetration Technology, Hanover, NH.	Effect of see cover on hydropomer production (1984, p. 23)- 234; MP 1876	Core drilling through Ross Ice Shelf (1979, p.6) 46; MP 1337
June 12-13, 1984 (Proceedings) (1984, 345p) SR 84-33	Unified degree-day method for river see cover thickness samu-	Sea see on bottom of Ross Ice Shell (1979, p.65-66) MP 1336
Wortley, C.A. Methods of see control for winter navigation in inland waters	lation (1985, p.54-62) MP 2065 Simulation of rel slick transport in Great Laker connecting	Zarling, J. Yukon River breakup 1974 (1977), p 592 5941 MP 966
(1984, p.329-337) MP 1831	channels theory and model formulation (1990, 1993) CR 98-61	fee force measurement on the Yulon River bridge (1961,
Harbor design for see conditions (1987, p.14-15) MP 2588	Varkin, I.G. Natural electrical potentials that arise when soils freeze	p.749.777; MP 1396 Zarling, J.P.
Rebuilding infrastructure for pleasure boating (1989, p. 188- 201) MP 2444	(1934, 24p) SR 96-12 Yen, YC.	Heat and mass transfer from freely falling drops at low tens- peratures (1980, 14p.) CR 80-18
Wright, B. Multi year pressure ridges in the Canadian Beaufort Sea	IMPACT OF SPHERES ON ICE. CLOSURE (1972, MP 988)	Single and double reaction beam load cells for measuring see forces (1910, 17p) CR 30-25
(1979, p. 107 126; MP 1229 Multi-year pressure ridges in the Canadian Beaufort Sea	Approximate analysis of melting and freezing of a drill look	Performance of a thermosyphon with an inchined evaporator and vertical constraint; (1994, p.64.64). MP 1677
(1981, p.125-145) MP 1514	through an are shelf in Antarctica (1975, p.421-431). MP 361	Laboratory tests and analysis of thermost phone with incheed
Wright, R.D. Sea see pressure ridges in the Beaufort Sea (1978, p.249	Heat transfer characteristics of melting and refreezing a drill hole through an see shelf in Antircina (1974, 1993)	Heat transfer characteristics of thermosyphons with on ingel
271 ₁ MP 1132 Wright, E.A.	CR 76-12 Heat transfer between a free water jet and an see block held	evaporator sections (1988, p.285/292) MP 2034 Heat transfer characteristics of a commercial thermosyphon
Thermal energy and the environment (1975, 5p. + 3p. figs)		
MP 1480	mermal to it 11976, p 299 30°; MP 882 Heat transfer over a vertical melting plate (1977 12p)	with an inclined evaporator section [175", p "9-56; MF 1190
MP 1480 Pothole permer a public administrator's guide to under- standing and managing the pothole problem (1481, 24p.)		with an inclined evaporative section 1992, p. 78-51 ABP 1190 Heat transfer performance of commercial themosphons with inclined evaporation sections 1, 993, p. 275-380

Zarling, J.P. (cont.)
On the application of thermosyphens in cold regions (1988,
p.281-2861 MP 2321 Thermosyphons and foundation design in cold regions
(1988, p.251-259) MP 2443
Cold regions engineering research-strategic plan a1080
p.172-1903 MP 2571
Thermal stabilization of permafrost with thermosyphons (1990, p 323-328) MP 2583
Zeller, E.J.
Planetary and ext. aplanetary event records in polar ice caps
[1980, p.18-27] MP 1461
Nitrogenous chemical composition of antarctic ice and snow
[1981, p 79-81] MP 1541 Nitrate fluctuations in antarctic snow and firm potential
sources and mechanisms of formation (1982, p.243-248,
MP 1551
Zhang, X.
Bibliography of literature on China's glaciers and permafrost.
Part I: 1938-1979 (1982, 44p) SR 82-20 Zhang, Y.
Preliminary development of a fiber optic sensor for TNT (1988, 16p.) SR 88-04
Development of a membrane for in-situ optical detection of
TNT [1988, 6p] SR 88-24
Single fiber measurements for remote optical detection of TNT (1989, 7p.) SR 89-18
Zhu, Y.
Relationship between the ice and unfrozen water phases in
frozen soils as determined by pulsed nuclear resonance and
physical desorption data (1983, p.37-46) MP 1632
Creep behavior of frozen silt under constant uniaxial stress (1983, p.1507-1512) MP 1805
Creep behavior of frozen silt under constant uniaxial stress
(1984, p.33-48) MP 1807
Uniaxial compressive strength of frozen silt under constant
deformation r.t. s [1984, p.3-15] MP 1773 Effects of soluble salts on the unfrozen water contents of the
Lanzhou, P.R.C., silt [1984, 18p] CR 84-16
Effects of soluble saits on the unfrozen water contents of the
Lanzhou, PRC, silt [1985, p 99-109] MP 1933
Strain rate effect on the tensile strength of frozen silt [1985, p.153-157] MP 1898
p.153-157 ₁ MP 1898 Tensile strength of frozen silt (1986, p.15-28 ₁ MP 1971
1011311C 311 CHB (1 10 10 10 10 11 11 15 11 15 15 15 15 15 15 15 15 15
Creep and strength behavior of frozen silt in uniaxial compres-
Creep and strength behavior of frozen silt in uniaxial compres- sion (1987, 67p.) CR 87-10
sion (1987, 67p.) CR 87-13 Tensile strength of frozen silt (1987, 23p.) CR 87-15
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371
sion (1987, 67p.) CR 87-13 Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J.
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-13 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-13 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zison, J.R. Experi mental determination of heat transfer coefficients in
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p] CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p 879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p]
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-13 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zison, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-13 Trisxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I.
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-13 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zison, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] Zison, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heave of full-depth asphalt concrete pavements (1985, p.60) MP 1927 Survey or airport pavement distress in cold regions [1986,
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03 Zomerman, I. Frost heave of full-depth asphalt concrete pavements (1985, p.60) Survey or airport pavement distress in cold regions (1986, p.41-50) MP 2002
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zisson, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements (1985, p.60-10-10-10-10-10-10-10-10-10-10-10-10-10
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements [1985, p.60] Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] CR 89-10
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements [1985, p.60] Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] CR 89-10
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zison, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heave of full-depth asphalt concrete pavements (1985, p.60 m.) Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1986, p.41-50] CR 89-10 Zottkov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64]
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zison, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03 Zomerman, I. Frost heava of full-depth asphalt concrete pavements (1985, p.66
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements [1985, p.60] MP 1927 Survey of airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1896, p.41-50] Zotikov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.63-66] MP 1336
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements [1985, p.60] MP 1927 Survey of airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1896, p.41-50] Zotikov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.63-66] MP 1336
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements [1985, p.60 m. MP 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] Zottikov, I.A. Core dulling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.65-66] MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf [1-9 Camp), Antsrctica [197, 12p.] CR 79-24
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zison, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements (1985, p.60 cm.) MP 1927 Survey or airport pavement distress in cold regions (1986, p.41-50) Definition of research needs to address airport pavement distress in cold regions (1989, p.41-50) Zofikov, I.A. Core drilling through Ross Ice Shelf (1979, p.63-64) MP 1337 Sea ice on bottom of Ross Ice Shelf (1979, p.65-66) MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (1-9 Camp), Antsrctica (1979, 12p.) CR 79-24 Structure of ice in the central part of the Ross Ice Shelf,
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zison, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60 MP 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] Zottkov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.65-66] MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarcticia [1979, 12p.] CR 79-24 Structure of ice in the central part of the Ross Ice Shelf, Antarctica [1985, p.39-44] MP 2110
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav- of full-depth asphalt concrete pavements [1985, p.60 m. P. 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] Zotikov, I.A. Core dulling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.65-66] MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (1-9 Camp), Antsrctica [1979, 12p.] CR 79-24 Structure of ice in the central part of the Ross Ice Shelf, Antsrctica [1985, p.39-44] Zufelt, J.
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60 m. MP 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1986, p.41-50] Zotikov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.63-64] MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarctica [1979, 12p.] Structure of ice in the central part of the Ross Ice Shelf, Antarctica [1985, p.39-44] Zufelt, J. Survey of ice problem areas in navigable waterways [1985, 32p.] SR 85-02
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03 Zomerman, I. Frost heave of full-depth asphalt concrete pavements (1985, p.60) Survey or airport pavement distress in cold regions (1986, p.41-50) Definition of research needs to address airport pavement distress in cold regions (1989, p.41-50) Zotikov, I.A. Core dulling through Ross Ice Shelf (1979, p.63-64) MP 1337 Sea ice on bottom of Ross Ice Shelf (1979, p.65-66) MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf, Antisrctica (1935, p.39-44) Ztructure of ice in the central part of the Ross Ice Shelf, Antisrctica (1935, p.39-44) Survey of ice problem areas in navigable waterways (1985, 22p.) Zufelt, J.E.
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) CR 87-15 Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Zisson, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet (1986, 81p.) CR 86-03 Zomerman, I. Frost heave of full-depth asphalt concrete pavements (1985, p.60) Survey or airport pavement distress in cold regions (1986, p.41-50) Definition of research needs to address airport pavement distress in cold regions (1989, p.41-50) Zotikov, I.A. Core dulling through Ross Ice Shelf (1979, p.63-64) MP 1337 Sea ice on bottom of Ross Ice Shelf (1979, p.65-66) MP 1336 Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf, Antisrctica (1935, p.39-44) Ztructure of ice in the central part of the Ross Ice Shelf, Antisrctica (1935, p.39-44) Survey of ice problem areas in navigable waterways (1985, 22p.) Zufelt, J.E.
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 MP 2371 MP 2371 MP 2712 Mson, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60 m. MP 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1986, p.41-50] Zotikov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.63-64] Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarctica [1979, 12p.] Structure of ice in the central part of the Ross Ice Shelf (Antistricia [1985, p.39-44] Zufelt, J. Survey of ice problem areas in navigable waterways [1985, 32p.] SR 85-02 Zufelt, J.E. Upper Delaware River ice control—a case study [1986, p.760-770] MP 2005
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 MP 2371 MP 2371 MP 2371 New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 MP 2712 MP 2712 MP 2712 MP 2712 MP 2712 Zisoon, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60 MP 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] CR 89-10 Zotikov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.63-64] Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarctica [1979, 12p.] CR 79-24 Structure of ice in the central part of the Ross Ice Shelf, Antarctica [1985, p.39-44] MP 2110 Zufeit, J.E. Upper Delaware River ice control—a case study [1986, p.760-770] NP 2005 Potential solution to ice jam flooding. Salmon River, Idaho (1986, p.15-5.5) MP 2131
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 MP 2371 MP 2371 MP 2371 New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 MP 2712 MP 2712 MP 2712 MP 2712 MP 2712 Zisoon, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60 MP 1927 Survey or airport pavement distress in cold regions [1986, p.41-50] Definition of research needs to address airport pavement distress in cold regions [1989, 142p.] CR 89-10 Zotikov, I.A. Core drilling through Ross Ice Shelf [1979, p.63-64] MP 1337 Sea ice on bottom of Ross Ice Shelf [1979, p.63-64] Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarctica [1979, 12p.] CR 79-24 Structure of ice in the central part of the Ross Ice Shelf, Antarctica [1985, p.39-44] MP 2110 Zufeit, J.E. Upper Delaware River ice control—a case study [1986, p.760-770] NP 2005 Potential solution to ice jam flooding. Salmon River, Idaho (1986, p.15-5.5) MP 2131
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) Tensile strength of frozen silt (1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 MP 2371 Mreapproach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 Zirschky, J. New approach for sizing rapid infiltration systems (discussion and closure) [1989, p.879-882] MP 2712 Zisoon, J.R. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) Tensile strength of frozen silt (1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 MP 2371 Mrew approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 MP 271
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 MP 2371 MP 2371 MP 2712 MP 2712 Mson, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60
sion (1987, 67p.) Tensile strength of frozen silt (1987, 23p.) Tensile strength of frozen silt (1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates (1988, p.1200-1205b) MP 2371 MP 2371 MP 2371 New approach for sizing rapid infiltration systems (discussion and closure) (1989, p.879-882) MP 2712 Laboratory study of transverse velocities and ice jamming in a river bend (1988, p.189-197) MP 2712
sion (1987, 67p.) Tensile strength of frozen silt [1987, 23p.) Tensile strength of frozen silt [1987, 23p.) Triaxial compressive strength of frozen soils under constant strain rates [1988, p.1200-1205b] MP 2371 MP 2371 MP 2371 MP 2712 MP 2712 Mson, JR. Experimental determination of heat transfer coefficients in water flowing over a horizontal ice sheet [1986, 81p.] CR 86-03 Zomerman, I. Frost heav of full-depth asphalt concrete pavements [1985, p.60

Ablation	Adhesive strength	Measurement and identification of aerosols collected near
Ablation seasons of arctic and antarctic sea ice. Andreas, E.L., et al. r1982, p.440-447; MP 1517	Seeking low ice adhesion. Sayward, J.M., [1979, 83p] SR 79-11	Barrow, Alaska. Kumai, M, (1978, 6p) CR 78-20 Microbiological aerosols during wastewater irrigation Bau
E.L., et al, [1982, p.440-447] MP 1517 On the differences in ablation seasons of Arctic and Antarctic	Admixtures	sum, H T., et al, [1978, p.273-280] MP 1150
sen ice. Andreas, E.L., et al, [1982, 9p] CR 82-33	Grouting of soils in cold environments a literature search.	Health aspects of water reuse in California Reed, S.C.
Energy exchange over antarctic sea ice in the spring. An-	Johnson, R., [1977, 49p] SR 77-42	[1979, p.434-435] MP 1404
dreas, E.L., et al, (1985, p 7199-7212) MP 1889	Adsorption	Bacterial aerosols resulting from wastewater irrigation in Ohio Bausum, H.T., et al., [1979, 64p] SR 79-32
Absorption Water absorption of insulation in protected membrane roofing	Water vapor adsorption by sodium montmorillonite at -5C. Anderson, D M, et al, [1978, p 638-644] MP 981	Ohio Bausum, H.T., et al. [1979, 64p] SR 79-32 Chemical obscurant tests during winter, environmental fate
systems. Schaefer, D., [1976, 15p] CR 76-38	Analysis of water in the Martian regolith. Anderson, D.M.,	Cragin, J.H., [1982, 9p] SR 82-19
Nondestructive evaluation of moisture migration in insulation	et al, (1979, p 33-38) MP 1409	Microbiological aerosols from waste water Bausum, HT, e
material. Ayorinde, O A , [1989, p 111-121]	Summary of the adsorption force theory of frost heaving.	al, (1983, p 65-75) MP 1576
MP 2716	Takagi, S., [1980, p 233-236] MP 1332	Chemical obscurant tests during winter. Environmental fate Cragin, J H., 1983, p 267-272, MP 176
Theoretical estimates of light reflection and transmission by spatially inhomogeneous and temporally varying ice covers	Adsorption force theory of frost heaving Takagi, S., 1980, p 57-811 MP 1334	Cragin, J H, [1983, p 267-272] MP 176 Aerosol growth in a cold environment. Yen, YC, [1984,
Perovich, D.K., [1990, p.45-49] MP 2729	Comments on "Modeling adsorption/desorption kinetics of	21p ₁ CR 84-0
Absorptivity	pesticides in a soil suspension". Leggett, D.C., (1989,	Catalog of smoke/obscurant characterization instruments
Light-colored surfaces reduce thaw penetration in permafrost.	p 231 ₁ MP 2532	O'Brien, H.W., et al, [1984, p 77-82] MP 1865
Berg, R.L., et al. [1977, p 86-99] MP 954 Effects of moisture and freeze-thaw on rigid thermal insula-	Aerial photographs Meso-scale strain measurements on the Beaufourt sea pack	Acidity of snow and its reduction by alkaline aerosols Kumai, M, (1985, p 92-94) MP 2000
tions. Kaplar, C.W., [1978, p 403-417] MP 1085	ice (AIDJEX 1971). Hibler, W.D., III, et al. [1974,	Aerosol exchange in the remote troposphere Hogan, A.W.
Accuracy	p.119-138 ₁ MP 1035	(1986, p.197-213) MP 218
Is advanced technology "the gateway to irresponsibility"	Remote sensing program required for the AIDJEX model	Chemical properties of snow in the northeastern United
Zufelt, J.E., [1989, p 434-437] MP 2529	Weeks, W.F. et al. (1974, p 22-44) MP 1040	States Kumai, M., (1987, p (C1)625-(C1)630) MP 223:
Satellite data collection platforms for temperature measurements Daly, S.F., et al, (1989, 14p) SR 89-37	Aerial photography Seasonal regime and hydrological significance of stream ic-	Scavenging of infrared screener EA 5763 by falling snow
Acoustic measurement	ings in central Alaska. Kane, D.L., et al. (1973, p.528-	Cragin, J H., et al, [1987, p 13-20] MP 229:
Rheology of ice. Fish, A M., [1978, 196p] MP 1988	540 ₁ MP 1026	Dynamic aerosol flow chamber Hewitt, A.D., [1988,
Acoustic emission response in polycrystalline materials. St.	Land use/vegetation mapping in reservoir management Cooper, S., et al., r1974, 30p.; MP 1039	13p ₁ SR 88-2
Lawrence, W.F., (1979, p 223-228) MP 1246	Cooper, S., et al. (1974, 30p) MP 1039 Aerial reconnaissance	Application of aerosol physics to snow research. Hogan A.W., [1989, p 201-207] MP 275
Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al. (1981, p 123-133)	Meso-scale strain measurements on the Beaufourt sea pack	Effect of aerosols on pH of snow Kumai, M, (1990, p 17-
MP 1436	ice (AIDJEX 1971). Hibler, W.D., III, et al, [1974,	30 ₁ MP 267:
Analysis of acoustical features of laboratory grown sea ice	p.119-138 ₁ MP 1035	Agriculture
Stanton, T.K., et al, [1986, p 1486-1494] MP 2222	Aerial surveys Correlation and quantification of airborne spectrometer data	Symposium on land treatment of wastewater, CRPEL, Aug
Acoustically induced ground motion in sand under winter conditions. Peck, L., 1989, p 37-541 MP 2626	to turbidity measurements at Lake Powell, Utah Merry,	1978. [1978, 2 vols] MP 114. Energy and costs for agricultural reuse of wastewater. Slet
conditions. Peck, L., [1989, p 37-54] MP 2626 Observations of low-frequency acoustic-to-seismic coupling	CJ, [1970, p 1309-1316] MP 1271	ten. RS, et al. [1980, p 339-346] MP 140
in the summer and winter. Albert, D.G., et al, (1989,	Applications of remote sensing in New England. McKim,	Air cushion vehicles
p.352-359 ₃ MP 2654	H L., et al. (1975 8p. + 14 figs. and tables) MP 913 Remote measurement of sea ice drift Hibler, W D, III, et	Some effects of air cushion vehicle operations on deep snow
Ice strength estimates from submarine topsounder data. DiMarco R., et al., [1989, p 425-426] MP 2691	al, (1975, p 541-554) MP 849	Abele, G, et al, [1972, p 214-241] MP 88
DiMarco R., et al, [1989, p 425-426] MP 2691 Acoustic measuring instruments	Land use and water quality relationships, eastern Wisconsin.	Height variation along sea ice pressure ridges Hibler, W.D III, et al. (1975, p.191-199) MP 84
Some characteristics of grounded floebergs near Prudhoe Bay,	Haugen, R.K., et al, (1976, 47p) CR 76-30	Arctic environment and the Arctic surface effect vehicle
Alaska. Kovacs, A., et al, [1976, p.169-172]	Skylab imagery Application to reservoir management in New	Sterrett, K.F., [1976, 28p.] CR 76-0
MP 1118	England. McKim, H L, et al, [1976, 51p] SR 76-07	Effects of hovercraft, wheeled and tracked vehicle traffic of
Grounded floebergs near Prudhoe Bay, Alaska Kovacs, A, et al, [1976, 10p] CR 76-34	Applications of remote sensing in the Boston Urban Studies	tundra Abele, G., (1976, p 186-215) MP 112
Acoustics	Program, Parts I and II. Merry, C.J., et al. (1977, 36p.)	Evaluation of an air cushion vehicle in Northern Alaska Abele, G, et al, [1976, 7p] MP 89
International Workshop on the Seasonal Sea Ice Zonc, Mon-	CR 77-13 Investigation of an airborne resistivity survey conducted at	Air-cushion vehicle effects on surfaces of Alaska's Arcti
terey, California, Feb 26-Mar.1, 1979. Andersen, B.G.,	very low frequency. Arcone, S.A., (1977, 48p.)	Slopes Slaughter, C.W., 1976, p 272-279
ed, (1980, 357p) MP 1292	CR 77-20	MP 138
Acoustic emissions during creep of frozen soils Fish, A M, e al, [1982, p.194-206] MP 1495	Water quality measurements at Lake Powell, Utah Merry,	Hovercraft ground contact directional control devices Abele, G., 1976, p 51-59; MP 87.
Effect of snow on vehicle-generated seismic signatures Al-	C.J., [1977, 38p] SR 77-28 Aerial photointerpretation of a small ice jam. DenHartog.	Air cushion vehicle ground contact directional control de
bert, D.G., [1987, p 881-887] MP 2229	S.L., (1977, 17p) SR 77-32	vices Abele, G, et al. [1976, 15p] CR 76-4
Acoustic-to-seismic coupling through a snow layer Peck,	Aerial photography of Cape Cod shoreline changes Gatto,	Arctic transportation operational and environmental evalua
L. [1987, p 47-55] MP 2294 Recent research on acoustic to seismic coupling Albert,	L.W. (1978, 49p) CR 78-17	tion of an air cushion vehicle in northern Alaska Abele G., et al. (1977, p 176-182) MP 98
D G., [1987, p 223-225] MP 2418	Estuarine processes and intertidal habitats in Grays Harbor, Washington, a demonstration of remote sensing techniques	Effects of low ground pressure vehicle traffic on tundra a
Seismic and acoustic wave propagation, working group report.	Gatto, L.W., [1978, 79p] CR 78-18	Lonery, Alaska Abele, G, et al. (1977, 32p)
Albert, D G, et al, (1987, p 253-255) MP 2419	VLF airborne resistivity survey in Maine. Arcone, SA,	SR 77-3
Acoustic emissions from composites at decreasing tempera-	(1978, p.1399-1417) MP 1166	Long-term effects of off-road vehicle traffic on tundra terrair Abele, G, et al. (1984, p. 283-294) MP 182
tures. Dutta, P.K., et al., (1988, p 1090-1095) MP 2430	Measurement of mesoscale deformation of Beaufort sea ice (AIDJEX-1971). Hibler, W.D., III, et al, (1978, p 148-	Mobility working group report. Blaisdell, GL, et a
Experimental and theoretical studies of acoustic-to-seismic	172 ₁ MP 1179	[1987, p 273 274] MP 242
coupling Albert, D.G., (1988, p. 19-31) MP 2432	Mapping of the LANDSAT imagery of the Upper Susitna	Air entrainment
Seismic/acoustic experiments at SNOW IV Peck, L. 1989, p 155-157; MP 2646	River Gatto, L.W, et al, (1980, 41p) CR 80-04	Gas inclusions in the Antarctic ice sheet Gow, A.J., et a (1975, p.5101-5108) MP 84
[1989, p 155-157] MP 2646 Active layer	Ice regime reconnaissance, Yukon River, Yukon Gerard, R, et al. (1984, p 1059-1073) MP 2406	Soft drink bubbles Cragin, J H., [1983, p 71]
Permafrost and active layer on a northern Alaskan road	Potential of remote sensing in the Corps of Engineers diedg-	MP 173
Berg, R.L., et al, [1978, p 615-621] MP 1102	ing program McKim, H.L., et al. (1985, 42p)	Air flow
Human-induced thermokarst at old drill sites in northern	SR 85-20	Water and air horizontal flow in porous media Nakano, Y
Alaska. Lawson, DE, et al, [1978, p.16-23] MP 1254	Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1988, p 50-61] MP 2436	(1980, p.81-85) MP 134 Water and air vertical flow through porous media Nakano
Geophysics in the study of permafrost Scott, W.J. et al.	Sea ice ridging in the Ross Sea, Antarctica, as compared with	Y . [1980, p 124-133] MP 134
(1979, p 93-115) MP 1266	sites in the Arctic. Weeks, W.F., et al. (1989, p.4984-	Traveling wave solution to the problem of simultaneous flor
Neumann solution applied to soil systems Lunardini, V J.	4988 ₁ MP 2490	of water and air through homogeneous porous media
[1980, 7p] CR 80-22 Dielectric properties of thawed active layers. Arcone, S.A.,	Ice runways near the South Pole Switninbank, C., (1989, 42p) SR 89-19	Nakano, Y., (1981, p.57-64) MP 141 Thermosyphons and foundation design in cold region:
et al, (1982, p 618-626) MP 1547	Development of an airborne sea ice thickness measurement	Haynes, F.D., et al. (1988, p.251-259) MP 244
Long-term active layer effects of crude oil spilled in interior	system and field test results Kovacs, A. et al. [1989,	Investigation into the post-stable behavior of a tube array i
Alaska. Collins, C.M., (1983, p 175-179) MP 1656	47p.) CR 89-19	cross-flow. Lever, J H., et al. (1989, p 457-465) MP 256
Recovery and active layer changes following a tundra fire in	Aerosols Propane dispenser for cold fog dissipation system Hicks,	Tracer gas measurement of air .xchange in buildings Flan
northwestern Alaska Johnson, L. et al. (1983, p.543- 547) MP 1660	JR, ct al, (1973, 38p) MP 1033	ders, S.N., et al. (1989, p.433-444) MP 255
Potential responses of permafrost to climatic warming	Aerosols in Greenland snow and ice Kumai, M. (1977,	Air change measurements of five Aimy buildings in Alaski
Goodwin, C W., et al. (1984, p.92-105) MP 1710	p.341-350 ₃ MP 1725	Flanders, S.N., (1990, p.53-63) MP 267
Fermairost, snow cover and vegetation in the USSR Bigl.	Figure 34 1077 5-	Friction loss through a uniform snow layer Yen, Y.C.

Air leakage Vents and vapor retarders for roofs. Tobiasson, W., £1986,	Airborne radar Investigation of an airborne resistivity survey conducted at	Foundation technology in cold regions Quinn, W.F., [1987, p 305-310] MP 2425
11p.j MP 2246	very low frequency. Arcone, S A . (1977, 48p.) CR 77-20	Airfields in Arctic Alaska. Crory, F.E., [1988, p.49-55]
Vents and vapor retarders for roofs. Tobiasson, W., (1987, p.80-90) MP 2352	Detection of moisture in orstruction materials. Morey,	MP 2451 Performance of pavement at Central Wisconsin Airport.
Vapor retarders for membrane roofing systems. Tobiasson, W, [1989, p 31-37] MP 2489	R.M., et al. (1977, 9p.) CR 77-25 Inlet current measured with Sea.at-1 synthetic aperture radar.	Stark, J., et al, (1989, p 92-103) MP 2463
Air pollution	Shemdin, O.H., et al. (1980, p 35-37) MP 1481	State of the art of pavement response monitoring systems for roads and airfields. [1989, 401p] SR 89-23
Winter air pollution at Fairbanks, Alaska. Coutts, H J., et al. (1981, p.512-528) MP 1395	Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p] SR 81-23	Albedo Meteorological variation of atmospheric optical properties in
Atmospheric pollutants in snow cover runoff Colbeck, S.C., [1981, p.1-10] MP 1586	Airborne electromagnetic sounding of sea ice thickness and sub-ice bathymetry. Kovacs, A., et al, [1987, p 289-311]	an antarctic storm. Egan, W.G., et al, [1986, p.1155-
Atmospheric pollutants in snow cover runoff. Colbeck, S.C.,	MP 2332	1165; MP 2099 Snowmelt increase through albedo reduction. Colbeck, S.C.,
(1981, p.1383-1388) MP 1487 Engine starters in winter. Coutts, H.J., (1981, 37p)	Radioglaciology by V.V. Bogorodskii, et al. Jezek, K.C., (1988, p 55-56) MP 2338	(1988, 11p) SR 88-26
SR 81-32	Airborne radar survey of a brash ice jam in the St. Clair River. Daly, S.F, et al, [1989, 17p] CR 89-02	Two-stream multilayer, spectral radiative transfer model for sea ice. Perovich, D.K., [1989, 17p] CR 89-15
Chemical obscurant tests during winter; environmental fate. Cragin, J.H, {1982, 9p} SR 82-19	Water detection in coastal plains using helicopter-borne short	Algae Sea are and are algae relationships in the Weddell Sea. Ack-
Low temperature automotive emissions. Coutts, H.J., [1983, 2 vols] MP 1703	pulse radar. Arcone, SA, et al, (1989, 25p.) CR 89-07	ley, S.F, et al, (1978, p 70-71) MP 1203
Catalog of smoke/obscurant characterization instruments	Measurement of sea ice thickness using electromagnetic induction. Holladay, J S, et al, (1990, p 309-315)	Standing crop of algae in the sea are of the Weddell Sea region Ackley, SF, et al, [1979, p.269-281] MP 1242
O'Brien, HW, et al, [1984, p.77-82] MP 1865 Chemical properties of snow in the northeastern United	MP 2590	Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al, (1982, p.107-
States. Kumai, M., [1987, p (C1)625-(C1)630] MP 2232	Aircraft icing Interaction of a surface wave with a dielectric slab discon-	109 ₁ MP 1609
Air temperature	tinuity. Arcone, S.A., et al, [1978, 10p] CR 78-08 Potential using of the space shuttle external tank Ferrick,	Physical mechanism for establishing algal populations in frazilice Garrison, D.L., et al., (1983, p.363-365)
Selected climatic and soil thermal characteristics of the Prudhoe Bay region. Brown, J., et al., [1975, p.3-12]	MG, et al, (1982, 305p) CR 82-25	MP 1717 Relative abundance of diatoms in Weddell Sea pack ice.
MP 1054 Surface temperature data for Atkasook, Alaska summer 1975.	Computer modeling of time-dependent rime icing in the at- mosphere Lozowski, EP, et al, [1983, 74p]	Clarke, DB, et al, (1983, p.181-182) MP 1786
Haugen, R K., et al, [1976, 25p] SR 76-01	CR 83-02 Studies of high-speed rotor icing under natural conditions	Morphology and ecology of diatoms in sea ice from the Wed- dell Sea Clarke, DB, et al. [1984, 41p] CR 84-05
20-yr oscillation in eastern North American temperature re- cords Mock, S J., et al, [1976, p.484-486] MP 889	Itagaki, K, et al, (1983, p 117-123) MP 1635	Sea ice and biological activity in the Antarctic Clarke, D.B., et al. (1984, p. 2087-2095) MP 1701
Compressive and shear strengths of fragmented ice covers Cheng, S.T., et al, [1977, 82p.] MP 951	Self-shedding of accreted ice from high-speed rotors Itaga- ki, K., (1983, p 1-6) MP 1719	Ice nucleation activity of antarctic marine microorganisms.
Midwinter temperature regime and snow occurrence in Ger-	Current procedures for forecasting aviation using. Tucker, WB, (1983, 31p) SR 83-24	Parker, L.V., et al. [1985, p.126-128] MP 2217 Sea-ice pressure ridge microbial communities. Ackley, S.F.,
many. Bilello, M.A., et al. [1978, 56p] CR 78-21 Maximum thickness and subsequent decay of lake, river and	Ice accretion under natural and laboratory conditions. Itaga-	(1988, p.172-174) MP 2450 All terrain vehicles
fast sea ice in Canada and Alaska. Bilello, M.A., (1980, 160p.) CR 80-06	ki, K., et al, [1985, p.225-228] MP 2009 Utilization of Unmanned Aerial Vehicles in the ALBE Thrust	Ecological and environmental consequences of off-road traf-
Summer air temperature and precipitation in northern Alaska. Haugen, R.K., et al., (1980, p. 403-412) MP 1439	Greeley, H.P., et al, (1986, p 249-257) MP 2663 Natural rotor icing on Mount Washington, New Hampshire	fic in northern regions Brown, J, (1976, p 40-53) MP 1383
Sea-ice atmosphere interactions in the Weddell Sea using	Itagaki, K, et al, (1986, 62p) CR 86-10	Hovercraft ground contact directional control devices Abele, G, [1976, p.51-59] MP 875
drifting buoys. Ackley, S.F., [1981, p.177-191] MP 1427	Prediction of winter battlefield weather effects Ryerson, C.C, et al, [1988, p.357-362] MP 2402	Vehicle damage to tundra soil and vegetation Walker, D A.,
Climate of remote areas in north-central Alaska 1975-1979 summary. Haugen, R.K., (1982, 110p) CR 82-35	Thickness distribution of accreted ice grown on rotor blades Itagaki, K., et al, (1988, p. 152-156) MP 2 23	et al. (1977, 49p) SR 77-17 Ecological impact of vehicle traffic on tundra. Abele, G,
Surface meteorology US/USSR Weddell Polynya Expedition,	Aircraft landing areas	(1981, p 11-37) MP 1463
1981 Andreas, E.L., et al, [1983, 32p] SR 83-14 Relationships between estimated mean annual air and perma-	Propane dispenser for cold fog dissipation system Hicks, J.R., et al, [1973, 38p.] MP 1033	Effects of all terrain vehicles on tundra Racine, C, et al, [1988, 12p] SR 88-17
frost temperatures in North-Central Alaska Haugen, R.K., et al., [1983, p.462-467] MP 1658	Runway site survey, Pensacola Mount iins, Antarctica Kovacs, A, et al, (1977, 45p) SR 77-14	Use of off-road vehicles and mitigation of effects in Alaska permafrost environments a review Slaughter, C.W., et al,
Spectra and cospectra of atmospheric turbulence over snow	Design considerations for airfields in NPRA Crory, F.E., et	[1990, p 63-72] MP 2682 Alpine landscapes
Andreas, E.L., (1986, p. 219-233) MP 2661 Humidity and temperature measurements obtained from an	al, (1978, p.441-458) MP 1086 Storm drainage design considerations in cold regions	Terrain analysis from space shuttle photographs of Tibet
unmanned aerial vehicle. Ballard, H, et al. [1987, p 35-45] MP 2293	Lobacz, E.F., et al, [1978, p. 474-489] MP 1088 Construction of temporary airfields in NPRA Crory, F.E.	Kreig, R.A., et al., [1986, p.400-409] MP 2097 Alpine tundra
Ice jams and the winter climate near White River, SD. Bilel-	(1978, p 13-15) MP 1253	Climatic and dendroclimatic indices in the discontinuous per-
lo, M.A., [1987, p.154-162] MP 2399 Spectral measurements in a disturbed boundary layer over	Aircraft operations in the Arctic. DenHartog, S. L., 1987, p 271-272, MP 2422	mafrost zone of the Central Alaskan Uplands Haugen. R K., et a!, {1978, p 392-398} MP 1099
snow. Andreas, E.L., (1987, p. 1912-1939) MP 2254 Regional climatic trends in northern New England Haugen,	Hard-surface runways in Antarctica. Mellor, M., (1988, 87p) SR 88-13	Altitude Atmospheric icing rates with elevation on northern New Eng-
R K., et al, [1988, p 64-71] MP 2748	improved techniques for construction of snow roads and air-	land mountains, U.S.A. Ryerson, C.C., [1990, p.90-97] MP 2589
Comparative studies of the winter climate at selected loca- tions in Europe and the United States Bates, R.E., et al.	strips Lee, S.M., et al. (1988, 99p) SR 88-18 Airfields in Arctic Alaska Crory, F.E. (1988, p.49-55)	Analysis (mathematics)
(1989, p 283-293) MP 2598 Year of Bowen ratios over the frozen Beaufort Sea. Andreas,	MP 2451 Airplanes	Buckling pressure of an elastic floating plate. Takagi, S., (1978, 49p.) CR 78-14
E L., (1989, p 12,721-12,724) MP 2508 Three-wavelength scintillation measurement of turbulent heat	Report on ice fall from clear sky in Georgia October 26, 1959.	Evaluation of the moving boundary theory. Nakano, Y. (1978, p 142-151) MP 1147
fluxes Andreas, E L., (1990, p 74-77) MP 2696	Harrison, L.P., et al. (1960, 31p. plus photographs)	Some Bessel function identities arising in ice mechanics prob-
Air water interactions Problems of the seasonal seauce zone Weeks, W.F., (1980).	Operation of the CRREL prototype air transportable shelter Flanders, S N, [1980, 73p] SR 80-10	lems Talagi, S. (1979, 13p) CR 79-27 Remote sensing of revegetation of burned tundra, Kokolik
p.1-35 ₁ MP 1293 Forecasting river water temperatures. Daly, S.F., [1988,	Humidity and temperature measurements obtained from an unmanned aerial vehicle. Ballard, H., et al., [1987, p.35-	River, Alaska Hall, D.K., et al, (1980, p. 263-272) MP 1391
p 180-188) MP 2500	45 ₁ MP 2293	Water and air vertical flow through porous media. Nakano,
Time constants for the evolution of sea spray droplets Andreas, E.L., (1989, p.147-149) MP 2555	Aircraft operations in the Arctic DenHartog, S.C., 1987, p.271-272; MP 2422	Y . (1980, p 124-133) MP 1342 One-dimensional transport from a highly concentrated, trans-
Comments on "A physical bound on the Bowen ratio" Andreas, E. L. (1989, p. 1252-1254) MP 2560	Mobility working group report Blaisdell, G.L., et al. [1987, p.273-274] MP 2423	fer type source O'Neill, K , (1982, p 27-36) MP 1489
Environment of wintertime leads and polynyas Andreas,	Airports	Boundary integral equation solution for phase change prob-
E.L., [1989, p.273-288] MP 2689 Lidar-derived particle concentrations in plumes from arctic	The strength of natural and processed snow (1975, p 176-186) Abele, G. MP 1058	Multivariable regression algorithm. Blaisdell, G L., et al.
leads Andreas, E.L., et al. (1990, p.9-12) MP 2758 Airborne equipment	Design of airfield pavements for seasonal frost and permafrost conditions Berg, R.L., et al. (1978, 18p.) MP 1189	[1983, 41p] SR 83-32 Mathematical modeling of river ice processes. Shen, H.T.
Airborne E-phase resistivity surveys of permafrost. Sell-	Snow and ice roads in the Arctic. Johnson, P.R., (1979,	(1984, p 554-558) MP 1973
mann, PV, et al. (1974, p 67-71) MP 1046 Remote sensing plan for the AIDJEX main experiment	p 1063-1071; MP 1223 Snow and ice control on railroads, highways and airports	Correlation function study for sea ice. Lin, F.C., et al. (1988, p 14,055-14,063) MP 2511
Weeks, W.F., et al. (1975, p.21-48) MP 862 Atmosphere subgroup discussions. Andreas, E.L., (1984,	Minsk, L.D. et al. (1981, p.671-706) MP 1447 Drainage facilities of airfields and heliports in cold regions	Heat conduction in snow Yen, Y.C., [1989, p 21-32] MP 2546
p 97-98 ₁ MP 2603	Lobacz, E.F., et al. (1981, 56p) SR 81-22	Comments on "A physical bound on the Bowen ratio". An-
Airborne roof moisture surveys Tobiasson, W., (1986, p 45-47) MP 2139	Survey of airport pavement distress in cold regions Vinson, T.S., et al. (1986, p 41-50) MP 2002	dreas, E.L., [1989, p.1252-1254] MP 2550 Anchors
Airborne measurement of sea ice thickness and subice bath- ymetry. Kovacs, A, et al. (1988, p.111-120)	Deformation of pavements during freeze thaw cycles Johnson, T.C., et al. [1986, 138p] CR 86-13	Stake driving tools a preliminary survey Kovaes, A., et al. [1977, 43p] SR 77-13
MP 2345	Frost action on roads and airfields Johnson, T.C., et al.	Towing ships through ice-clogged channels by warping and
Measurement of sea ice thickness using electromagnetic induction Holladay, J.S., et al. (1990, p. 309-315)	(1986, 45p) CR 86-18 Freeze thaw tests of road and airfield subgrade soils Cole,	kedging Mellor, M. (1979, 21p.) CR 79-21 Vibration analysis of a DEW Line station Haynes, F.D., et
MP 2590 Airborne sea ice thickness sounding Kovacs, A, et al.	D M et al. (1987, 36p) CR 87-02 Airport payement distress in cold regions Vinson, T.S., et	al. (1988, p.1513-1518) MP 2341 Imjin River ice boom Perham, R.E., (1988, 10p.)
(1990, p 225-229) MP 2737	al. (1937. p 981-1012) MP 2234	SR 88-22

Anemometers	-Byrd Station	-Ross Ice Shelf
Calibrating cylindrical hot-film anemometer sensors. Andreas, E L, et al, (1986, p.283-298) MP 1860	Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., (1972, p.429-434) MP 997	Stability of Antarctic ice Weertman, J, [1975, p.159] MP 1042
Animals Ecological investigations of the tundra biome in the Prudhoe	Gas inclusions in the Antarctic ice sheet Gow, A J, et al, 1975, p 5101-5108; MP 847	Stable isotope profile through the Ross Ice Shelf at Little America V, Antarctica. Dansgaard, W, et al, 1977,
Bay Region, Alaska. Brown, J., ed, [1975, 215p]	Resurvey of the "Byrd" Station, Antarctica, drill hole Gar-	p.322-325 ₁ MP 1095
MP 1053 Influence of grazing on Arctic tundra ecosystems Batzli,	field, D.E., et al. [1976, p.29-34] MP 846 Internal structure and crystal fabrics of the West Antarctic ice	Ross Ice Shelf Project drilling, October-December 1976 Rand, J H., [1977, p 150-152] MP 1061
G.O, et al, [1976, p.153-160] MP 970	sheet. Gow, A J., et al, (1976, 25p.) CR 76-35	Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., 1978, p.7-361 MP 1075
Arctic ecosystem the coastal tundra at Barrow, Alaska. Brown, J., ed, (1980, 571p) MP 1355	Crystal fabrics of Weat Antarctic ice sheet Gow, A J, et al, [1976, p.1665-1677] MP 1382	Core drilling through Ross Ice Shelf Zotikov, I.A. et al
Point Barrow, Alaska, USA. Brown, J., [1981, p 775-776] MP 1434	Ultrasonic measurements on deep ice cores from Antarctica.	(1979, p 63-64) MP 1337 Ross Ice Shelf bottom ice structure. Zotikov, I.A. et al
River ice and salmonids. Walsh, M., et al, [1986, p D-4 1-	Gow, A.J., et al, [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica	(1979, p 65-66) MP 1336
D-4.26; MP 2477 Winter habitats of salmon and trout. Calkins, DJ, (1989,	Kohnen, H, et al, [1979, 16p] CR 79-10	Radar detection of sea ice and current alinement under the Ross Ice Shelf Morey, R M, et al. (1981, p.96-97)
9p) SR 89-34	Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al, (1979, p 4865-4874) MP 1239	MP 1543 Effects of conductivity on high-resolution impulse rada
Anisotropy Internal structure and crystal fabrics of the West Antarctic ice	Ultrasonic tests of Byrd Station ice cores Gow, A J., et al,	sounding Morey, R.M., et al, (1982, 12p)
sheet. Gow, A J., et al, (1976, 25p) CR 76-35	[1979, p.147-153] MP 1282 Time-priority studies of deep ice cores Gow, A J, [1980,	CR 82-42 Changes in the Ross Ice Shelf dynamic condition Jezek
Radar anisotropy of sea ice Kovacs, A., et al, (1978, p. 171-201) MP 1111	p.91-102 ₁ MP 1308 —Crary Ice Rise	K.C. (1984, p.409-416) MP 2050
Radar anisotropy of sea ice. Kovacs, A., et al. [1978, p 6037-6046] MP 1139	Changes in the Ross Ice Shelf dynamic condition. Jezek,	Modified theory of bottom crevasses Jezek, K.C., 1984, p 1925-1931, MP 2059
Ultrasonic investigation on ice cores from Antarctica.	KC, (1984, p 409-416) MP 2058 —Dome C	Mass balance of a portion of the Ross Ice Shelf Jezek, K C. et al, (1984, p 381-384) MP 1915
Kohnen, H. et al. (1979, 16p) CR 79-10 Ultrasonic investigation on ice cores from Antarctica.	Borehole geometry on the Greenland and Antarctic ice	Rheology of glacier ice Jezek, K.C., et al, [1985, p 1335-
Kohnen, H., et al, (1979, p 4865-4874) MP 1239	sheets Jezek, K.C., [1985, p 242-251] MP 1817 —East Antarctica	1337) MP 184 —Ross Sea
Anisotropic properties of sea ice Kovacs, A., et al. (1979, p 5749-5759) MP 1258	Nitrate fluctuations in antarctic snow and firm Parker, B C.,	Surface roughness of Ross Sea pack ice Govoni, J W., et al
Anisotropic properties of sea ace in the 50-150 MHz range. Kovacs, A, et al. [1979, p 324-353] MP 1620	et al. (1982, p 243-248) MP 1551Folger, Cape	(1983, p 123-124) MP 176 West antarctic sea ice Ackley, S.F., (1984, p 88-95)
Physical properties of sea ace and under-ice current orienta-	Internal properties of the ice sheet at Cape Folger by radio	MP 1818
tion. Kovacs, A., et al. [1980, p 109-153] MP 1323 Polarization studies in sea ice Arcone, S.A., et al. [1980,	echo sounding Keliher, TE, et al, [1978, 12p] CR 78-04	Sea ice ridging in the Ross Sea, Antarctica, as compared with sites in the Arctic. Weeks, W.F., et al., 1989, p.4984-
p 225-245 ₁ MP 1324	lee sheet internal reflections Ackley, S.F., et al. 1979,	4988; MP 2490 —Siple Coast
Modeling of anisotropic electromagnetic reflection from sea ice. Golden, K.M., et al, [1980, p 247-294]	p.5675-5680 ₃ MP 1319Howe, Mount	Changes in the Ross Ice Shelf dynamic condition, Jezek
MP 1325	Ice runways near the South Pole. Swithinbank, C., 11989,	KC, (1984, p.409-416) MP 2056 -South Pole
Sea ice anisotropy, electromagnetic properties and strength Kovacs, A., et al, [1980, 18p] CR 80-20	42p ₁ SR 89-19 —Little America Station	Composition and structure of South Pole snow crystals
Modeling of anisotropic electromagnetic reflection from sea ice. Golden, K.M., et al, (1980, 15p) CR 80-23	Ultrasonic investigation on ice cores from Antarctica.	Kumai, M., (1976, p.833-841) MP 85: —Victoria Land
Modeling of anisotropic electromagnetic reflections from sea	Kohnen, H., et al. [1979, 16p] CR 79-10 Ultrasonic investigation on ice cores from Antarctica.	Antarctic soil studies using a scanning electron microscope
ice. Golden, K.M., et al, [1981, p 8107-8116] MP 1469	Kohnen, H. et al. (1979, p 4865-4874) MP 1239	Kumai, M, et al. [1978, p 106-i12] MP 1380 Radar wave speeds in polar glaciers Jezek, K.C., et al.
Shear strength anisotropy in frozen saline and freshwater soils Chamberlain, E.J., 1985, p. 189-1941	—Marie Byrd Land Surface-wave dispersion in Byrd Land Acharya, H K.,	(1983, p. 199-208) MP 205' Unfrozen water contents of six antarctic soil materials. And
MP 1931	(1972, p. 955-959) MP 992 Byrd Land quaternary volcanism. LeMasurier, W.E.	erson, D M., et al. [1989, p 353-366] MP 247
ANTARCTICA Antarctic ice sheet. Mellor, M., (1961, 50p) M I-B1	Byrd Land quaternary volcanism. LeMasurier, W.E., (1972, p 139-141) MP 994	~Vostok Station Nitrogenous chemical composition of antarctic ice and snow
Climatology of Antarctic regions Wilson, C., [1968, 77p.]	McMurdo Ice Shelf Dielectric constant and reflection coefficient of snow surface	Parker, B C, et al. (1981, p 79-81) MP 154
M I-A3c Methods of building on permanent snowfields. Mellor, M.	layers in the McMurdo Ice Shelf Kovacs, A, et al, [1977,	-Weddell Sea Choanoflageliata from the Weddell Sea, summer 1977
[1968, 43p] M III-A2a	p 137-138 ₁ MP 1011 Subsurface measurements of the Ross ice Shelf, McMurdo	Buck, K R , (1980, 26p) CR 80-1
Antarctica Review of sea-ice weather relationships in the Southern Hem-	Sound, Antarctica Kovacs, A., et al, (1977, p.146-148) MP 1013	Choanoflagellates from the Weddell Sea. Buck, KR (1981, p 47-54) MP 145
isphere. Ackley, S.F., [1981, p.127-159] MP 1426 Boom for shipboard deployment of meteorological instru-	Brine zone in the McMurdo Ice Shelf, Antarctica. Kovacs,	CRREL 2-inch frazil ice sampler. Rand, J H , (1982, 8p.) SR 82-0
ments. Andreas, E.L., et al., (1983, 14p) SR 83-28	A. et al. (1982, p 166-171) MP 1550 McMurdo Ice Shelf brine zone Kovacs, A, et al. (1982,	Physical and structural characteristics of intarctic sea icc
Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237]	28p ₁ CR 82-39	Gow, AJ, et al. (1982, p 113-117) MP 154 On modeling the Weddell Sea pack ice Hibler, WD, H
MP 1752 Waste management practices of the United States Antarctic	—McMurdo Sound leberg thickness and crack detection Kovaes, A. [1978,	et al, (1982, p.125-130) MP 154
Program. Reed, S.C., et al, (1989, 28p) SR 89-3	p 131-145 ₁ MP 1128	Numerical simulation of the Weddell Sea pack ice. Hibles W.D., III, et al. (1983, p.2873-2887) MP 159
Compacted-snow runways design and construction guide- lines for Antarctica Russell-Head, D.S., et al. (1989,	Axial double point-load tests on snow and ice Kovacs, A, (1978, 11p) CR 78-01	Surface meteorology US/USSR Weddell Polynya Expedition 1981. Andreas, E.L., et al., (1983, 32p.) SR 83-1
68p) SR 89-10	Subsurface measurements of McMurdo Ice Shelf Gow,	US/USSR Weddell Polynya expedition, Upper air data, 1981
Airfields on antarctic glacier ice. Mellor, M, et al. (1989, 97p) CR 89-21	A J., et al. (1979, p. 79-80) MP 1338 Physical and structural characteristics of sea ice in McMurdo	Andreas, E. L., (1983, 288p.) SR 83-1 Physical mechanism for establishing algal populations in fraz
US global ice core research program West Antarctica and beyond. Grootes, P.M., et al., [1989, 32p] MP 2709	Sound Gow, A.J., et al., [1981, p.94-95] MP 1542	ice Garrison, D.L., et al. (1983, p.363-365) MP 171
—Allan Hills	Chemical fractionation of brine in the McMurdo Ice Shelf Cragin, J.H., et al. (1983, 16p) CR 83-06	Elemental compositions and concentrations of micros
Radio echo sounding in the Allan Hills, Antarctica Kovacs, A, (1980, 9p) SR 80-23	Physical mechanism for establishing algal populations in frazilice. Garrison, D.L., et al. (1983, p.363-365)	pherules in snow and pack ice from the Weddell Ser Kumai, M. et al. [1983, p.128-131] MP 177
Emerging meteorite crystalline structure of the enclosing ice	MP 1717	Relative abundance of diatoms in Weddell Sea pack ice
Gow, A J., et al. (1989, p 87-91) MP 2503 Amundsen-Scott Station	Sea ice microbial communities in Antarctica Garrison, D.L. et al. (1986, p. 243-250) MP 2026	Antarctic sea ice microwave signatures Comiso, J.C., et a
Nitrogenous chemical composition of antarctic ice and snow Parker, B C, et al. (1981, p.79-81) MP 1541	Chemical fractionation of brine in McMurdo Ice Shelf Cra-	[1984, p 662-672] MP 166 Morphology and ecology of diatoms in sea ice from the Wee
South Pole ice core drilling, 1981-1982. Kuivinen, K.C., et		dell Sea Clarke, DB, et al. (1984, 41p) CR 84-0
al, (1982, p.89-91) MP 1621 Baseline act lity of ancient precipitation from the South Pole	Hard-surface runways in Antarctica Mellor, M., 1988,	Sea ice and biological activity in the Antarctic Clarke, D B et al. (1984, p.2087-2095) MP 170
Cragin, J.H., et al., (1984, 7p) CR 84-15		Drag coefficient across the Antarctic marginal ice zone Ar
Meteorological variation of atmospheric optical properties in an antarctic storm Egan, W.G., et al. (1986, p. 1155-	strips Lee, S.M., et al. (1988, 99p.) SR 88-18	dreas, E.L., et al., (1984, p.63-71) MP 178 Sea ice data hoys in the Weddell Sea. Ackley, S.F., et a
1165; MP 2099 Baseline acidity of South Pole precipitation Cragii, J H., et		(1984, 1 ^q p) CR 84-1
al, [1987, p 789-792] MP 2275	W	Ice dynamics Hibler, W.D., III. (1984, 52p) M 84-0
Hard-surface runways in Antarctica Mellor, M. (1988, 87p) SR 88-13	Improving snow roads and airstrips in Antarctica. Lee, S.M.,	Heat and moisture advection over antarctic sea ice Ar dreas, E.L., (1985, p.736-746) MP 188
Improved techniques for construction of snow roads and air-	ct al. (1989, 18p) SR 89-22	Weddell-Scotta Sea MIZ, October 1984 Crasey, F.D. et a
strips Lee, S.M., et al., (1988, 99p.) SR 88-18 Improving snow roads and airstrips in Antarctica Lee, S.M.,	Ice runways near the South Pole Swithinbank, C., 1989,	(1986, p. 3920-3924) MP 153 Sea lee interoblat communities in Antaretica Garrison
et al. (1989, 18p) SR 89-22		D L., et ai, (1986, p.243-250) MP 202
-Amundsen Sea West antarctic sea ice. Ackley, S.F., (1984, p. 88-95)	Runway site survey, Pensacola Mountains, Antarctica	Ice dynamics Hibler, W.D., III. (1986, p 577-640) MP 221
—Beacon Valley	Kovacs, A., et al. (1977, 45p) SR 77-14 —Queen Maud Mountains	Sea-ice investigations during the Winter Weddell Sea Project Ackley, S.F., et al. [1987, p.88-89] MP 249
Examining antarctic soils with a scanning elect micro-	a	Physical and structural characteristics of Weddell Sea pac

Antarctica	Arctic soils	Atmospheric density
-Weddell Sea (cont.) Sea-ice pressure ridge microbial communities Ackley, S.F.,	Pedologic investigations in northern Alaska Tedrow, J C F. (1973, p.93-108) MP 1005	Snow concentration and effective air density during snow- falls Mellor, M., [1983, p 505-507] MP 1769
(1988, p.172-174) MP 2450	Arctic topography	Atmospheric physics
Development of sea ice in the Weddell Sea Lange, MA, et	Morphology of the North Slope Walker, H J , [1973, p 49-	Estimating Cn square over snow and sea ice from meteorolog-
al, (1989, p 92-96) MP 2615 Elastic properties of frazil ice from the Weddell Sea, Antarc-	52 ₁ MP 1004 Arctic vegetation	ical quantities Andreas, E.L., [1988, p.258-267] MP 2440
tica Lange, M.A., et al., [1989, p.208-217]	Vegetative research in arctic Alaska Johnson, P.L., et al,	Estimating Cn square over snow and sea ice from meteorolog-
MP 2620	(1973, p 169-198) MP 1008	ical data. Andreas, E.L., [1988, p 481-495]
Compressive strength of antarctic frazilice Richter-Menge, JA., et al, (1989, p 269-278) MP 2621	Artificial freezing	MP 2393 Atmospheric stability from scintillation measurements An-
Passive microwave in situ observations of winter Weddell Sea	Thermal and creep properties for frozen ground construction. Sanger, F.J., et al., [1978, p 95-117] MP 1624	dreas, E L , [1988, p 2241-2246] MP 2386
ice. Comiso J C., et al, [1989, p 10,891-10,905]	Thermal and creep properties for frozen ground construction.	Atmospheric pressure
MP 2655 Snow cover effects on antarctic sea ice thickness Ackley,	Sanger, F.J., et al. (1979, p 311-337) MP 1227	Depth of water-filled crevasses that are closely spaced. Rob-
S.F., et al. (1990, p 16-21) MP 2726	Mechanical properties of frozen ground. Ladanyi, B, et al.	in, G de Q, et al, (1974, p 543-544) MP 1038 Sea-ice atmosphere interactions in the Weddell Sea using
Physical properties of sea ice from the Weddell Sea Eicken,	(1979, p 7-18) MP 1726 Freezing of soil with surface convection. Lunardini, V.J.	drifting buoys Ackley, S.F., [1981, p. 177-191]
H., et al. (1990, p 23-32) MP 2727 Comparison of the compressive strength of antarctic frazil ice	(1982, p 205-212) MP 1595	MP 1427
and laboratory-grown columnar ice Richter-Menge, J.A.	Initial stage of the formation of soil-laden ice lenses Takagi,	Comparison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W B, (1983, p 1084-
et al, [1990, p.79-84] MP 2731	S, (1982, p 223-232) MP 1596	1088 ₁ MP 1737
Sea ice. a habitat for the foraminifer Neogloboquadrina pa- chyderma?. Dieckmann, G, et al, (1990, p 86-92)	Solution of phase change problems O'Neill, K, [1983, p.134-146] MP 1894	Low pressure weather systems in and around Norwegian waters Bilello, MA, 11986, p 53-661 MP 2181
MP 2732	Ground freezing for management of hazardous waste sites	ters Bilello, MA, [1986, p 53-66] MP 2181 Atomic absorption
-Wright Valley	Sullivan, J M, Jr, et al. (1985, 15p) MP 2030	Blank corrections for ultratrace atomic absorption analysis.
Examining antarctic soils with a scanning electron micro-	Potential use of artificial ground freezing for contaminant immobilization. Iskandar, I.K., et al, (1985, 10p)	Cragin, J.H., et al., [1979, 5p] CR 79-03
scope Kumai, M., et al. [1976, p 249-252] MP 931 Antennas	MP 2029	ATTENUATION Explosions and snow Mellos M .1965 34p.
Deicing a satellite communication antenna Hanamoto, B.	Classification and laboratory testing of artificially frozen	Explosions and snow Mellor, M. (1965, 34p.) M III-A3a
et al, [1980, 14p] SR 80-19	ground Sayles, F.H, et al. (1987, p 22-48) MP 2227	Attenuation
Atmospheric icing on comrunication masts in New England Mulherin, N., (1986, 46p.) CR 86-17	Ground freezing controls hazardous waste Iskandar, I.K.,	Visible propagation in falling snow as a function of mass con-
Rime meteorology in the Green Mountains Ryerson, C.	(1987, p 455-456) MP 2270	centration and crystal type Lacombe, J. et al. (1983, p 103-111) MP 1757
[1987, 46p.] CR 87-01	Experimental methods for decontaminating soils by freezing	Comparative near-millimeter wave propagation properties of
New England mountain using climatology Ryerson, C.C.,	Ayorinde, O.A., et al., [1988, 12p.] MP 2513 Freezing a temporary roadway for transport of a 3000 ton	snow or rain Nemarich, J, et al, (1983, p 115-129)
(1988, 35p.) CR 88-12 Atmospheric icing and broadcast antenna reflections Ryer-	dragline Maishman, D, et al, [1988, p 357-365]	MP 1690 Utilization of the snow field test series results for development
son, C.C., [1988, 13p] CR 88-11	MP 2378	of a snow obscuration primer. Ebersole, J.F., et al. [1983,
Antifreezes	Contaminant transport in freezing soils. Ayorinde, O A, et al, [1988, 29p] MP 2514	p 209-217 ₃ MP 1692
Winter maintenance research needs Minsk, LD, (1975, p 36-38) MP 950	Freezing technique for in-situ treatment of contaminated	Attenuation and backscatter for snow and sleet at 96, 140, and 225 GHz. Nemarich, J., et al., [1984, p.41-52]
Freezing and thawing tests of liquid descing chemicals or	soils Ayorinde, O.A., et al. (1989, p 489-498)	MP 1864
selected pavement materials. Minsk, L.D., [1979, p 51-	MP 2515	Catalog of smoke/obscurant characterization instruments.
581 MP 1220 Predicting unfrozen water content behavior of a soil Black.	Mass transfer along ice surfaces Tobin, T M, et al. (1977,	O'Brien, H.W., et al. (1984, p. 77-82) MP 1865 Approach to snow propagation modeling Koh, G. (1984,
P.B., ct al., [1990, p 54-60] MP 2677	p 34-37) MP 1091	p 247-259) MP 1869
Antifreeze admixtures for cold weather concreting Prelimi-	Crystalline structure of urea ice sheets used in modeling in the	Laboratory studies of acoustic scattering from the underside
nary test results Korhonen, C.J., et al, [1990, 8p]	CRREI test basin Gow, AJ, [1984, p 241-253] MP 1835	of sea ice Jezek, K.C. et al, (1985, p.87-91) MP 1912
MP 2742 Arctic environment	Fracture experiments on freshwater and urea model ice.	Snow mass extinction coefficient Koh, G. [1986, p.35-
Progress report on ERTS data on Arctic environment And-	Bentley, D L . et al. (1988, 152p) MP 2502	38 ₁ MP 2659
erson, D.M., et al, [1972, 3p] MP 991	Correlation function study for sea ice Lin, F.C., et al. (1988, p.14,055-14,063) MP 2511	Effect of snow on vehicle-generated seismic signatures Albert, D.G., 1987, p 881-887, MP 2229
Arctic lanadscapes	(1988, p 14,055-14,063) MP 2511 Radar backscattering from artificially grown sea ice Bre-	Forward scatter meter for measuring extinction in adverse
Arctic transportation operational and environmental evalua- tion of an air cushion vehicle in northern Alaska. Abele,	dow, J, et al. [1989, p 259-264] MP 2667	weather Koh, G, [1987, p 81-84] MP 2295
G., et al, [1977, p 176-182] MP 985	Radar backscatter measurements over saline ice. Gogineni,	High frequency acoustical properties of saline icc. Jezek, KC, et al. (1989, p 9-23) MP 2686
Arctic landscapes	S , ct al. [1990, p 603-615] MP 2741 Artificial islands	Augers
Environmental setting, Barrow, Alaska Brown, J., 1970, p 50-64; MP 945	Foundations of structures in polar waters Chamberlain,	Kinematics of axial rotation machines Mellor, M. 1976,
Trends in carbohydrate and lipid levels in Arctic plants	EJ. (198i. 16p) SR 81-25	45p; CR 76-16 Conventional land mines in winter Richmond, PW,
McCown, B H, et al, [1972, p 40-45] MP 1376	Offshore mechanics and Arctic engineering, symposium, 1983 (1983, 813p.) MP 1581	(1984, 23p) SR 84-30
Arctic environment and the Arctic surface effect vehicle. Sterrett, KF, 1976, 28p ₁ CR 76-01	1983 (1983, 813p) MP 1581 Mukiuk ice stress measurement program Cox, G.F.N., et al.	Prototype drill for core sampling fine-grained perennially
Upland forest and its soil and litters in interior Alaska	(1988. p 457-463) MP 2354	frozen ground Brockett, B E, et al. (1985, 29p.) CR 85-01
Troth, J.L., et al. [1976, p 33-44] MP 867	Artificial melting	Ice-coring augers for shallow depth sampling. Rand, J H, et
Revegetation in arctic and subarctic North America—a litera- ture review Johnson, L.A., et al. (1976, 32p)	Bubbler induced melting of ice covers Keribar, R, et al. (1978, p. 362-366) MP 1160	al, [1985, 22p] CR 85-21
CR 76-15	(1978, p 362-366) MP 1160 Artificial nucleation	Auger bit for frozen fine-grained soil Sellmann, PV, et al. (1986, 13p) SR 86-36
Ecological and environmental consequences of off-road traf-		
	Ice crystal formation and supercooled fog dissipation	Bit design improves augers Scilmann, P.V., et al. (1987.
fic in northern regions Brown J. (1976, p 40-53) MP 1383	Ice crystal formation and supercooled fog dissipation Kumai, M, (1982, p 579-587) MP 1539	Bit design improves augers Sellmann, PV, et al. (1987, p 453-454) MP 2269
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic	Atmospheric attenuation MP 1539	Bit design improves augers Scilmann, PV, et al., [1987, p 453-454] MP 2269 Drilling in frozen ground, bitumens and concretes Sell-
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279)	Kumai, M. (1982, p.579-587) MP 1539	Bit design improves augers Sellmann, P.V. et al., (1987, p453-454) MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, P.V. et al., (1988, 10p) SR 88-08
Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p.113-120] MP 2630 Three-wavelength scintillation measurement of turbulent heat	Bit design improves augers Sellmann, P.V., et al., (1987, p. 453-454) Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., (1988, 10p.) AVALANCHE COUNTERMEASURES Avalanches Melior, M., (1968, 215p.) M. III-A3d
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, HT, et al., (1977, 32p) SR 77-34	Atmospheric attenuation Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p. 113-120], MP 2630 Three-wavelength-scintillation measurement of surbulent heat fluxes. Andreas, E.L., [1990, p.74-77], MP 2696	Bit design improves augers p 453-454] Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, HT, et al., (1977, 32p.) SR 77-34 Biological restoration strategies in relation to nutrients at a	Atmospheric attenuation Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p. 113-120] MP 2630 Three-wavelength scintillation measurement of turbulent heat fluxes Andreas, E.L., [1990, p. 74-77] MP 2696 ATMOSPHERIC CIRCULATION	Bit design improves augers p 453-454] MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., [1988, 10p] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche.
MP 1383 Attreushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, HT, et al., (1977, 32p) SR 77-34 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, LA, (1978,	Atmospheric attenuation Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p. 113-120], MP 2630 Three-wavelength-scintillation measurement of surbulent heat fluxes. Andreas, E.L., [1990, p.74-77], MP 2696	Bit design improves augers p 453-454] Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, HT, et al., (1977, 32p.) SR 77-34 Biological restoration strategies in relation to nutrients at a	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p. 113-120] MP 2630 Three-wavelength scintillation measurement of surbulent heat fluxes Andreas, E.L., [1990, p. 74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.) MI-A3d Climatology of the cold regions of the northern hemisphere,	Bit design improves augers p 453-454] MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, P.V. et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J.B., [1984, p.42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F.,
MP 1383 Attreushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p. 272-279) MP 1384 Canol Pipeline Project a historical review. Ucda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p. 460-466) Scientific challenges at the poles Weich, J.P., et al., (1987, p. 232-26) MP 2228	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1985, p. 113-120] MP 2630 Three-wavelength scintiliation measurement of surbulent heat fluxes Andreas, E.L., [1990, p. 74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.) M I-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.] M I-A3a	Bit design improves augers p 453-454 p 453-454 p 453-454 p Filing in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J B., [1984, p 42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216] MP 1366
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subactic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) MP 1100 Scientific challenges at the poles Weich, J.P., et al., (1987, p 23-26) Arctic Ocean	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p. 113-120]. MP 2630 Three-wavelength scintiliation measurement of surbulent heat fluxes. Andreas, E.L., [1990, p. 74-77]. MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions. Wilson, C., [1967, 35p.). M 1-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.). M 1-A3d Climatology of Antarctic regions. Wilson, C., [1968, 77p.]	Bit design improves augers p 453-454 p 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
MP 1383 Attreushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ucda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Weich, J.P., et al., (1987, p 23-26) MP 2228	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p. 113-120] MP 2630 Three-wavelength scintiliation measurement of surbulent heat fluxes Andreas, E.L., [1990, p. 74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.) M I-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.] M I-A3d Climatology of Antarctic regions Wilson, C., [1968, 77p.] M I-A3c Atmospheric circulation	Bit design improves augers p 453-454 p 453-454 p 453-454 p Filing in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J B., [1984, p 42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216] MP 1366
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) MP 1100 Scientific challenges at the poles Welch, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R E, et al., [1989, p.113-120] MP 2630 Three-wavelengths contiliation measurement of surbulent heat fluxes. Andreas, E L., [1990, p.74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions. Wilson, C., [1967, 35p.) M I-A3d Climatology of the cold regions of the northern hemisphere, I Wilson, C., [1967, 141p.) M I-A3d Climatology of Antarctic regions. Wilson, C., [1968, 77p.) M I-A3c Atmospheric circulation Sea ice, atmosphere, interactions in the Weddell Sea using	Bit design improves augers Sellmann, P.V. et al., (1987, p. 453-454) MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., (1988, 10p.) SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J.B., (1984, p.42-47) MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., (1980, p. 209-216) MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A3d Avalanche mechanics Acoustic emissions in the investigation of avalanches St.
MP 1383 Att-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p.) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Weich, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May, 1979. McPhee, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes (1982, 141p.) SR 83-25	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates. R E. et al. [1989, p 113-120] MP 2639 Three-wavelength scintillation measurement of surbulent heat fluxes. Andreas, E L., [1990, p 74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions. Wilson, C, [1967, 35p] M 1-A3d Climatology of the cold regions of the northern hemisphere, I Wilson, C, [1967, 141p] M 1-A3d Climatology of Antarctic regions. Wilson, C, 1968, 7p.] M 1-A3c Atmospheric circulation. Sea ice atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S F, [1981, p 177-191]	Bit design improves augers p 453-454 MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A34 Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J. B., [1984, p. 42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p. 209-216] MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A34 Avalanche mechanics Acoustic emission in the investigation of avalanches St. Lawrence, W.F., [1977, p. VII/24-VII/33) MP 1630
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) MP 1100 Scientific challenges at the poles Welch, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R E, et al., [1989, p.113-120] MP 2639 Three-wavelengths cintiliation measurement of surbulent heat fluxes. Andreas, E L., (1990, p.74-77) MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions. Wilson, C., [1967, 35p) M I-A3d Climatology of the cold regions of the northern hemisphere, I Wilson, C., [1967, 141p) M I-A3d Climatology of Antarctic regions. Wilson, C., [1968, 77p) M I-A3c Atmospheric circulation. Sea ice atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S F., [1981, p.177-191] MP 1427 Atmospheric turbulence measurements at SNOW-ONE-B	Bit design improves augers Sellmann, P.V. et al., (1987, p. 453-454) MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., (1988, 10p.) SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J.B., (1984, p.42-47) MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., (1980, p. 209-216) MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A3d Avalanche mechanics Acoustic emissions in the investigation of avalanches St.
MP 1383 Att-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salimity and density, March-May 1979. McPhee, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Weeks,	Atmospheric circulation Aimospheric circulation Millimeter-wave performance during mixed precipitation Millimeter-wave performance during mixed precipitation Bates. R.E., et. al., [1980, p. 113-120] MP 2630 Three-wavelength scintiliation measurement of turbulent heat fluxes Andreas, E.L., [1990, p. 74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.] M 1-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.] M 1-A3d Climatology of Antarctic regions Wilson, C., [1968, 77p.] M 1-A3c Atmospheric circulation Sea ice atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S.F., [1981, p. 177-191] MP 1427 Atmospheric turbulence measurements at SNOW-ONE-B Andreas, E.L., [1983, p. 81-87] MP 1846	Bit design improves augers p 453-454 MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p.] SR 88-08 AVALAN-CHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A34 Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J. B., [1984, p. 42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p. 209-216] MP 1366 AVALAN-CHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A34 Avalanche mechanics Avoustic emission in the investigation of avalanches St. Lawrence, W.F., [1977, p. VII/24-VII/33] MP 1630 Dynamics of snow avalanches Mellor, M., [1978, p. 753-792] MP 1070 AVALANCHE TRIGGERING
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p. 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p. 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p. 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 20p.) SR 81-05 Understanding the Arctic sea floor for engineering purposes (1982, 141p). Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) Mechanical properties of ice in the Arctic sea Wecks, W.F., et al., (1984, p. 235-259). MP 1674	Atmospheric circulation Atmospheric circulation Millimeter-wave performance during mixed precipitation Bates. R E. et al. [1989, p.113-120] MP 2630 Three-wavelength scintiliation measurement of surbulent heat fluxes Andreas. E L. [1990, p.74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.] M 1-A3d Climatology of the cold regions of the northern hemisphere, I Wilson, C., [1967, 141p.] M 1-A3d Climatology of Antarctic regions Wilson, C., [1968, 77p.] M 1-A3e Atmospheric circulation Sea ice atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S F., [1981, p.177-191] MP 1427 Atmospheric turbulence measurements at SNOW-ON-E-B Andreas, L L., [1983, p.81-87] MP 1846 Dag cuefficient across the Antarctic marginal ice zone. An-	Bit design improves augers p 453-454 p 453-454 p 453-454 p 453-454 p MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J. B., [1984, p 42-47.] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216.] MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A3d Avalanche mechanics Acoustic emissions in the investigation of avalanches St. Lawrence, W.F., [1977, p VIII/24-VIII/33] Dynamics of snow avalanches Mellor, M., [1968, 215p.] MP 1070 AVALANCHE TRIGGERING Avalanches Mellor, M., [1968, 215p.] M III-A3d
MP 1383 Att-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p.) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Weich, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 20p.) Suderstanding the Arctic sea floor for engineering purposes (1982, 141p.) Sulence program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Weeks, W.F., et al., (1984, p 235-259) Shore ice override and pileup features, Beaufort Sea	Atmospheric attenuation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p.113-120), MP 2630 Three-wavelengths cintiliation measurement of surbulent heat fluxes. Andreas, E.L., [1990, p.74-77), MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions. Wilson, C., [1967, 35p.), M I-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.), M I-A3d Climatology of Antarctic regions. Wilson, C., [1968, 77p.), M I-A3c Atmospheric circulation. Sea ice. atmosphere interactions in the Weddell. Sea using drifting buoys. Ackley, S.F., [1981, p.177-191, MP 1427 Atmospheric turbulence measurements at SNOW-ONE-B Andreas, E.L., [1983, p.81-87], MP 1846 Drig coefficient across the Antarctic marginalice zone. Andreas, E.L., et al., [1984, p.63-71), MP 1784	Bit design improves augers Sellmann, P.V. et al., (1987, p. 453-454) MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, P.V., et al., (1988, 10p.) SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., (1968, 215p.) M III-A3d Avalanches Melior, M., (1968, 215p.) MP 1920 Avalanche formation MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., (1980, p. 209-216) MP 1366 AVALANCHE MECHANICS MP 1366 Avalanche mechanics Avalanche mechanics Avalanche mechanics Avalanche mechanics Avalanche mechanics Mellor, M., (1968, 215p.) M III-A3d Avalanche mechanics Mellor, M., (1977, p. VIII/24-VIII/33) MP 1630 Dynamics of snow avalanches Mellor, M., (1978, p. 753-792) MP 1070 AVALANCHE TRIGGERING Avalanches Mellor, M., (1968, 215p.) M III-A3d Avalanche triggering
MP 1383 Air-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p. 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p. 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p. 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 20p.) SR 81-05 Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic sea Wecks, W.F., et al., (1984, p. 235-259) MP 1674 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Sea ice 7-neuration in the Arctic Ocean Weeks, W.F.	Atmospheric circulation Atmospheric circulation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p.113-120) MP 2630 Three-wavelength scintiliation measurement of surbulent heat fluxes Andreas, E.L., [1990, p.74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.] M 1-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.] M 1-A3d Climatology of Antarctic regions Wilson, C., [1968, 77p.] M 1-A3e Atmospheric circulation Sea ice. atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S.F., [1981, p.177-191] MP 1427 Atmospheric turbulence measurements at SNOW-ON-E-B Andreas, E.L., [1983, p.81-87] MP 1846 Dange selfficient across the Antarctic marginal ice zone. Andreas, E.L., et al., [1984, p.63-71) MP 1784 Low pressure weather systems in and around Norwegian waters Bilello, MA, (1986, p.53-66) MP 2181	Bit design improves augers p 453-454 p 453-454 p 453-454 p 453-454 p MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A3d Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J. B., [1984, p 42-47.] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216.] MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A3d Avalanche mechanics Acoustic emissions in the investigation of avalanches St. Lawrence, W.F., [1977, p VIII/24-VIII/33] Dynamics of snow avalanches Mellor, M., [1968, 215p.] MP 1070 AVALANCHE TRIGGERING Avalanches Mellor, M., [1968, 215p.] M III-A3d
MP 1383 Att-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p.) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Weich, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhec, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Wecks, W.F., et al., (1984, p 235-259) Shore ice override and pileup features, beaufort Sea Kovacs, A., (1984, 28p.) map; CR 84-26 Sea ice 7 neuration in the Arctic Ocean (Resk.) W.F. (1934, p. 37-65) MP 1993	Atmospheric circulation Atmospheric circulation Millimeter-wave performance during mixed precipitation Bates, R E, et al., [1989, p.113-120) MP 2630 Three-wavelengths cintiliation measurement of surbulent heat fluxes. Andreas, E L., [1990, p.74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions. Wilson, C., [1967, 35p.) M I-A3d Climatology of the cold regions of the northern hemisphere, I Wilson, C., [1967, 141p.] M I-A3d Climatology of Antarctic regions. Wilson, C., [1968, 77p.] M I-A3c Atmospheric circulation Sea ice atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S F., [1981, p.177-191, MP 1427 Atmospheric turbulence measurements at SNOW-ONE-B Andreas, E L., [1983, p.81-87] MP 1846 Drig coefficient across the Antarctic marginal ice zone. Andreas, E L., et al., [1984, p.63-71] MP 1784 Low pressure weather systems in and around Norwegian waters. Bilello, M A., [1986, p.53-66] MP 2181 Acrosol exchange in the remote troposphere Hogan, A W.	Bit design improves augers p 451-454 MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al., [1988, 10p.] SR 88-08 AVALANCHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p.] M III-A34 Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J. B., [1984, p.42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p.209-216] MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p.] M III-A34 Avalanche mechanics Avoustic emissions in the investigation of avalanches St. Lawrence, W.F., [1977, p.VII/24-VII/33] MP 1630 Dynamics of snow avalanches Mellor, M., [1978, p.753-792] MP 1070 AVALANCHE TRIGGERING Avalanches Mellor, M., [1968, 215p.] M III-A34 Avalanche triggering Analysis of non-steady plastic shock waves in snow Brown, R. L., [1980, p. 279-287] MP 1354 Acoustic emission response of snow St. Lawrence, W.F.
MP 1383 Attreushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salimity and density, March-May 1979. McPhee, M.G., (1981, 20p.) SR 81-05 Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Weeks, W.F., et al., (1984, p.235-259) Solution (1984, p.235-259) Solution (1984, p.235-259) Solution (1984, p.235-259) MP 1674 Sea ice principation in the Arctic Ocean (1984, p.37.65) MP 1993 My 1993 Wecks, W.F., MP 1993	Atmospheric circulation Sea ace atmospheric interactions in the Weddell Sea using drifting buoys. Ackley, S. F., (1981, p. 177-191, MP 1427 Atmospheric turbulence measurements at NOW-ONE-B Andreas, E. L. (1990, p. 74-77), MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., (1967, 35p.) M 1-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., (1967, 141p.) M 1-A3c Climatology of Antarctic regions Wilson, C., (1968, 77p.) M 1-A3c Atmospheric circulation Sea ace atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S. F., (1981, p. 177-191), MP 1427 Atmospheric turbulence measurements at SNOW-ONE-B Andreas, E. L., (1983, p. 81-87) MP 1846 Dag coefficient across the Antarctic marginal ice zone. Andreas, E. L., et al., (1984, p. 63-71), MP 1784 Low pressure weather systems in and around Norwegian waters. Bilello, M.A., (1986, p. 53-66) Aerotol exchange in the remote troposphere. MP 2180	Bit design improves augers p 453-454 p 453-454 p 453-454 p 453-454 p 453-454 p 453-454 p 453-4554 p
MP 1383 Att-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May. 1979. McPhee, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Wecks, W.F., et al., (1984, p 235-259) Shore ice override and pileup features. Beaufort Sea. Kovacs, A., (1984, 28p. + map) Canol Pipeline Projectives of the sea ice cover (1986, p 87-102) Physical properties of the sea ice cover (1986, p 87-102) Remote sensing of the Arctic seas Weck, W.F., et al., (1987-102)	Atmospheric circulation Atmospheric circulation Almospheric circulation Millimeter-wave performance during mixed precipitation Bates, R.E., et al., [1989, p.113-120) MP 2630 Three-wavelength scintiliation measurement of surbulent heat fluxes Andreas, E.L., [1990, p.74-77] MP 2696 ATMOSPHERIC CIRCULATION Radioactive fallout in northern regions Wilson, C., [1967, 35p.] M 1-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.] M 1-A3d Climatology of Antarctic regions Wilson, C., [1968, 77p.] M 1-A3e Atmospheric circulation Sea i.e. atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S.F., [1981, p.177-191] Atmospheric turbulence measurements at SNOW-ON-E-B Andreas, E.L., [1983, p.81-87] MP 1846 Dang cuefficient across the Antarctic marginal ice zone. Andreas, E.L., et al., [1984, p.63-71] Low pressure weather systems in and around Norwegian waters Bilello, M.A., [1986, p.53-66] MP 2181 Acrosol exchange in the remote troposphere (1986, p.197-213) Atmospheric composition	Bit design improves augers p 453-454 p 453-454 p 453-454 p 453-454 p MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al. [1988, 10p] SR 88-08 AVALAN-CHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p] M III-A34 Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J B., [1984, p 42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216] MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p] M III-A34 Avalanche mechanics Avoustic emission in the investigation of avalanches St. Lawrence, W.F., [1977, p VII/24-VII/33] MP 1630 Dynamics of snow avalanches Mellor, M., [1968, 215p] M III-A34 Avalanche TRIGGERING Avalanche triggering Analysis of non-steady plastic shock waves in snow Brown, R L., [1980, p 279-287] Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216] MP 1366 Avalanche wind Dynamics of snow avalanches Melior, M., (1978, p 753-
MP 1383 Attr-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p. 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p. 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p. 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 20p.) SR 81-05 Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Wecks, W.F., et al., (1984, p. 235-259) Shore ice override and pileup features, March-May 1674 Sca ice progration in the Arctic Ocean (1984, p. 37-65) Physical properties of the sea ice cover (1986, p. 87-102) Remote sensing of the Arctic seas Wecks, W.F., et al., (1986, p. 87-102) Remote sensing of the Arctic seas Wecks, W.F., et al., (1986, p. 87-102)	Atmospheric circulation Sea ac atmospheric interactions in the Weddell Sea using drifting buoys. Ackley, S.F., (1981, p. 177-191), MP 1427 Atmospheric treinulation measurement of surbulent heat fluxes. Andreas, E.L., (1990, p. 74-77), MP 2696 ATMOSPHERIC CIRCULATION. Radioactive failout in northern regions. Wilson, C., (1967, 35p.). M 1-A3d Climatology of the cold regions of the northern hemisphere, I. Wilson, C., (1967, 141p.). M 1-A3d Climatology of Antarctic regions. Wilson, C., (1968, 77p.). M 1-A3c Atmospheric circulation. Sea ac atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S.F., (1981, p. 177-191), MP 1427 Atmospheric turbulence measurements at SNOW-ONE-B. Andreas, E.L., (1983, p. 81-87). MP 1846 Drig coefficient across the Antarctic marginal ice. zone. Andreas, E.L., et al., (1984, p. 63-71). MP 1784 Low pressure weather systems in and around Norwegian waters. Bilello, M.A., (1986, p. 53-66). MP 2181 Acrosol exchange in the remote troposphere. Hogan, A.W., (1986, p. 197-213). MP 2180 Atmospheric composition.	Bit design improves augers p 453-454
MP 1383 Att-cushion vehicle effects on surfaces of Alaska's Arctic Siopes Slaughter, C.W., (1976, p 272-279) MP 1384 Canol Pipeline Project a historical review. Ueda, H.T., et al., (1977, 32p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., (1978, p 460-466) Scientific challenges at the poles Welch, J.P., et al., (1987, p 23-26) Arctic Ocean Arctic Ocean temperature, salinity and density, March-May. 1979. McPhee, M.G., (1981, 20p.) Understanding the Arctic sea floor for engineering purposes (1982, 141p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1884 Mechanical properties of ice in the Arctic seas Wecks, W.F., et al., (1984, p 235-259) Shore ice override and pileup features. Beaufort Sea. Kovacs, A., (1984, 28p. + map) Canol Pipeline Projectives of the sea ice cover (1986, p 87-102) Physical properties of the sea ice cover (1986, p 87-102) Remote sensing of the Arctic seas Weck, W.F., et al., (1987-102)	Atmospheric circulation Sea icc atmospheric interactions in the Weddell Sea using drifting buoys. Ackley, S.F., [1981, p.177-191]. Atmospheric circulation Radiocactive fallout in northern regions Wilson, C., [1967, 35p.) M-I-A3d. Climatology of the cold regions of the northern hemisphere, I. Wilson, C., [1967, 141p.) M-I-A3d. Climatology of Antarctic regions Wilson, C., [1968, 77p.) M-I-A3d. Atmospheric circulation Sea icc atmosphere interactions in the Weddell Sea using drifting buoys. Ackley, S.F., [1981, p.177-191]. MP-1427. Atmospheric turbulence measurements at SNOW-ON-E-B-Andreas, E.L., [1983, p.81-87]. MP-1427. Atmospheric turbulence measurements at SNOW-ON-E-B-Andreas, E.L., [1984, p.63-71]. MP-1784. Dang coefficient across the Antarctic marginal icc zone. Andreas, E.L., et al., [1984, p.63-71]. MP-1784. Low pressure weather systems in and around Norwegian waters. Biello, MA, [1986, p.53-66]. MP-2181. Atmospheric composition Trace gas analysis of Arctic and subarctic atmospheric	Bit design improves augers p 453-454 p 453-454 p 453-454 p 453-454 p MP 2269 Drilling in frozen ground, bitumens and concretes Sellmann, PV, et al. [1988, 10p] SR 88-08 AVALAN-CHE COUNTERMEASURES Avalanches Melior, M., [1968, 215p] M III-A34 Avalanche deposits Detection of sound by persons buried under snow avalanche. Johnson, J B., [1984, p 42-47] MP 1920 Avalanche formation Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216] MP 1366 AVALANCHE MECHANICS Avalanches Mellor, M., [1968, 215p] M III-A34 Avalanche mechanics Avoustic emission in the investigation of avalanches St. Lawrence, W.F., [1977, p VII/24-VII/33] MP 1630 Dynamics of snow avalanches Mellor, M., [1968, 215p] M III-A34 Avalanche TRIGGERING Avalanche triggering Analysis of non-steady plastic shock waves in snow Brown, R L., [1980, p 279-287] Acoustic emission response of snow St. Lawrence, W.F., [1980, p 209-216] MP 1366 Avalanche wind Dynamics of snow avalanches Melior, M., (1978, p 753-

Avalanches	Evaluation of ice-covered water crossings. Dean, A M., Jr., 1980, p.443-4531 MP 1348	Bering Sea
Dynamics of snow and ice masses. Colbeck, SC, ed, [1980, 468p] MP 1297	Structural evaluation of porous pavement in cold climate.	Sea ice rubble formations off the NE Bering Sea and Norton Sound. Kovacs, A., [1981, p.1348-1363] MP 1527
History of snow-cover research. Colbeck, S.C., (1987,	Eaton, R.A, et al, [1980, 43p] SR 80-39	Wind-generated polynyas off the coasts of the Bering Sea
p.60-65 ₁ MP 2316	Full-depth and granular base course design for frost areas Eaton, R.A., et al, (1983, p 27-39) MP 1492	islands. Kozo, T.L., et al, [1990, p 126-132] MP 2734
Snow properties and processes. Colbeck, S.C., (1987, p. 145-150) MP 2413	Eaton, R.A., et al, (1983, p 27-39) MP 1492 Ice reinforced with Geogrid. Haynes, F.D., et al, (1989,	Bering Strait
Backscattering	p.179-185 ₁ MP 2484	Bering Strait sea ice and the Fairway Rock icefoot. Kovacs,
Imaging radar observations of frozen Arctic lakes. Elachi, C., et al., 1976, p.169-175; MP 1284	Dynamic analysis of a floating ice sheet undergoing vertical indentation McGilvary, W.R., et al., 1990, p 195-2031	A, et al, [1982, 40p] CR 82-31
C., et al, [1976, p.169-175] MP 1284 Surface-based scatterometer results of Arctic sea ice On-	MP 2579	Sea ice and the Fairway Rock icefoot. Kovacs, A., et al., [1985, p.25-32] MP 2145
stott, R.G., et al, [1979, p.78-85] MP 1260	Bearing tests	Bibliographies
Comparative near-millimeter wave propagation properties of snow or rain. Nemarich, J, et al, [1983, p.115-129]	Effect of freeze-thaw cycles on resilient properties of fine- grained soils Johnson, T.C, et al, [1978, 19p]	Bibliography of the Barrow, Alaska, IBP ecosystem model. Brown, J., 1970, p 65-71, MP 946
MP 1690	MP 1082	Brown, J., (1970, p 65-71) MP 946 Mechanics of ice Glen, J W., (1975, 43p.) M II-C2b
Attenuation and backscatter for snow and sleet at 96, 140, and	Freeze thaw effect on resilient properties of fine soils John-	Bearing capacity of floating ice plates Kerr, A D., (1976,
225 GHz. Nemarich, J., et al, [1984, p 41-52] MP 1864	son, T.C, et al, [1979, p 247-276] MP 1226 Beaufort Sea	p.229-268 _j MP 884
Effects of water and ice on the scattering of diffuse reflectors.	Delineation and engineering characteristics of permafrost	Bibliography on harbor and channel design in cold regions Haynes, F.D., [1976, 32p.] CR 76-03
Jezek, K.C., et al. (1986, p.259-269) MP 2664 Observations of the backscatter from snow at millimeter	beneath the Beaufort Sea Sellmann, P.V, et al, [1976, p 391-408] MP 1377	Infrared thermography of buildings an annotated bibliogra-
wavelengths Berger, R H, et al. [1986, p 311-316]	Engineering properties of submarine permafrost near Prudhoe	phy. Marshall, S.J., (1977, 21p.) SR 77-09
MP 2665	Bay. Chamberlain, E.J., et al, [1978, p 629-635]	Bibliography of soil conservation activities in USSR perma- frost areas Andrews, M., [1977, 116p] SR 77-07
Comments on the characteristics of in situ snow at millimeter wavelengths. Walsh, J. et al., [1986, p. 317-320]	MP 1104 Subsea permafrost study in the Beaufort Sea, Alaska Sell-	Bibliography of permafrost soils and vegetation in the USSR.
MP 2666	mann, P.V., et al, (1979, p 207-213) MP 1591	Andrews, M., [1978, 175p] SR 78-19
Scattering at mm wavelengths from in situ snow Walsh, J, et al, [1986, p.1 6.1-1 6.2] Walsh, J MP 2141	Distribution and properties of subsea permafrost of the Beau-	Infrared thermography of buildings—a bibliography with abstracts. Marshall, S J., (1979, 67p.) SR 79-01
Two-stream approximation to radiative transfer in falling	fort Sea. Sellmann, P.V., et al, (1979, p 93-115) MP 1287	Bibliography on techniques of water detection in co d regions.
snow. Koh, G., (1988, p 463-470) MP 2604	Permafrost distribution on the continental shelf of the Beau-	Smith, D.W., comp. (1979, 75p) SR 79-10
Overview of obscuration in the cold environment Berger, RH, et al, [1988, p 537-555] MP 2609	fort Sea Hopkins, D.M., et al, {1979, p 135-141} MP 1288	Cold Regions Science and Technology Bibliography Cummings, N.H., [1981, p.73-75] MP 1372
Lidar detection of leads in Arctic sea ice. Schnell, R.C. et	Hyperbolic reflections on Beaufort Sea seismic records	Mobility bibliography Liston, N., comp, [1981, 313p]
al, (1989, p.530-532) MP 2602	Neave, K.G, et al. [1981, 16p.] CR 81-02	SR 81-29 Bibliography on glaciers and permafrost, China, 1938-1979
Radar backscattering from artificially grown sea ice. Bre- dow, J., et al, [1989, p 259-264] MP 2667	Delineation and engineering of subsea permafrost, Beaufort Sea. Sellmann, P.V., et al. (1981, p 137-156)	Shen, J., ed, (1982, 44p) SR 82-20
Radar backscatter measurements over saline ice. Gogineni,	MP 1600	Corps of Engineers land treatment of wastewater research
S, et al, [1990, p 603-615] MP 2741	Foundations of structures in polar waters Chamberlain, E.J., [1981, 16p] SR 81-25	program an annotated bibliography Parker, L.V., et al., [1983, 82p] SR 83-09
Bacteria Health aspects of water reuse in California Reed, S.C.,	Site investigations and submarine soil mechanics in polar re-	US tundra biome publication list. Brown, J, et al, (1983,
(1979, p.434-435) MP 1404	gions Chamberlain, E J, (1981, 18p) SR 81-24	29p) SR 83-29
Disinfection of wastewater by microwaves lskandar, 1 K, et al, [1980, 15p] SR 80-01	Alaska's Beaufort Sea coast ice ride-up and pile-up features Kovacs, A., [1983, 51p] CR 83-09	User's guide for the BIBSORT program for the IBM-PC personal computer. Kyriakakis, T., et al. [1985, 61p.]
Microbiological aerosols from waste water. Bausum, HT, et	Seismic velocities and subsea permafrost in the Beaufort Sea,	SR 85-04
al, [1983, p 65-75] MP 1578	Alaska. Neave, K.G., et al, [1983, p 894-898] MP 1665	Topical databases: Cold Regions Technology on-line. Liston, N., et al, [1985, p 12-15] MP 2027
Sea ice microbial communities in Antarctica. Garrison, D.L., et al, [1986, p.243-250] MP 2026	Ice scoring on the Alaskan shelf of the Beaufort Sea Weeks,	Biomass
Balloons	W.F, et al, (1983, 34p + map) CR 83-21	Bibliography of the Barrow, Alaska, IBP ecosystem model.
Aerostat icing problems Hanamoto, B, [1983, 29p] SR 83-23	Summary of the strength and modulus of ice samples from multi-year pressure ridges Cox, G F.N, et al. 1984.	Brown, J., [1970, p 65-71] MP 946 Primary productivity in sea ice of the Weddell region Ack-
Baltic Sea	p.126-133 ₁ MP 1679	ley, S.F., et al, [1978, 17p] CR 78-19
Size and shape of ice floes in the Baltic Sea in spring Lep-	Variation of ice strength within and between multiyear pres- sure ridges in the Beaufort Sea. Weeks, W.F., [1984,	Arctic ecosystem, the coastal tundra at Barrow, Alaska, Brown, J. ed. (1980, 571p.) MP 1355
päranta, M., (1983, p.127-136) MP 2061		
	p 134-139 ₃ MP 1680	
—Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks.	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al. (1980, p. 84-96) MP 1431
-Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p 5-15) MP 2725	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al. (1984, p. 213- 236) MP 1838	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al. (1980, p. 84-96) MP 1431 Analysis of processes of primary production in tundra growth
—Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks.	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al. (1984, p 213-236) MP 1838 Determining distribution patterns of ice-bonded permafrost in	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al. (1980, p. 84-96) MP 1431 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al. (1981, p. 285-356) MP 1433
—Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., (1980, 14p.) SR 80-20	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al. (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, K G, et al. (1984, p 237-258) MP 1839	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S. F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Mon-
—Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. ct al. [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W. [1982]	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell-	Sca icc studies in the Weddeli Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary and productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p.] SR 82-15 Sea icc a habitat for the foraminifer Neogloboquadrina pa-
—Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. ct al. [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] Reservoir bank erosion caused and influenced by ice cover	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p.] SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92]
-Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., [1990, p.5-15] Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., [1982, 26p] SR 82-31	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beafort Sea Kovacs, A., (1984, 28p. + map) CR 84-26	Sca icc studies in the Weddeli Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary and productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p.] SR 82-15 Sea icc a habitat for the foraminifer Neogloboquadrina pa-
—Bothnia, Bay Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. ct al. [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., [1982, 26p] SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., ct al. [1983, 103p] SR 83-30	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements.
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., [1982, 26p] SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., [1983, 103p] Erosion of perennially frozen streambanks Lawson, D.E.	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p.237-258) Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salmity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F. et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Treszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p.] SR 82-15 Sea ice a habitat for the foraminifer Neogloboguadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92], MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., [1978, p. 403-437] MP 1209
Physical properties of brackish ice. Bay of Bothnia Weeks. W.F. ct al. (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al. (1983, 103p.) Erosion of perennally frozen streambanks Lawson, D.E. (1983, 22p.) CR 83-29	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salmity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples Richter-	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1433 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p.] SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92] MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., [1978, p. 403-437] MP 1209 Asphalt concrete for cold regions Dempsey, B.J., et al., [1980, 55p.] CR 80-05
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. et al., [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., [1982, 26p] SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 82-30 Erosion of perennially frozen streambanks Lawson, D.E., [1983, 22p] Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., [1984, 98p. 5, 3p.	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure indges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples MP 1857 Study of sea ice induced gouges in the sea floor. Weeks,	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Treszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p] SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92] MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., [1978, p. 403-437] MP 1209 Asphalt concrete for cold regions Dempsey, B.J., et al., [1980, 55p] Roofs in cold regions Marson's Store, Claremont, New
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. ct al., [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., [1982, 26p] Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., [1983, 103p] SR 82-31 Bank recession of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., [1984, 98p + 5 appends] SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W.,	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples Richter-Menge, J.A., et al., (1985, p.465-475) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, WF., et al., (1985, p.126-135) MP 1917	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) MP 1431 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p.) SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p.) CR 80-05 Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p.) SR 80-25
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] CR 82-11 Reservoir bank erosion caused and influenced by ice covity Gatto, L.W., (1982, 26p] SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., [1983, 103p] SR 82-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p) CR 83-29 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., [1984, 98p] + 5 appends.) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p)	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure indges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples MP 1857 Study of sea ice induced gouges in the sea floor. Weeks,	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Treszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p] SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92] MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., [1978, p. 403-437] MP 1209 Asphalt concrete for cold regions Dempsey, B.J., et al., [1980, 15p] Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., [1980, 13p] SR 80-25 Fabric installation to reduce cracking on runways Eaton.
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p + 5 appends) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p) Bank recession and channel changes of the Tanana River,	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples Richter-Menge, J.A., et al., (1985, p 465-475) MP 1877 Study of sea ice induced gouges in the sea floor. WER, et al., (1985, p 126-135) MP 1917 Ice gouge formation and infilling, Beaufort Sea Weeks, WF, et al., (1985, p 393-407) MP 1904 Structure, salinity and density of multi-year sea ice pressure	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] MP 1431 Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., [1982, 106p.] SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92] MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., [1978, p. 403-437] MP 1209 Asphalt concrete for cold regions Dempsey, B.J., et al., [1980, 55p.] CR 80-05 Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., [1980, 13p.] SR 80-25 Fabric installation to reduce cracking on runways Eaton, R.A., et al., [1981, 26p.] Roof monsture surveys Tobiasson, W., et al., [1981, 18p.]
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. et al. (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p.) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., MP 1746 Bank recession and channel changes of the Tanana River, Alaska, Collins, C.M., Erosion analysis of the Tanana River, Alaska Collins, C.M.	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, KG, et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf self-mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salmity and density of multi-year sea ice pressure ridges Richter-Menge, J.A. et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples Richter-Menge, J.A., et al., (1985, p.194-197) Study of sea ice induced gouges in the sea floor. Weeks, WF., et al., (1985, p.126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, WF., et al., (1985, p.393-407) MP 1904 Structure, salmity and density of multi-year sea ree pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497)	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions CT 80-05 Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p) CT 80-05 Fabric installation to reduce cracking on runways Fabric installation to reduce cracking on runways R.A., et al., (1981, 26p) Roof moisture surveys Tobiasson, W., et al., (1981, 18p) SR 81-10 SR 81-10 SR 81-10
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. ct al., (1990, p. 5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) CR 83-29 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p + 5 appends) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p) Bank recession and channel changes of the Tanana River, Alaska Gatto, L.W., (1984, 59p) MP 1747 Erosion analysis of the Tanana River, Alaska Guins, C.M., (1984, 98, + figs.)	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) WP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198, MP 1857 Compressive strength of pressure ridge ice samples Richter- Menge, J.A., et al., (1985, p.126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, WF, et al., (1985, p.126-135) MP 1917 lec gouge formation and infiling. Beaufort Sea Weks, WF, et al., (1985, p.393-407) Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dicekmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) MP 1209 Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p) Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p) Fabric installation to reduce cracking on runways Fabric installation to reduce cracking on runways RA, et al., (1981, 26p) Roof moisture surveys Tobiasson, W., et al., (1981, 18p), SR 80-15 Stabilization of fine-grained soil for road and airfield con-
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. ct al., [1990, p.5-15] MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., [1982, 75p] Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., [1982, 26p] SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., ct al., [1983, 103p] SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) SR 83-37 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., ct al., [1984, 98p + 5 appends] SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p) MP 1746 Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., ct al., [1984, 98p + 5 appends] Gatto, L.W., (1984, 59p) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p, + figs] MP 1748 Bank crossion, vegetation and permafrost, Tanana River near	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K.G., et al., (1984, p.237-258) Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, p.75-82) MP 1852 Structure, salmity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples MP 1857 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p.126-135) Ice gouge formation and infilling. Beaufort Sea W.F., et al., (1985, p.393-407) Structure, salmity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1904 Structure, salmity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1905 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p.110-114)	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions CT 80-05 Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p) CT 80-05 Fabric installation to reduce cracking on runways Fabric installation to reduce cracking on runways R.A., et al., (1981, 26p) Roof moisture surveys Tobiasson, W., et al., (1981, 18p) SR 81-10 SR 81-10 SR 81-10
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. et al., (1990, p. 5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) CR 83-29 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p, +5 appends) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p) MP 1747 Erosion analysis of the Tanana River, Alaska Gatto, L.W., (1984, 59p, Higs) MP 1748 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 59p, Higs) SR 84-37 Erosion sandysis of the Tanana River, Alaska Collins, C.M., (1984, 59p, Higs) SR 84-37 Erosion half segulation and permafrost, Tanana River near Fairbanks. Gatto, L.W., (1984, 53p) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 1984, 1984) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 1984, 1984) SR 84-21	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198, MP 1857 Compressive strength of pressure ridge ice samples Richter- Menge, J.A., et al., (1985, p.126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, WF, et al., (1985, p.126-135) MP 1917 lec gouge formation and infiling. Beaufort Sea Weks, WF, et al., (1985, p.393-407) Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209. Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p.). CR 80-05 Roofs in cold regions. Marson's Store, Claremont. New Hampshire. Tobiasson, W., et al., (1980, 13p.). SR 80-25 Fabric installation to reduce cracking on runways. Eaton, R.A., et al., (1981, 18p.). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p.). SR 81-31 Stabilization of fine-grained soil for road and artifield construction. Danyluk, L.S., (1986, 37p.). SR 86-21 Bittuminous concretes.
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. et al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) Erosion of perennially frozen streambanks (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R. et al., (1984, 98p. + 5 appends.) Bank recession of the Tanana River, Alaska (1984, 3pp.) Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., et al., (1984, 98p.) MP 1746 Bank crossion and channel changes of the Tanana River, Alaska, Gatto, L.W., et al., (1984, 98p.) MP 1747 Erosion analysis of the Tanana River, Alaska (Ollins, C.M., (1984, 8p. + figs.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 20). SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 90). SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 90). SR 84-21	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K.G., et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf. Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples. MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p.126-135) Ice gouge formation and infilling. Beaufort Sea W.F., et al., (1985, p.393-407) MP 1917 Ice gouge formation and infilling. Beaufort Sea W.F., et al., (1985, p.393-407) MP 1904 Structure, salinity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p.493-497) MP 1905 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p.110-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W.F., et al., (1986, p.259-268)	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions CR 80-05 Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p) Roof moisture surveys Tobiasson, W., et al., (1981, 18p) SR 81-10 Sr 81-10 Stabilization of fine-grained soil for road and airfield construction Danyluk, L.S., (1986, 37p) SR 86-21 Bituminous concretes
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p. 5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) CR 83-29 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p + 5 appends) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p) MP 1746 Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., (1984, 8p, + figs.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p, + figs.) MP 1748 Bank erosion, vegetation and permafrost, Tanana River near Fairbanks. Gatto, L.W., (1984, 53p) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J. R., (1984, 101p) CR 84-32 CR 84-32	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al., (1984, p 213-236) Determining distribution patterns of ice-bonded permafrost in the U S Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sellmann, P.V., et al., (1984, p 75-82) Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p 194-198) MP 1857 Study of sea ice induced gouges in the sea floor. Weeks, W F, et al., (1985, p 126-135) MF 1917 Structure, salnity and density of multi-year sea ice pressure ridges and the sea floor. Weeks, W F, et al., (1985, p 126-135) MP 1917 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p 493-497) Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p 110-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges Weeks, W F, et al., (1986, p 259-268) MP 2218	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p.) CR 80-05 Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p.) SR 80-25 Fabric installation to reduce cracking on runways Eaton, R.A., et al., (1981, 26p.) SR 81-10 Roof moisture surveys Tobiasson, W., et al., (1981, 18p.) Stabilization of fine-grained soil for road and artifield construction Danyluk, L.S., (1986, 37p.) SR 86-21 Bituminous concretes Freeze-thaw tests of liquid deicing chemicals on selected pavement materials Minsk, L.D., (1977, 16p.) CR 77-28 Temperature effects in compacting an asphalt concrete over-
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. et al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) SR 83-30 Erosion of perennially frozen streambanks (1983, 22p.) CR 83-29 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, CR. et al., (1984, 98p.) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) SR 84-37 Bank recession and channel changes of the Tanana River, Alaska. Gatto, L.W., et al., (1984, 98p.) SR 84-37 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 202-214) MP 1787 Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) Bank conditions and crosion along selected reservoirs Gat-	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p.213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, K G, et al., (1984, p.237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p.75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, WF., et al., (1985, p.126-135) MP 1917 Ice gouge formation and infilling. Beaufort Sea WF, et al., (1985, p.136-135) MP 1910 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1904 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1905 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p.110-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges Weeks, WF, et al., (1986, p.259-268) MW 218 Mukluk ice stress measurement program Cox, G.F.N., et al., (1988, p.457-463) MP 2354	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p) Rofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p) Fabric installation to reduce cracking on runways Fabric installation to reduce cracking on runways R.A., et al., (1981, 26p) Roof moisture surveys Tobiasson, W., et al., (1981, 18p) SR 81-31 Stabilization of fine-grained soil for road and airfield construction Danyluk, L.S., (1986, 37p) SR 86-21 Bitumlnous concretes Freeze-thaw tests of liquid descing chemicals on selected pavement materials Minsk, L.D., (1977, 16p) CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158) MP 1083
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) CR 82-22p Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 ap., pends.) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) MP 1746 Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., et al., (1984, 98p.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) SR 84-21 Bank crossion, vegetation and permafrost, Tanana River near Fairbanks, Gatto, L.W., (1984, 53p.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Bank conditions and erosion along selected reservoirs Gatto, L.W., et al., (1987, p. 143-154) MP 2196	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, WF, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the US Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Compressive strength of pressure ridge ice samples Richter- Menge, J.A., et al., (1985, p.126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, WF., et al., (1985, p.126-135) MP 1917 lee gouge formation and infilling. Beaufort Sea WF., et al., (1985, p.393-407) MP 1965 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p.110-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges Weeks, WF, et al., (1986, p.259-268) MP 218 Mukluk ice stress measurement program Cox, G.F. S., et al., (1988, p.457-463) MP 2354 Seafloor temperature and thermal conductivity Sellmann,	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana. Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209 Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p). CR 80-05 Roofs in cold regions. Marson's Store, Claremont, New Hampshire. Tobiasson, W., et al., (1980, 13p). SR 80-25 Fabric installation to reduce cracking on runways. Eaton, R.A., et al., (1981, 26p). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p). SR 81-31 Stabilization of fine-grained soil for road and airfield construction. Danyluk, L.S., (1986, 37p). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid decing chemicals on selected pavement materials. Minsk, L.D., (1977, 16p). CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 459-
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F. et al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) SR 83-30 Erosion of perennially frozen streambanks (1983, 22p.) CR 83-29 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, CR. et al., (1984, 98p.) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) SR 84-37 Bank recession and channel changes of the Tanana River, Alaska. Gatto, L.W., et al., (1984, 98p.) SR 84-37 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 202-214) MP 1787 Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) Bank conditions and crosion along selected reservoirs Gat-	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al., (1984, p 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the U S Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) Structure, salnity and density of multi-year sea ree pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198) MP 1857 Study of sea ice induced gouges in the sea floor. Weeks, W F., et al., (1985, p.126-135) MP 1917 Structure, salnity and density of multi-year sea ree pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) Structure, salnity and density of multi-year sea ree pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p.1910-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges Weeks, W F., et al., (1986, p.259-268) MP 2218 Mukluk ice stress measurement program Cox, G F.N., et al., (1988, p.457-463) Seafloor temperature and thermal conductivity P.V., et al., (1989, 199) Sea ice ridging in the Ross Sea, Antarctics, as compared with	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., [1980, p. 84-96] Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., [1981, p. 285-356] MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana. Woods, P.F., et al., [1982, 106p]. SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., [1990, p. 86-92]. MP 2732 Bitumens. Thermal and load-associated distress in pavements. Johnson, T.C., et al., [1978, p. 403-437]. MP 1209 Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p). CR 80-05 Roofs in cold regions. Marson's Store, Claremont, New Hampshire. Tobiasson, W., et al., [1980, 13p). SR 80-25 Fabric installation to reduce cracking on runways. R.A., et al., [1981, 26p]. SR 81-10 Roof moisture surveys. Tobiasson, W., et al., [1981, 18p]. SR 81-10 Stabilization of fine-grained soil for road and airfield construction. Danyluk, L.S., [1986, 37p]. SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid decing chemicals on selected pavement materials. Minsk, L.D., [1977, 16p]. CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., [1978, p. 146-158]. MP 1087 473]. MP 1087
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) CR 82-27 Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 ap., pends.) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) MP 1746 Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., et al., (1984, 98p.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) MP 1748 Bank crossion, vegetation and permafrost, Tanana River near Fairbanks, Gatto, L.W., (1984, 53p.) SR 88-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-03 Bathymetry	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p. 213- 236) Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K. G., et al., (1984, p. 237-258) Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p. 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p. 194-198; MP 1857 Compressive strength of pressure ridge ice samples Richter-Menge, J.A., et al., (1985, p. 194-198, W.F., et al., (1985, p. 126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced in the floor in the	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). Aphalta concrete for cold regions. Dempsey, B.J., et al., (1980, 55p). Roofs in cold regions. Marson's Store, Claremont. New Hampshire. Tobiasson, W., et al., (1980, 13p). Fabric installation to reduce cracking on runways. R.A., et al., (1981, 26p). SR 80-25 Bituminous concretes. Freeze-thaw tests of liquid descing chemicals on selected pavement materials. Minsk, L.D., (1977, 16p). CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Resiliency of subgrade soils during freezing and thawing.
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p.) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) Bank recession and channel changes of the Tanana River, Alaska. Gatto, L.W., (1984, 59p.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) Bank conson, vegetation and permafrost, Tanana River near Fairbanks. Gatto, L.W., (1984, 53p.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 202-214) Bank conditions and crosion along selected reservoirs Gatto, L.W., (1984, 101p.) Bank conditions and crosion along selected reservoirs Gatto, L.W., (1987, 143-154) MP 2196 Techniques for measuring reservoir bank crosion Gatto, L.W., (1988, 27p.) SR 88-03	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al., (1984, p 213-236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the U S Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) Subsea permafrost distribution on the Alaskan shelf Sellmann, P.V., et al., (1984, p 75-82) Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p 194-198) MP 1857 Compressive strength of pressure ridge ice samples Richter-Menge, J.A., et al., (1985, p 193-3407) Structure, salnity and density of multi-year sea ice pressure ridges of formation and infilling. Beaufort Sea Weeks, W F., et al., (1985, p 126-135) MP 1910 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p 493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p 110-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W F., et al., (1986, p 259-268) MP 218 Mukluk ice stress measurement program Cox, G F.N., et al., (1988, p.457-463) Seafloor temperature and thermal conductivity Sea ice ridging in the Ross Sea, Antarctica, as compared with sites in the Arctic Weeks, W, F., et al., (1989, p.4984) Chemical and structural properties of sea ice in the southern	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p) Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p) SR 80-25 Fabric installation to reduce cracking on runways R.A. et al., (1981, 26p) SR 81-10 Roof moisture surveys Tobiasson, W., et al., (1981, 18p) SR 81-11 Stabilization of fine-grained soil for road and airfield construction Danyluk, L.S., (1986, 37p) SR 86-21 Bituminous concretes Freeze-thaw tests of liquid deicing chemicals on selected pavement materials Minsk, L.D., (1977, 16p) CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158) MP 1087 Resiltency of subgrade voils during freezing and thawing, Johnson, T.C., et al., (1978, 59p) Design of airfield pavements for seasonal frost and permafrost
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 ap., pends.) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) MP 1746 Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., et al., (1984, 98p.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) SR 88-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-21 Reservoir bank erosion reased by ice Gatto, L.W., (1984, 27p.) SR 88-03 Bathymeetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 35p.) SR 88-03 Bearing strength	p 134-139; MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al., (1984, p 213-236) Determining distribution patterns of ice-bonded permafrost in the U S Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) Subsea permafrost distribution on the Alaskan shelf Sellmann, P.V., et al., (1984, p 75-82) Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.194-198; MP 1857 Compressive strength of pressure ridge ice samples Richter-Menge, J.A., et al., (1985, p.196-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W F., et al., (1985, p.126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W F., et al., (1985, p.393-407) Structure, salinity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p.493-497) Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p.110-114) Preliminary simulation of the formation and infilling of sea ice gouges Weeks, W F., et al., (1986, p.259-268) Mukluk ice stress measurement program Cox, G F N., et al., (1988, p.457-463) Seafloor temperature and thermal conductivity Sellmann, P.V., et al., (1989, p.499, 1989, p.4984, 4988) Chemical and structural properties of sea ice in the southern Beaufort Sea Meese, D.A., (1989, 294p) MP 2456	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209 Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p). CR 80-05 Roofs in cold regions. Marson's Store, Claremont, New Hampshire. Tobiasson, W., et al., (1980, 13p). SR 80-25 Fabric installation to reduce cracking on runways. Eaton, R.A., et al., (1981, 18p). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p). SR 81-31 Stabilization of fine-grained soil for road and artifield construction. Danyluk, L.S., (1986, 37p). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid deceng chemicals on selected pavement materials. Minsk, L.D., (1977, 16p). CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 459-473). MP 1087 Resiliency of subgrade soils during freezing and thawing, Johnson, T.C., et al., (1978, 59p). CR 78-23 Design of airfield pavements for seasonal frost and permafrost conditions. Berg, R.L., et al., (1978, 18p). MP 1189
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p.) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p.) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) Erosion of perennially frozen streambanks Lawson, D.E. (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 appends.) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) Bank recession and channel changes of the Tanana River, Alaska. Gatto, L.W., ct al., (1984, 98p.) MP 1746 Bank crosion, segetation and permafrost, Tanana River, near Fairbanks. Gatto, L.W., (1984, 53p.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 101p.) CR 84-32 Bank conditions and erosion along selected reservoirs Gatto, L.W., (1984, 101p.) CR 84-32 Bank conditions and erosion along selected reservoirs Gatto, L.W., (1984, 101p.) SR 86-03 Bathymaetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 357p.) SR 88-03 Bearing strength Piles in permafrost for bridge foundations. Crory, I.E., et al.	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p. 213-236) Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K.G., et al., (1984, p. 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sellmann, P.V., et al., (1984, p. 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salinity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p. 194-198) MP 1857 Compressive strength of pressure ridge ice samples. Richter-Menge, J.A., et al., (1985, p. 126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Structure, salinity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p. 493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p. 110-114) Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W.F., et al., (1986, p. 259-268) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W.F., et al., (1986, p. 259-268) MP 2148 Mukluk ice stress measurement program. Cox, G.F.N., et al., (1988, p. 457-463) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1989, 199) Sea ice ridging in the Ross Sea, Antaretica, as compared with sites in the Arctic. Weeks, W.F., et al., (1989, p. 494, 4988) Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, 667-679) MP 2656 Refractive index structure parameter for a year over the frozen Beaufort Sea. Andreas, E.L., (1989, 667-679)	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p) Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92) MP 2732 Bitumens Thermal and load-associated distress in pavements Johnson, T.C., et al., (1978, p. 403-437) Asphalt concrete for cold regions Dempsey, B.J., et al., (1980, 55p) Roofs in cold regions Marson's Store, Claremont, New Hampshire Tobiasson, W., et al., (1980, 13p) SR 80-25 Fabric installation to reduce cracking on runways R.A. et al., (1981, 26p) SR 81-10 Roof moisture surveys Tobiasson, W., et al., (1981, 18p) SR 81-11 Stabilization of fine-grained soil for road and airfield construction Danyluk, L.S., (1986, 37p) SR 86-21 Bituminous concretes Freeze-thaw tests of liquid deicing chemicals on selected pavement materials Minsk, L.D., (1977, 16p) CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158) MP 1087 Resiltency of subgrade voils during freezing and thawing, Johnson, T.C., et al., (1978, 59p) Design of airfield pavements for seasonal frost and permafrost
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 ap., pends.) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) MP 1747 Erosion analysis of the Tanana River, Alaska Gatto, L.W., (1984, 8p. + figs.) MP 1748 Bank crossion, egetation and permafrost, Tanana River near Fairbanks. Gatto, L.W., (1984, 53p.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-32 Bank conditions and erosion along selected reservoirs Gatto, L.W., (1987, p. 143-154) MP 2196 Techniques for measuring reservoir bank erosion Gatto, L.W., (1988, 27p.) SR 88-03 Bathymetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 357p.) SR 88-03 Bearing strength Ples in permafrost for bridge foundations Crory, F., et al., (1967, 41p.) Bearing capacity of floating ice plates. Kerr, A.D., (1976)	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p. 213-236) Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K.G., et al., (1984, p. 237-258) Subsea permafrost distribution on the Alaskan shelf. Sellmann, P.V., et al., (1984, p. 75-82) Shore ice override and pileup features. Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p. 194-198) MP 1857 Compressive strength of pressure ridge ice samples. Richter-Menge, J.A., et al., (1985, p. 194-197) Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1917 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 193-407) MP 1904 Structure, salnity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p. 493-497) MP 1904 Structure, salnity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p. 493-497) MP 1905 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p. 110-114) Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W.F., et al., (1988, p. 457-463) Seafloor temperature and thermal conductivity. P.V., et al., (1988, p. 497-463) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1988, p. 497-463) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1988, p. 497-463) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1988, p. 497-463) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1989, p. 498-498) Chemical and structural properties of sea ice in the southern Beaufort Sea. Meese, D.A., (1989, p. 494), M.P. 2556	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 129. Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p.). CR 80-05 Roofs in cold regions. Marson's Store, Claremont, New Hampshire. Tobiasson, W., et al., (1980, 13p.). SR 80-25 Fabric installation to reduce cracking on runways. Eaton, R.A., et al., (1981, 18p.). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p.). SR 81-31 Stabilization of fine-grained soil for road and artifield construction. Danyluk, L.S., (1986, 37p.). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid deceing chemicals on selected pavement materials. Minsk, L.D., (1977, 16p.). CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 459-473). MP 1087 Resiliency of subgrade soils during freezing and thawing. Johnson, T.C., et al., (1978, 59p.). CR 78-23 Design of airfield pavements for seasonal frost and permafrost conditions. Berg, R.L., et al., (1978, 18p.). MP 1189 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 129 Full-depth pavement considerations in seasonal frost areas.
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p) Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p.) SR 84-37 Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) SR 84-37 Bank recession and channel changes of the Tanana River, Alaska. Gatto, L.W., (1984, 98p.) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) MP 1748 Bank conson, vegetation and permafrost, Tanana River near Fairbanks. Gatto, L.W., (1984, 53p.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 202-214) MP 1787 Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-03 Bank conditions and crosion along selected reservoirs Gatto, L.W., (1988, 27p.) SR 88-03 Baltymetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 357p.) SR 88-03 Bearing strength Piles in permafrost for bridge foundations Croy, F. E., et al., (1967, 41p.) MP 1881 Piles in permafrost for bridge foundations Croy, F. et al., (1967, 41p.) MP 884	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al., (1984, p 213-236) Determining distribution patterns of ice-bonded permafrost in the U S Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf Sellmann, P.V., et al., (1984, p 75-82) Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) Structure, salnity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p 194-198) Compressive strength of pressure ridge ice samples. MP 1857 Study of sea ice induced gouges in the sea floor. Weeks, W F, et al., (1985, p 126-135) W F., et al., (1985, p 126-135) MP 1910 Structure, salnity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p 393-407) Structure, salnity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al., (1985, p 493-497) Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p 110-1114) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p 259-268) MP 218 Mukluk ice stress measurement program. Cox, G. F.N., et al., (1988, p.457-463) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1989, p.4974, 4988) Seafloor temperature and thermal conductivity. Sellmann, P.V., et al., (1989, p.4974, 4988) Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, p.467-679) MP 2556 Refractive index structure parameter for a year over the frozen Beaufort Sea. Andreas, E.L., (1989, p.467-679) MP 2557 Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, p.467-679)	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana. Woods, P.F., et al., (1982, 106p). SR 82-15. Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens. Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209 Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p). CR 80-05. Sea ice al., (1980, 13p). SR 80-25 Fabric installation to reduce cracking on runways. Eaton, R.A., et al., (1981, 26p). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p). SR 81-31 Stabilization of fine-grained soil for road and airfield construction. Danyluk, L.S., (1986, 37p). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid descing chemicals on selected pavement materials. Minsk, L.D., (1977, 16p). Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 459, 473). MP 1087 Resiliency of subgrade soils during freezing and thawing. Johnson, T.C., et al., (1978, p. 403-437). CR 78-23 Design of airfield pavements for seasonal frost and permafrost conditions. Berg. R.L., et al., (1978, 18p). MP 1188 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209 Full-depth pavement considerations in seasonal frost areas. Laton, R.A., et al., (1979, 1497). MP 1209 Full-depth pavement considerations in seasonal frost areas. Laton, R.A., et al., (1979, 1497). MP 1209
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) SR 82-31 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 ap., pends) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., (1984, 98p. + figs.) Bank recession and permafrost, Tanana River, Alaska, Gatto, L.W., (1984, 59p.) SR 84-37 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-03 Bank conditions and erosion along selected reservoirs Gatto, L.W., (1988, 27p.) SR 88-03 Bahtymetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 357p.) SR 88-03 Bearing strength Peles in permafrost for bridge foundations Crory, F.E., et al., (1967, 41p.) Bearing agraetty of floating ice plates. Kerr, A.D., (1976, p. 229-268) Nondestructive testing of in-service highway pavements in Maine Smith, N., et al., (1979, 22p.) CR 79-06	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p. 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K.G., et al., (1984, p. 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf mann, P.V., et al., (1984, p. 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p. 194-198) MP 1857 Compressive strength of pressure ridge ice samples MP 1857 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 136-135) MP 1971 Ce gouge formation and infilling, Beaufort Sea Weeks, W.F., et al., (1985, p. 393-407) MP 1904 Structure, salinity and density of multi-year sea rec pressure ridges Richter-Menge, J.A., et al., (1985, p. 493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p. 110-114) Preliminary simulation of the formation and infilling of sea ice gouges Weeks, W.F., et al., (1986, p. 259-268) MP 2218 Mukluk ice stress measurement program Cox, G.F.N., et al., (1988, p. 437-463) Seafloor temperature and thermal conductivity P.V., et al., (1988, 199) Sea ice ridging in the Ross Sea, Antarctica, as compared with sites in the Arctic Weeks, W.F., et al., (1989, p. 494, 4983) Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, p. 497, MP 2575 Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, 134p) MP 2656 Refractive index structure parameter for a year over the froren Beaufort Sea. Andreas, E.L., (1989, 1949) MP 2656 Refractive index structure parameter for a year over the froren Beaufort Sea. Andreas, E.L., (1989, 1949) MP 26	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S. F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana. Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209 Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p.). CR 80-05 Roofs in cold regions. Marson's Store, Claremont. New Hampshire. Tobiasson, W., et al., (1980, 13p.). SR 80-25 Fabric installation to reduce cracking on runways. Eason, R.A., et al., (1981, 18p.). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p.). SR 81-31 Stabilization of fine-grained soil for road and artifield construction. Danyluk, L.S., (1986, 37p.). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid deicing chemicals on selected pavement materials. Minsk, L.D., (1977, 16p.). SR 86-21 Emperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 459-473). Design of artifield pavements for seasonal frost and permatrost conditions. Berg. R.L., et al., (1978, 18p.). MP 1189 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1187 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1189 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). CR 80-05
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975. 1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 appends) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) Bank recession and channel changes of the Tanana River, Alaska. Gatto, L.W., (1984, 59p.) Bank recession and permafrost, Tanana River, near Fairbanks. Gatto, L.W., (1984, 53p.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, 202)-214) Bank conditions and erosion along selected reservoirs Gatto, L.W., (1984, 101p) SR 86-21 Bank conditions and erosion along selected reservoirs Gatto, L.W., (1988, 27p) Bank conditions and erosion for bank erosion Gatto, L.W., (1988, 197) SR 88-03 Bathymmetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 357p.) SR 88-03 Bearing strength Piles in permaffrost for bridge foundations Crory, F.E., et al., (1967, 41p.) MP 1841 Bearing capacity of floating ice plates, Kerr, A.D., (1976, p.229-268) Nondestructive testing of in-service highway pavements in Maine Smith, N., et al., (1979, 22p.) Snow studiev associated with the sudeways move of D1 Fr.J.	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W F, et al., (1984, p 213- 236) Determining distribution patterns of ice-bonded permafrost in the U S Beaufort Sea from seismic data Neave, K G, et al., (1984, p 237-258) Subsea permafrost distribution on the Alaskan shelf MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell- mann, P.V., et al., (1984, p 75-82) Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p 194-198) MP 1857 Compressive strength of pressure ridge ice samples Menge, J.A., et al., (1985, p 465-475) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W F., et al., (1985, p 126-135) MP 1917 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p 493-497) Mr 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p 110-114) MP 2147 Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W F., et al., (1986, p 259-268) MP 218 Mukluk ice stress measurement program Cox., G F.N., et al., (1988, p.457-463) Seafloor temperature and thermal conductivity Sea ice ridging in the Ross Sea, Antarctica, as compared with sites in the Arctic Weeks, W, F., et al., (1989, p.4984, 4988) Chemical and structural properties of sea ice in the southern Beaufort Sea Meese, D.A., (1989, 134p) CR 89-25 Bench marks Vertically stable benchmarks, a synthesis of existing informa- Vertically stable benchmarks, a synthesis of existing informa- Vertically stable benchmarks, a synthesis of existing informa-	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S.F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana. Woods, P.F., et al., (1982, 106p). SR 22-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens. Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p). Roofs in cold regions Marson's Store, Claremont, New Hampshire. Tobiasson, W., et al., (1980, 13p). SR 80-25 Fabric installation to reduce cracking on runways. R.A., et al., (1981, 26p). Roof moisture surveys. Tobiasson, W., et al., (1981, 18p). SR 81-10 Stabilization of fine-grained soil for road and airfield construction. Danyluk, L.S., (1986, 37p). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid deicing chemicals on selected pavement materials. Minsk, I.D., (1977, 16p). CR 77-28 Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 949, 147). Design of airfield pavements for veasonal frost and permafrost conditions. Berg, R.L., et al., (1978, 18p). Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1087 Resiliency of subgrade soils during freezing and thawing. Johnson, T.C., et al., (1978, p. 403-437). MP 1087 Resiliency of subgrade soils during in the pavements of the subgrade of the pavements of the subgrade of
Physical properties of brackish ice, Bay of Bothnia Weeks, W.F., ct al., (1990, p.5-15) MP 2725 Banks (waterways) Sediment displacement in the Ottauquechee River—1975-1978 Martinson, C.R., (1980, 14p) SR 80-20 Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) SR 82-31 Reservoir bank erosion caused and influenced by ice cover Gatto, L.W., (1982, 26p) SR 82-31 Bank recession of Corps of Engineers reservoirs Gatto, L.W., (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) SR 83-30 Erosion of perennially frozen streambanks Lawson, D.E., (1983, 22p.) Tanana River monitoring and research studies near Fairbanks, Alaska Neill, C.R., et al., (1984, 98p. + 5 ap., pends) Bank recession of the Tanana River, Alaska Gatto, L.W., (1984, 59p.) Bank recession and channel changes of the Tanana River, Alaska, Gatto, L.W., (1984, 98p. + figs.) Bank recession and permafrost, Tanana River, Alaska, Gatto, L.W., (1984, 59p.) SR 84-37 Erosion analysis of the Tanana River, Alaska Collins, C.M., (1984, 8p. + figs.) SR 84-21 Reservoir bank erosion caused by ice Gatto, L.W., (1984, p. 203-214) Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., (1984, 101p.) SR 88-03 Bank conditions and erosion along selected reservoirs Gatto, L.W., (1988, 27p.) SR 88-03 Bahtymetry Coastal marine geology of the Beaufort, Chukchi and Bering Seas Gatto, L.W., (1980, 357p.) SR 88-03 Bearing strength Peles in permafrost for bridge foundations Crory, F.E., et al., (1967, 41p.) Bearing agraetty of floating ice plates. Kerr, A.D., (1976, p. 229-268) Nondestructive testing of in-service highway pavements in Maine Smith, N., et al., (1979, 22p.) CR 79-06	p 134-139) MP 1680 Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Beaufort Sea Weeks, W.F., et al., (1984, p. 213- 236) MP 1838 Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data Neave, K.G., et al., (1984, p. 237-258) MP 1839 Subsea permafrost distribution on the Alaskan shelf mann, P.V., et al., (1984, p. 75-82) MP 1852 Shore ice override and pileup features, Beaufort Sea Kovacs, A., (1984, 28p. + map) CR 84-26 Structure, salnity and density of multi-year sea ice pressure ridges Richter-Menge, J.A., et al., (1985, p. 194-198) MP 1857 Compressive strength of pressure ridge ice samples MP 1857 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 126-135) MP 1877 Study of sea ice induced gouges in the sea floor. Weeks, W.F., et al., (1985, p. 136-135) MP 1971 Ce gouge formation and infilling, Beaufort Sea Weeks, W.F., et al., (1985, p. 393-407) MP 1904 Structure, salinity and density of multi-year sea rec pressure ridges Richter-Menge, J.A., et al., (1985, p. 493-497) MP 1965 Monitoring seasonal changes in seafloor temperature and salinity. Sellmann, P.V., et al., (1986, p. 110-114) Preliminary simulation of the formation and infilling of sea ice gouges Weeks, W.F., et al., (1986, p. 259-268) MP 2218 Mukluk ice stress measurement program Cox, G.F.N., et al., (1988, p. 437-463) Seafloor temperature and thermal conductivity P.V., et al., (1988, 199) Sea ice ridging in the Ross Sea, Antarctica, as compared with sites in the Arctic Weeks, W.F., et al., (1989, p. 494, 4983) Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, p. 497, MP 2575 Chemical and structural properties of sea ice in the southern Beaufort Sea. Andreas, E.L., (1989, 134p) MP 2656 Refractive index structure parameter for a year over the froren Beaufort Sea. Andreas, E.L., (1989, 1949) MP 2656 Refractive index structure parameter for a year over the froren Beaufort Sea. Andreas, E.L., (1989, 1949) MP 26	Sea ice studies in the Weddell Sea aboard USCGC Polar Sea. Ackley, S. F., et al., (1980, p. 84-96) Analysis of processes of primary production in tundra growth forms. Tieszen, L.L., et al., (1981, p. 285-356) MP 1433 Limnology and primary productivity, Lake Koocanusa, Montana. Woods, P.F., et al., (1982, 106p). SR 82-15 Sea ice a habitat for the foraminifer Neogloboquadrina pachyderma? Dieckmann, G., et al., (1990, p. 86-92). MP 2732 Bitumens Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1209 Asphalt concrete for cold regions. Dempsey, B.J., et al., (1980, 55p.). CR 80-05 Roofs in cold regions. Marson's Store, Claremont. New Hampshire. Tobiasson, W., et al., (1980, 13p.). SR 80-25 Fabric installation to reduce cracking on runways. Eason, R.A., et al., (1981, 18p.). SR 81-10 Roof moisture surveys. Tobiasson, W., et al., (1981, 18p.). SR 81-31 Stabilization of fine-grained soil for road and artifield construction. Danyluk, L.S., (1986, 37p.). SR 86-21 Bituminous concretes. Freeze-thaw tests of liquid deicing chemicals on selected pavement materials. Minsk, L.D., (1977, 16p.). SR 86-21 Emperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1083 Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., (1978, p. 459-473). Design of artifield pavements for seasonal frost and permatrost conditions. Berg. R.L., et al., (1978, 18p.). MP 1189 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1187 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). MP 1189 Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437). CR 80-05

Bituminous concretes (cont.)	Ross Ice Shelf bottom ice structure. Zotikov, I A, et al.	Grain clusters in wet snow Colbeck, S.C., [1979, p.371-384] MP 1267
Effect of color and texture on the surface temperature of asphalt concrete pavements Berg, R L, et al. 1983, p 57-61, MP 1652	(1979, p 65-66) MP 1336 Ice cover distribution in Vermont and New Hampshire Atlan- tic salmon rearing streams Calkins, D.J., et al., (1988,	Application of recent results in functional analysis to the problem of water tables Nakano, 7., (1979, p. 185-190)
Comparison of three compactors used in pothole repair. Snelling, M.A., et al, 1984, 14p; SR 84-31	p.85-96 ₃ MP 2473 Bottom sediment	MP 1269 Functional analysis of the problem of wetting fronts Naka-
Frost heave of full-depth asphalt concrete pavements. Zom- erman, I, et al, (1985, p.66-76) MP 1927	1977 CRREL-USGS permafrost program Beaufort Sea Alas- ka, operational report. Sellmann, PV, et al, §1977, 19p j	no, Y, (1980, p 314-318) MP 1307 Water and air horizontal flow in porous medis. Nakano, Y,
Resilient moduli of soil specimens in the frozen and thawed	SR 77-41	[1980, p 81-85] MP 1341
states. Johnson, T.C., et al., [1986, 62p] CR 86-12 Low temperature cracking susceptibility of asphalt concrete.	Permafrost beneath the Beaufort Sea Sellmann, P.V., et al. [1978, p.50-74] MP 1206	Water and air vertical flow through porous media. Nakano, Y., (1980, p 124-133) MP 1342
Janoo, V.C., et al, [1987, p.397-415] MP 2233 Summary of proper cold weather pavement repair methods	Overconsolidated sediments in the Beaufort Sea Chamber- lain, E.J., (1978, p.24-29) MP 1255	Deforming finite elements with and without phase change. Lynch, D R., et al. (1981, p.81-96) MP 1493
Eaton, R.A., [1987, p. 1013-1027] MP 2235 Use of low viscosity asphalts in cold regions. Janoo, V.C.,	Penetration tests in subsea permafrost, Prudhoe Bay, Alaska Blouin, S E, et al, [1979, 45p] CR 79-07	Boundary integral equation solution for phase change prob- lems O'Neili, K. (1983, p. 1825-1850) MP 2093
(1989, p 70-80) MP 2462	Distribution and properties of subsea permafrost of the Beau- fort Sea Sellmann, P.V., et al. (1979, p.93-115)	Boundary value problem of flow in porous media. Nakano,
Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., (1990, 47p) SR 90-12	MP 1287	Y, (1983, p 205-213) MP 1721 Modeling two-dimensional freezing. Albert, M.R., (1984,
Blasting Dynamic in-situ properties test in fine-grained permafrost.	Permafrost distribution on the continental shelf of the Beaufort Sea Hopkins, D.M., et al. (1979, p.135-141)	45p ₁ CR 84-10 Bridges
Blouin, S.E., [1977, p.282-313] MP 963 Testing shaped charges in unfrozen and frozen silt in Alaska.	MP 1288 Distribution and features of bottom sediments in Alaskan	Piles in permafrost for bridge foundations Crory, F.E., et al., [1967, 41p.] MP 1411
Smith, N , (1982, 10p) SR 82-02	coastal waters Sellmann, P.V., (1980, 50p) SR 80-15	Failure of an ice bridge. DenHartog, S L., et al, 11976,
Blasting and blast effects in cold regions Part 1: Air blast Mellor, M., (1985, 62p) SR 85-25	Sediment displacement in the Ottauquechee River—1975- 1978. Martinson, C.R., (1980, 14p.) SR 80-20	13p CR 76-29 Ice breakup on the Chena River 1975 and 1976 McFadden.
Blasting and blast effects in cold regions Part 3 explosions in ground materials Mellor, M, (1989, 62p)	Characteristics of permafrost beneath the Beaufort Sea Sell- mann, P.V., et al, 1981, p 125-157 MP 1428	T., et al. (1977, 44p) CR 77-14 Arching of model ice floes at bridge piers Calkins, D.J.,
BLOWING SNOW	Hyperbolic reflections on Beaufort Sea seismic records	(1978, p 495-507) MP 1134 lee forces on the Yukon River bridge—1978 breakup. John-
Blowing snow. Mellor, M., (1965, 79p) M III-A3c	Neave, K G, et al. (1981, 16p.) CR 81-02 Subsea trenching in the Arctic Mellor, M., (1981, p.843-	son, P.R., et al. (1979, 40p) MP 1304 Single and double reaction beam load cells for measuring ice
Snow Symposium, 1st, Hanover, NH, Aug 1981 (1982)	882; MP 1464 Bottom heat transfer to water bodies in winter O'Neill, K.	forces Johnson, PR, et al, [1980, 17p] CR 80-25
324p ₁ SR 82-17 Snow Symposium, 2nd, 1982 (1983, 295p ₁ SR 83-04	et al. [1981, 8p.) SR 81-18 Subsea permafrost in Harrison Bay. Alaska Neave, K.G. et	lce force measurement on the Yukon River bridge. McFadden, T, et al, [1981, p.749-777] MP 1396
Performance and optical signature of an AN/VVS-1 laser rangefinder in falling snow Preliminary test results La-	al, (1982, 62p) CR 82-24	Snow and ice control on railroads, highways and airports Minsk, L. D., et al., [1981, p.671-706] MP 1447
combe, J., (1983, p 253-266) MP 1759	Potential use of SPOT HRV imagery for analysis of coastal sediment plumes. Band, L.E., et al., [1984, p. 199-204]	Ice engineering for civil work: baseline study et al. (1983, 91p.) Carey, K L., MP 2441
Utilization of the snow field test series results for development of a snow obscuration primer Ebersole, J.F., et al., [1983, 200, 202]	MP 1744 Mapping resistive seabed features using DC methods. Sell-	Ice action on pairs of cylindrical and conical structures.
p 209-217 ₁ MP 1692 Helicopter snow obscuration sub-test Ebersole, J.F.	mann, P.V., et al, (1985, p. 136-147) MP 1918 lee gouge formation and infilling, Beaufort Sea Weeks,	Kato, K., et al, (1983, 35p) CR 83-25 Ice forces on a bridge pier, Ottauquechee River, Vermont
(1984, p.359-376) MP 2094 Clear improvement in obscuration Palmer, R A, (1985,	W.F., et al. (1985, p.393-407) MP 1904 Freeze thaw consolidation of sediments, Beaufort Sea, Alas-	Sodhi, D.S., et al, [1983, 6p] CR 83-32 lee forces on inclined model bridge piers Haynes, F.D., et
p.476-4771 MP 2067 Meteorological variation of atmospheric optical properties in	ka Lee, H J, et al. (1985, 83p) MP 2025	al. (1984, p 1167-1173) MP 2407 lee forces on bridge piers Haynes, F.D. (1986, p 83-101)
an antarctic storm. Egan, W.G., et al. (1986, p.1155- 1165; MP 2099	Preliminary study of scour under an ice jam. Wuebben, J.L. (1988, p 177-192) MP 2475	MP 2160
Booms (equipment)	Bottom topography ice scoring on the Alaskan shelf of the Beaufort Sea Weeks,	Tactical bridging during winter: 1986 Korean bridging exercise Coutermarsh, B.A., (1987, 23p.) SR 87-13
Boom for shipboard deployment of meteorological instru- ments. Andreas, E.L., et al. (1983, 14p) SR 83-28	W.F., et al. (1983, 34p + map) CR 83-21 Some probabilistic aspects of ice gouging on the Alaskan Shelf	Imjin River ice boom Perham, R.E., [1988, 10p] SR 88-22
Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al. (1984, p. 227-237)	of the Beaufor' Sea Weeks, W.F., et al., [1984, p.213- 236] MP 1838	Dynamic ice breakup control for the Connecticut River near Windsor, Vermont. Fernek, M.G., et al., [1988, p.245-
MP 1752 Borehole instruments	Study of sea ice induced gouges in the sea floor Weeks,	258 ₃ MP 2449 Factors affecting rates of ice cuiting with a chain saw. Cou-
Resurvey of the "Byrd" Station, Antarctica, drill hole Gar- field, D.E., et al, (1976, p 29-34) MP 846	WF, et al. (1985, p 126-135) MP 1917 Ice gouge formation and infilling, Beaufort Sea Weeks,	termarsh, B.A., (1989, 14p.) SR 89-24
Dynamics and energetics of parallel motion tools for cutting	W.F., et al., (1985, p. 393-407) MP 1904 Laboratory study of flow in an ice-covered sand bed channel	Ice force measurements on a bridge pier in a small river. Sodhi, D.S., et al., (1989, p. 1419-1427) MP 2764
and boring Mellor, M., [1977, 85p.] CR 77-07 Design for cutting machines in permafrost. Mellor, M.	Wuebben, J.L., [1986, p.3-14] MP 2123 Analysis of a short pulse radar survey of revetments along the	Winter bridging exercise on thick ice. Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p]
[1978, 24p] CR 78-11 Ice drilling technology Holdsworth, G, ed. [1984, 142p]	Mississippi River. Arcone, S.A., [1989, 20p.] MP 2692	SR 90-i0 Brines
SR 84-34 Boreholes	On modeling the baroclinic adjustment of the Arctic Ocean Hibler W.D., III, [1990, p 247-250] MP 2739	Subsurface measurements of the Ross Ice Shelf, McMurdo Sound, Antarctica Kovacs, A., et al., [1977, p 146-148]
Melting and freezing of a drill hole through the Antarctic shelf ice Tien, C. et al. (1975, p.421-432) MP 861	Boundary layer	MP 1013 Subsurface measurements of McMurdo Ice Shelf Gow.
Heat transfer in drill holes in Antarctic ice Yen, Y-C, et	Abiotic overview of the Fundra Biome Program, 1971 Weller, G, et al. (1971, p 173-181) MP 906	A.J., et al., (1979, p.79-80) MP 1338
Geodetic positions of borehole sites in Greenland Mock,	Oceanic boundary-layer features and oscillation at drift sta- tions McPhee, M.G., [1980, p.870-884] MP 1369	Modeling of anisotropic electromagnetic reflection from sea- ice. Golden, K.M., et al. [1980, p. 247-294]
SJ, (1976, 7p) CR 76-41 Permafrost beneath the Beaufort Sea Sellmann, PV, et al.	Nonsteady ice drift in the Strait of Belle Isle Sodhi, D.S., et al., (1980, p. 177-186) MP 1364	MP 1325 Sea ice anisotropy, electromagnetic properties and strength.
(1978, p 50-74) MP 1206 Distribution and properties of subsea permafrost of the Beau-	Approximate solution to Neumann problem for soil systems Lunardini, V J., et al, [1981, p 76.81] MP 1494	Kovacs, A, et al. (1980, 18p) CR 80-20 Brine zone in the McMurdo Ice Shelf, Antarctica Kovacs,
Distribution and properties of subsea permafrost of the Beau- fort Sea Sellmann, PV, et al. [1979, p 93-115] MP 1287	Sea ice drag laws and boundary layer during rapid melting.	A. et al. (1982, p. 160-171) MP 1550 Equations for determining the gas and brine volumes in sea
Permafrost distribution on the continental shelf of the Beau-	McPhee, M.G., (1982, 17p.) Atmospheric dynamics in the antarctic marginal ice zone	ice samples Cox, G.F.N., et al., [1982, 11p] CR 82-30
fort Sea Hopkins, D.M. et al, 1079, p 135-141 ₁ MP 1288	Andreas, E.L., et al. (1984, p. 649-661) MP 1667 Stefan problem in a firite domain Takagi, S., (1985, 28p.)	McMurdo Ice Shelf brine zone Kovacs, A, et al. (1982,
Calculating borehole geometry Jezek, K.C., et al. (1984, 18p) SR 84-15	SR 85-08 Heat conduction phase change problems Albert, M.R., et al.,	28p.) CR 82-39 Equations for determining gas and brine volumes in sea ice
Ice flow leading to the demicore hole at Dye 3, Greenland Whillans, I M, et al. [1984, p.185-190] MP 1824	(1986, p. 591-607) MP 2159 Spectral measurements in a disturbed boundary layer over	Cox. G F.N., et al. (1983, p.306-316) MP 2055 Horizontal salinity variations in sea ice Tucker, W B, et al.
Borehole geometry on the Greenland and Antarctic ice sheets Jezek, K.C., [1985, p.242-251] MP 1817	snow Andreas, E.L., (1987, 41p.) CR 87-21	(1984, p. 6505-6514) MP 1761 Electromagnetic measurements of sea ice Kovacs, A., et al.
Dielectric studies of permafrost Arcone, S.A., et al. (1985.	Boundary value problems Viscous wind-driven circulation of Arctic sea ice Hibler.	(1986, p 67-93) MP 2020
p 3-5; MP 1951 Preparation of geophysical borehole site with ground ice.	W.D., III, et al. (1977, p. 95-133) MP 983 Moving boundary problems in the hydrodynamics of porous	Geochemistry of freezing brines Thurmond, V.L., et al. (1987, 11p.) CR 87-13
Fairbanks, AK Delancy, AJ, [1987, 15p] SR 87-07	media Nakano, Y., (1978, p.125-134) MP 1343 In-plane deformation of non-coasial plastic soil Takagi, S.	Brittleness Brittleness of reinforced concrete structures under arctic con-
Camp Century survey 1986 Gundestrup, N.S., et al. (1987, p. 281-288) MP 2331	(1978, 28p.) CR 78-07	ditions Kisckus, L et al. (1986, 202) CR 86-02 Bubbles
Borehole investigations of the electrical properties of frozen silt. Arcone, S.A., et al., [1988, p.910-915] MP 2364	(1978, 49p) CR 78 14	Continuous monitoring of total dissolved gases, a feasibility
Bothnia, Bay	Hydraulic model investigation of drifting snow Wijebben, J.L., (1978, 29p.) (R 78-16	Gas inclusions in the Antarctic ice sheet Gow, A J., et al.
Field studies of brackish ice to compare with satellite data Weeks, W.F., et al. (1989, p.1318-1333) MP 2763	Evaluation of the moving boundary theory Nakano, Y., 1978, p. 142-151; MP 1147	(1975, p. 5101-5108) MP 847 Point source bubbler systems to suppress ice. Ashton, G.D.
Bottom ice Ice blockage of water intakes Carey K.I., [1979, 27]	liffect of the oceanic boundary layer on the mean drift of pack- ice application of a simple model. McPhee, M.G., £1979,	(1979, 12p.) CR 79-12 Performance of the USCGC Katmar Bay techreaker. Vance,
MP 1197 Oil pooling under sea ice Kovaes, A. (1979, p. 310-323)	p 388-4001 MP 1198 Steady in plane deformation of noncoaxial plastic soil	GP (1980, 28p) CR 80-08 Soft drink bubbles Cragin, JH, (1983, p.71)
MP 1289	Takagi, S., (1979, p.1049-1072) MP 1238	MP 1736

	mark at 1 to 11 to 11 to 12 to	Cell morphology
Thermal and size evolution of sea spray droplets. Andreas, E.L., [1989, 37p] CR 89-11	Deteriorated building panels at Sondrestrom, Greenland. Korhonen, C., (1985, p.7-10) MP 2017	Trends in carbohydrate and lipid levels in Arctic plants.
Bubbling	Measured and expected R-values of 19 building envelopes	McCown, B.H, et al, [1972, p.40-45] MP 1376
Numerical simulation of air bubbler systems. Ashton, G.D.,	Flanders, S N., (1985, p 49-57) MP 2115 Confidence in heat flux transducer measurements of build-	Cellular materials Influence of insulation upon frost penetration beneath pave-
(1977, p.765-778) MP 936 Numerical simulation of air bubbler systems Ashton, G.D.	ings Flanders, S.N., [1985, p.515-531] MP 2290	ments Eaton, R A., et al, [1976, 41p] SR 76-06
[1978, p.231-238] MP 1618	Models for predicting building material distribution in NE	Sulfur foam as insulation for expedient roads Smith, N., et CR 79-18
Bubbler induced melting of ice covers Keribar, R. et al,	cities. Merry, C.J., et al. (1985, 50p) SR 85-24 Megastructures for mobilization Flanders, S.N., (1986,	al, (1979, 21p) CR 79-18 Cellular plastics
[1978, p 362-366] MP 1160 Point source bubbler systems to suppress ice. Ashton, G.D.,	p 10-11 ₁ MP 2153	Evaluation of MESL membrane—puncture, stiffness, temper-
[1979, p 93-100] MP 1326	Reference guide for building diagnostics equipment and techniques McKenna, C., et al, [1986, 148p] MP 2226	ature, solvents. Sayward, J.M., [1976, 60p.]
Ice control at navigation locks. Hanamoto, B, [1981, p.1088-1095] MP 1448	Measuring building R-values with thermography and heat flux	Reinsulating old wood frame buildings with urea-formalde-
Performance of a point source bubbler under thick ice	sensors Flanders, S.N., [1987, 29p] SR 87-06	hyde foam. Tobiasson, W., et al, [1977, p.478-487] MP 958
Haynes, F.D., et al., [1982, p 111-124] MP 1529	Measured insulation improvement potential for ten U.S. Army buildings. Flanders, S.N., (1987, p.202-220)	Moisture detection in roofs with cellular plastic insulation
Bubblers and pumps for melting ice Ashton, G.D., 1986, p. 223-2341 MP 2133	MP 2327	Kothonen, C., et al. [1982, 22p] SR 82-07
High-flow air-screen bubbler systems to control ice in locks	Arctic construction working group report Marvin, E.L., et al., e1987, p. 311-314; MP 2426	Locating wet cellular plastic insulation in recently construct-
Rand, J H., (1988, p 34-43) MP 2496 Elements of floating-debns control systems Perham, R E.	al, (1987, p 311-314) MP 2426 Composite buildings for military bases Flanders, S.N.,	cd roofs. Korhonen, C., et al, [1983, p.168-173] MP 1729
(1988, 54p + appends) MP 2453	(1988, 25p) CR 88-04	Wetting of polystyrene and urethane roof insulations
Building codes Analysis of roof snow load case studies, uniform loads O'-	Distribution of building materials exposed to acid rain. Merry, C.J., et al. (1989, 156p) SR 89-01	Tobiasson, W., et al. (1987, p 108-119) MP 2337 Cement admixtures
Rourke, M, et al. [1983, 29p] CR 83-01	Unique new cold weather testing facility. Eaton, RA,	Asphalt concrete for cold regions Dempsey, B J., et al,
Foundations on permafrost, US and USSR design and prac-	(1989, p. 335-342) MP 2468 Reference guide for building diagnostics equipment and tech-	(1980, 55p) CR 80-05
tice. Fish, A.M., (1983, p 3-24) MP 1682 Changes coming in snow load design criteria Tobiasson, W.	niques McKenna, C.M., et al, [1989, 64p.]	Stabilization of fine-grained soil for road and airfield con- struction. Danyluk, L.S., [1986, 37p] SR 86-21
(1989, p.413-418) MP 2612	SR 89-27 Vapor retarders to control summer condensation Tobias-	Cements
Beildings	Vapor retarders to control summer condensation Tobias- son, W., [1989, p 566-572] MP 2558	Cements for structural concrete in cold regions. Johnson, R.,
Management of power plant waste heat in cold regions Aamot, H.W.C., [1975, p 22-24] MP 942	Air change measurements of five Army buildings in Alaska	(1977, 13p) SR 77-35 Resins and non-portland cements for construction in the cold.
Detecting structural heat losses with mobile infrared thermog-	Flanders, S N, (1990, p 53-63) MP 2676 Buoyancy	Johnson, R., (1980, 19p) SR 80-35
raphy, Part IV. Munis, R H., et al. [1976, 9p.] CR 76-33	Modeling ice restraint forces in an ice boom Perham, R.E.	Cold weather construction materials; Part 2—Regulated-set cement for cold weather concreting, field validation of
Temporary environment. Cold regions habitability. Bech-	(1988, p.198-206) MP 2596	laboratory tests Houston, B J., et al., r1981, 330-1
tel, R.B., et al. (1976. 162p) SR 76-10	Caissons Kadluk ice stress measurement program Cox, G.F.N.,	MP 1400
Energy conservation in buildings Ledbetter, C B. (1976, SP 76-17	[1987, p.100-107] MP 2298	Channels (waterways) Bibliography on harbor and channel design in cold regions.
Computer derived heat requirements for buildings in cold	Calorimeters Snow calorimetric measurement at SNOW-ONE Fisk, D.	Haynes, F.D., (1976, 32p) CR 76-03
regions Bennett, F.L., (1977, 113p.) SR 77-03 Guidelines for architectural programming of office settings	Snow calorimetric measurement at SNOW-ONE Fisk, D., [1982, p 133-138] Fisk, D., MP 1986	Investigation of water jets for lock wall descing. Calkins,
Ledbetter, CB, [1977, 14p] SR 77-05	Calving	D.J., et al. (1976, p G2/13-22) lee removal from the walls of navigation locks Franken-
Infrared thermography of buildings an annotated bibliography. Marshall, S J., (1977, 21p) SR 77-09	Physical and structural characteristics of sea ice in McMurdo Sound. Gow, A.J., et al, [1981, p.94-95] MP 1542	stein, G.E., et al. (1976, p.1487-1496) MP 888
ice engineering facility heated with a central heat pump sys-	Canada	Topological properties of some trellis pattern channel networks Mock, SJ, {1976, 54p} CR 76-46
tem. Aamot, H.W.C., et al. [1977, 4p] MP 939	-Labrador	ice arching and the drift of pack ice through restricted chan-
Measuring unmetered steam use with a condensate pump cycle counter. Johnson, P.R., (1977, p. 434-442)	Generation of runoff from subarctic snowpacks. Dunne, T, et al., £1976, P.677-685; MP 883	nels Sodhi, D.S. [1977, 11p] CR 77-18
MP 957	-Labrador-Hebron Flord	Lock wall deicing studies Hanamoto, B., ed., [1977, 68p.] SR 77-22
Reinsulating old wood frame buildings with urea-formalde- hyde foam Tobiasson, W., et al. [1977, p 478-487]	Sea-ice crystal structure and salinity, Hebron Fiord, Labrador. Gow, A.J., (1987, 18p.) CR 87-04	Investigation of ice clogged channels in the St. Marys River.
MP 958	-Northwest Territories-Mackenzie River	Mellor, M, et al. (1978, 73p) MP 1170
Waste heat recovery for building heating Sector, P.W. 5R 77-11	fce jam research needs Gerard, R., (1984, p.181-193)	ice arching and the drift of pack ice through channels. Sod- hi, D.S. et al. (1978, p. 415-432) MP 1138
Architects and scientists in research for design of buildings in	—Saint Lawrence River	River channel characteristics at selected ice jam sites in Ver-
Alaska, Ledbett-r, CB, (1977, 8p.) CR 77-23 Maintaining S in the Arctic Tobiasson, W, et al.	Remote sensing of frazil and brash ice in the St Lawrence	mont. Gatto, L.W., (1978, 52p.) CR 78-25 Turbulent heat transfer from a river to its ice cover Haynes.
(1977, p 2+/ ,1)11 1308	River. Dean, A.M., Jr., (1977, 19p.) St. Lawrence River freeze-up forecast Shen, H.T., et al.	F.D., et al. (1979, 5p) CR 79-13
Infrared thermography of buildings Munis, R H, et al.	(1984, p 177-190) MP 1713	Towing ships through ice-clogged nannels by warping and kedging Mellor, M. (1979, 21p.) CR 79-21
[1977, 17p] SR 77-29 Infrared thermography of buildings Munis, R H, et al.	Computer simulation of ice cover formation in the Upper St.	Clearing ice-clogged shipping channels Vance, G.P.
(1977, 21p) SR 77-26	Lawrence River. Shen, H.T., et al, (1984, p.227-245) MP 1814	(1980, 13p) CR 80-28
Temporary protection of winter construction Bennett, F.L. SR 77-39	Field investigation of St. Lawrence River hanging ice dams	Effects of ice on coal movement via the inland waterways Lunardini, V.J., et al., [1981, 72p] SR 81-13
Architectural programming Making socially responsive ar-	Shen, H.T., et al., (1984, p. 241-249) MP 1830 Unified degree-day method for river ice cover thickness simu-	Sediment load and channel characteristics in subarctic upland
chitecture more accessible Ledbetter, CB, (1978, 7p; SR 78-02	lation Shen, H.T., et al. (1985, p 54-62) MP 2065	catchments Slaughter, C.W., et al. [1981, p 39-48] MP 1518
Kotzebue hospital-a case study Crory, F.E., (1978,	-Yukon River Ice regime reconnaissance, Yukon River, Yukon Gerard,	River ice suppression by side channel discharge of warm wa-
p 342-359 ₁ MP 1084	R., et al. [1984, p 1059-1073] MP 2406	ter. Ashton, G.D., [1982, p 65-80] MP 1528
Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W, [1978, p 884-890] MP 1108	Capillarity	Application of HEC-2 for ice-covered waterways Calkins, DJ, et al. (1982, p 241-2-8) MP 1575
Details behind a typical Alaskan pile foundation Tobiasson.	Water flow through heter geneous snow. Colbeck, S.C., 1979, p 37-451 MP 1219	On zero-inertia and kinematic waves. Katopodes, N.D.,
W, et al. (1978, p.891-897) MP 1109 Therms, scanning systems for detecting building heat loss	Introduction to the basic thermodynamics of cold capillary	[1982, p.1381-1387] MP 2053
Grot. R A , et al. (1978, p B71-B90) MP 1212	systems Colbeck, S.C., [1981, 9p] SR 81-06	Effect of vessel size on shorelines along the Great Lakes chan- nels Wuchben, J.L., (1983, 62p) SR 83-11
Infrared thermography of buildings—a bibliography with abstracts Marshall, S.J., [1979, 67p] SR 79-01	Carbohydrates Trends in carbohydrate and lipid levels in Arctic plants	Application of a block copolymer solution to ice-prone struc-
Infrared thermography of buildings 1977 Coast Guard sur-	McCown, BH, et al. [1972, p 40-45] MP 1376	Methods of see control Frankenstein, G.E., et al. (1983.)
vey Marshall, S.J., (1979, 40p) SR 79-20	Carbon dioxide Carbon dioxide dynamics on the Arctic tundra Coyne, P.1.	p.204-215 ₃ MP 1642
Post occupancy evaluation of a planned community in Arctic Canada Bechtel, R.B. et al. (1980, 27p.) SR 80-06	ct al. (1971, p 48-52) MP 903	Bank recession and channel changes of the Tanana River, Alaska Gatto, L.W., et al., 1984, 98p.; MP 1747
Roof leaks in cold regions school at Chevak, Alaska	Carbon dioxide exchange in tundra vegetation. Coyne, P1. et al. r1972, p 36-39; MP 1375	
Tobiasson, W. et al. (1980, 12p.) CR 80-11 Time constrain's on measuring building R-values Flanders.	et al. [1972, p 36-39] MP 1375 Case for comparison and standardization of carbon dioxide	al. (1984, p.271-289) MP 1711
S N., (1980, 30p) CR 80-15	reference gases Kelley, J.J., et al. [1973, p 163-181] MP 964	Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J, et al. (1984)
Post occupancy evaluation for communities in hot or cold regions. Bechtel, R.B., et al. [1980, 57p.] SR 80-29	CO2 effect on permafrost terrain Brown, J., et al. (1982.	2¢ , SR #4-05
US -Soviet seminar on building under cold climates and on	30p 1 MP 1546	Use of remote sensing for the U.S. Army Corps of Engineers diedging program. McKim, H.L., et al. (1985, p.1141-
permafrost (1980, 365p) SR 80-40	West antarctic sea ice Ackley, S.F., (1984, p.88-95) MP 1818	1150 ₁ MP 1890
Measuring building R-values for large areas Flanders, S.N., et al. [1981, p.137-138] MP 1388	Potential responses of permafrost to climati wirming	Laboratory study of flow in an ice-covered sand bed channel
Least life-cycle costs for insulation in Alaska Flanders.	Goodwin, C.W., et al. (1984, p.92-105) M. 1710	Wuebben, J.L., (1986, p.3-14) MP 2123 Sub-see channels and frazil bars, Tanana River, Alaska
S.N. et al. (1982, 47p) CR 82-27 Toward in-situ building R value measurement Flanders.	Detection of cavities under concrete pavement Kovacs, A.	Lawson, 7 %, et al. (1986, p.465-474) MP 2129
S N , et al. [1984, 13p] CR 84-01	ct al. (1983, 41p) CR 83-18	Computer-controlled data acquisition system for a hydraulic
Deteriorated concrete panels on buildings at Sondrestrom.	Some developments in shaped charge technology Mellor, M. [1986, 29p.] SR 86-18	Ice cover distribution in Vermont and New Hampshire Atlan-
Measuring thermal performance of building envelopes nine	Effect of ice pressure on marginal ice zone dynamics Flato.	tic salmon reating streams. Calkins, D3, et al. [1988,
case studies Flanders, S.N., (1985, 36p.) CR 85-07	G.M., et al. (1989, p.514-521) MP 2522 Cavitating fluid sea ice model. Flato, G.M., et al. (1990,	Effects of an ice cover on flow in a movable bed channel
Structure data bases for predicting building material distribu- tion. Merry, C.J., et al. (1985, 35p.) SR 85-07	p 239-242; MP 2738	

Charge transfer Possibility of anomalous relaxation due to the charged dislo-	Current research on snow and ice removal in the United States. Minsk, L.D., [1978, p.21-22] MP 1199	lon and moisture migration and frost heave in freezing Morin clay Qiu, G., et al, [1986, p.1014] MP 1970
cation process Itagaki, K , [1983, p 4261-4264]	ice fog suppression using reinforced thin chemical films	Physical changes in clays due to frost action Chamberlain,
MP 1669 Charts	McFadden, T, et al, [1978, 23p] CR 78-26 Noncorrosive methods of ice control. Minsk, LD, [1979,	E J. (1989, p 863-893) MP 2595 Effect of freeze thaw cycles on soils. Chamberlain, E, et al,
Geoecological mapping scheme for Alaskan coastal tundra.	p.133-162 ₃ MP 1265	(1990, p.145-155) MP 2678
Everett, K.R., et al. (1978, p 359-365) MP 1098 Chemical analysis	lce fog suppression in Arctic communities. McFadden, T. (1980, p 54-65) MP 1357	Clays Isothermal compressibility of water mixed with montmorillo-
Report on ice fall from clear sky in Georgia October 26, 1959	Optimizing deicing chemical application rates Minsk, L.D.,	nite Oliphant, J L, et al, (1983, p.45-50) MP 2066
Harrison, L.P., et al. (1960, 31p. plus photographs) MP 1017	(1982, 55p) CR 82-18 Chemical properties	Thawing of frozen clays Anderson, D M, et al., [1985, p.1-9] MP 1923
Salinity variations in sea ice Cox, GFN, et al. [1974,	Chemical obscurant tests during winter, environmental fate	Evaluation of the X-ray radiography efficiency for heaving
p 109-122 ₁ MP 1 ² 23 Vanadium and other elements in Greenland ice cores Her-	Cragin, J.H., (1982, 9p.) SR 82-19 Building materials and acid precipitation. Merry, C.J., et al.	and consolidation observation. Akagawa, S., (1988, p 23- 28) MP 2376
ron, M.M., et al. (1976, 4p) CR 76-24	(1985, 40p) SR 85-01	Climate
Treatment of primary sewage effluent by rapid infiltration Satterwhite, M B, et al, [1976, 15p] CR 76-49	Structure data bases for predicting building material distribu- tion Merry, C.J., et al. (1985, 35p.) SR 85-07	Selected climatic and soil thermal characteristics of the Prudhoe Bay region Brown, J. et al. [1975, p.3-12]
Composition of vapors evolved from military TNT. Leggett,	Acidity of snow and its reduction by alkaline aerosols.	MP 1054
D C, et al. [1977, 25p] SR 77-16 Atmospheric trace metals and sulfate in the Greenland Ice	Kumai, M., (1985, p. 92-94) MP 2008 Description of the building materials data base for New	Antarctic sea ice dynamics and its possible climatic effects Ackley, S.F. et al. (1976, p 53-76) MP 1378
Sheet. Herron, M.M., et al. (1977, p.915-920) MP 949	Haven, Connecticut Merry, CJ, et al, [1985, 129p.] SR 85-19	Environmental atlas of Alaska Hartman, C.W., et al,
Vanadium and other elements in Greenland ice cores Her-	Chemical properties of snow in the northeastern United	(1978, 95p) MP 1204 Winter surveys of the upper Susitna River, Alaska Bilello,
ron, M.M., et al., (1977, p. 98-102) MP 1092 Dating annual layers of Greenland ice. Langway, C.C., Jr.,	States. Kumai, M., [1987, p (C1)625-(C1)630] MP 2232	M A., (1980, 30p) SR 80-19
et al. (1977, p 302-306) MP 1094	Baseline acidity of South Pole precipitation Cragin, J.H., et	Coastal tundra at Barrow. Brown, J., et al. [1980, p.1-29] MP 1356
Delineation and engineering characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al. (1977,	al. [1987, p789-792] MP 2275 Persistence of chemical agents on the winter battlefield.	Environment of the Alaskan Haul Road Brown, J. (1980,
p 432-440 ₁ MP 1077	Leggett, D.C., [1987, 20p] CR 87-12	p 3-52 ₁ MP 1350 Hydrology and climatology of a drainage basin near Fair-
Chemical composition of haul road dust and vegetation Is- kandar, I.K., et al. (1978, p. 110-111) MP 1116	Does snow have ion chromatographic properties Hewitt, A.D., et al. [1989, p.165-171] MP 2755	Hydrology and climatology of a drainage basin near Fairbanks, Alaska Haugen, R.K., et al. (1982, 34p) CR 82-26
Geochemistry of subsea permafrost at Prudhoe Bay, Alaska	Chemical migration in snowpack Murphey, BB, et al. (1989, p 282-286) MP 2757	Climate of remote areas in north-central Alaska: 1975-1979
Page, F.W., et al. (1978, 70p) SR 78-14 Blank corrections for ultratrace atomic absorption analysis	(1989, p 282-286) MP 2757 Effect of aerosols on pH of snow Kumai, M, (1990, p 17-	summary. Haugen, R K, (1982, 110p) CR 82-35
Cragin, J.H., et al, (1979, 5p) CR 79-03	30 ₃ MP 2675	Climate at CRREL, Hanover, New Hampshire Bates, R.E. SR 84-24
Winter air pollution at Fairbanks, Alaska Coutts, H.J., et al. (1981, p 512-528) MP 1395	Chemical reactions Lee fog suppression using monomolecular films McFadden,	Comparative studies of the winter climate at selected loca-
Wastewater treatment by a prototype slow rate land treatment	T. [1977, p 361-367] MP 956	tions in Europe and the United States Bates, R.E., et al., (1989, p. 283-293) MP 2598
system. Jenkins, TF, et al. (1981, 44p) CR 81-14 Halocarbons in water using headspace gas chromatography.	UV radiational effects on: Martian regolith water Nadeau, P.H., [1977, 89p.] MP 1072	Climatic changes
Leggett, D C., (1981, 13p) SR 81-26	Second progress report on oil spilled on permafrost McFad-	Greenland climate changes shown by ice core W., et al, [1971, p 17-22] Dansgaard, MP 998
Nitrogenous chemical composition of antarctic ice and snow Parker, B.C., et al. [1981, p 79-81] MP 1541	den, T., et al. (1977, 46p) SR 77-44 Increasing the effectiveness of soil compaction at below-freez-	Study of climatic elements occurring concurrently Bilello, M. A., [1976, p. 23-30] MP 1613
Chemical obscurant tests during winter. Environmental fate.	ing temperatures Haas, W.M. et al. (1978, 58p.) SR 78-25	CO2 effect on permafrost terrain Brown, J, et al. (1982,
Cragin, J.H., (1983, p. 267-272) MP 1760 Nitrogen behavior in soils irrigated with liquid waste. Selim,	ice fog suppression using thin chemical films McFadden.	30p 3 MP 1546 West antarctic sea ice. Ackley, S.F., £1984, p 88-953
H.M. et al. (1984, p.96-108) MP 1762	T., et al. (1979, 44p) MP 1192 Grouting silt and sand at low temperatures—a laboratory	MP 1818
Snow chemistry of obscurants released during SNOW- TWO/Smoke Week VI Cragin, J.H., [1984, p. 409-416]	investigation Johnson, R. [1979, 33p] CR 79-05	Potential responses of permafrost to climatic warming Goodwin, C.W., et al. (1984, p.92-105) MP 1710
MP 1873 Description of the building materials data base for Portland,	Chemistry Evaporation of chemical agents from ice and six. I eggett,	Role of sea ice dynamics in modeling CO2 increases Hibler,
Maine Merry, CJ, et al. (1986, 83p) SR 86-13	D.C. (1988, 10p) CR 88-03	WD. III. (1984, p. 238-253) MP 1749 Regional climatic trends in northern New England Haugen.
Low temperature effects on organophosphonates Britton, KB, (1986, 47 refs.) SR 86-38	Decontamination of chemical agents on the vinter battlefield Parker, L.V., [1988, 48p] CR 88-07	R K., et al. (1988, p 64-71) MP 2748
Comparison of extraction techniques for munitions residues	China	US global ace core research program West Antarctica and beyond Grootes, P.M., et al., [1989, 32p] MP 2709
in soil. Jenkins, T.F., et al. [1987, p.1326-1331] MP 2350	National Chinese Conference on Permafrost, 2nd, 1981 Brown, J. et al, 1982, 58p 3 SR 82-03	Cavitating fluid sea ice model Flato, G M., et al. (1990,
Chemical analysis of hazardous wastes McGee, I E, et al. (1987, 57p.) SR 87-21	Bibliography on glaciers and permafrost, China, 1938-1979 Shen, J, ed, 1982, 44p 1 SR 82-20	p 239-242; MP 2738 Climatic factors
Analytical method for determining tetrazene in soil Waish,	Shen, J., ed. (1982, 44p.) SR 82-20 US permafrost delegation visit to China, July 1984. Brown,	Roofs in cold regions Tobiasson, W. [1980, 21p]
M.E., et al. (1988, 22p) SR 88-15 Chemical and structural properties of sea ice in the southern	J., (1985, 137p) SR 85-09	MP 1408 U.SSoviet seminar on building under cold climates and on
Beaufort Sca Meese, D.A., (1989, 294p.) MP 2656	Chukchi Sea Subsea permafrost distribution on the Alaskan shelf Sell-	permafrost [1980, 365p] SR 80-40
Determination of explosive residues in soil Part 3. Bauer, C.F., et al. (1989, 89p.) CR 89-09	mann, PV, et al. (1984, p. 75-82) MP 1852 Sea ice ridging in the Ross Sea, Antarctica, as compared with	Tundra and analogous soils Everett, KR, et al. (1981, p. 139-179) MP 1405
Low concentration measurement capability in trace analysis	sites in the Arctic Weeks, W.F. et al. [1989, p.4984-	Introduction to abiotic components in tundra Brown, J.
Grant, C.L., et al. (1989, 2!p) SR 89-20 Inn-pairing RP-HPLC method for determining tetrazene in	4988 ₁ MP 2490 Civil engineering	(1981, p 79) MP 1432 Climatic factors in cold regions surface conditions Bilello.
water and soil Walsh, M.E. et al. [1989, p 159-179]	Role of research in developing surface protection measures	M A . (1985, p.308-517) MP 1961
MP 2593 Analytical methods for detecting military-unique compounds	for the Arctic Slope of Alaska Johnson, P.R., 1978, p.202-2051 MP 1068	Utilization of Unmanned Aerial Vehicles in the ALBE Thrust Greeley, H.P., et al. (1986, p. 249-257) MP 2663
Jenkins, T.F., et al. (1989, p. 13-14) MP 2713 Influence of well casings on well water Hewitt, A.D., et al.	Classifications	ice jams and the winter climate near White River, SD. Bilel- io, MA, (1987, p.154-162) MP 2399
(1989, 9p.) MP 2717	Proposed size classification for the texture of frozen earth materials McGaw, R, [1975, 10p] MP 921	Prediction of winter battlefield weather effects Ryerson,
Chromatographic determination of nitroaromatic residues in soil. Jenkins, T.F., et al., [1989, p.890-899]	Topological properties of some trellis pattern channel net-	C C et al, [1988, p 357-362] MP 2402 Comparative studies of the winter climate at selected loca-
MP 2586	works Mock, S.J., [1976, 54p.] CR 76-46 Icebergs an overview Kovacs, A., [1979, 7p.]	tions in Europe and the United States Bates, R.E., et al.
Chemical and structural properties of sea ice in the southern Beaufort Sea Meese, D.A., (1990, p. 32-35)	Frost susceptibility of soil, review of index tests Chamber-	[1989, p 283-293] MP 2598 Cold regions weather data systems Bates, R.E., et al.
MP 2728	lain, E.J., (1982, 110p.) MP 1557	(1989, p 139-145) MP 2568
Solvent extraction for solute preconcentration from water. Leggett, D.C., et al., [1990, p.1355-1356] MP 2743	Composition and structure of South Pole snow crystals	Proceedings (1990, 318p ₃ SR 90-01 CLIMATOLOGY
Chemical composition	Kumai, M., (1976, p.833-1) MP 853	Climatology of the cold regions of the northern hemisphere,
Forage grass growth on overland flow systems Palazzo, AJ, et al., [1980, p.347-354] Palazzo, MP 1402	Applications of thermal analysis to cold regions Sterrett, KF, [1976, p 167-181] MP 890	I Wilson, C., (1967, 141p.) M 1-A3a Climatology of Antarctic regions Wilson, C., (1968, 77p.)
Spray application of waste-water effluent in a cold climate	Water vapor adsorption by sodium montmoriflonite at -5C	M I-A3c
Cassell, E.A. et al. (1980, p.620-626) MP 1403 Phosphorus chemistry of sediments of Lake Koscanusa, Mon-	Anderson, D.M., et al, (1978, p.638-644) MP 981 Clay soils	Climatology of the cold regions of the northern hemisphere, II Wilson, C., (1969, 158p.) M I-A3b
tana. Iskandar, I K., et al. (1981, 9p.) SR 81-15	Leological baseline on the Alaskan haul toad Brown, J. ed.	Climatology
Sorption of chemical agents and simulants Leggett, D.C., (1987, 15p.) 5R 87-18	(1978, 131p) SR 78-13 Overconsolidated sediments in the Beaufort Sea Chamber-	Surface temperature data for Atkasook, Alaska summer 1975 Haugen, R.K., et al. (1976, 25p.) SR 76-01
Octanol-water partition coefficients for organophosphonates	lain, E.J., (1978, p.24-29) MP 1255	Environmental analyses in the Knotenai River region, Mon-
Britton, K B , ct al. 71988, 24p 1 SR 88-11 Chemical ice prevention	Lectron microscope investigations of frozen and unfrozen bentonite Kumai, M., (1979, 14p.) CR 79-28	tana McKim, H.L., et al. (1976, 53p.) SR 76-13 Study of climatic elements occurring concurrently Bilello,
Use of descing salt possible environmental impact Minsk,	Overconsolidation effects of ground freezing Chamberlain,	MA, (1976, p.23-30) MP 1613
I.D., (1973, p.1-2) MP 1037 Freeze thaw tests of liquid descing chemicals on selected	E.J. (1980 p. 325-337) MP 1452 Water migration in frozen clay under linear temperature	Soil characteristics and climatology during wastewater ap- plication at CRRFI Iskandar, I.K., et al. (1979, 82p.)
pavement materials. Minsk, I, D, (1977, 16p) CR 77-28	gradients Xu, X , et al. (1985, p.111-122) MP 1934	SR 79-23
fee releasing block copolymer coatings. Jellinek, H.H.G. et	Experimental study on factors affecting water migration in frozen morin clay Xu, X, et al. (1985, p. 123-128)	International Workshop on the Seasonal Sea Ice Zone, Mon- terey, California, Feb. 26-Mar 1, 1979. Andersen, B.G.
al, (1978, p.544-551) MP 1141	MF 1897	ed (1980, 357p) MP 1292

Arctic research of the United States, Vol 4 [1990, 120p] MP 2765	Roofs in cold regions Tobiasson, W., [1980, 21p.] MP 1408	Some recent developments in sibrating wire rock mechanics instrumentation. Dutta, P.K., [1985, 12p] MP 1968
Cloud chambers	Construction of foundations in permafrost Linell, KA, et	Cold weather O&M. Reed, S.C., et al. (1985, p 10-15)
Increased transmission,rough brass obscurant clouds during snowfall Hewitt, A.D., et al., [1988, p. 489-496]	al. (1980, 310p) SR 80-34 Soviet construction under difficult climatic conditions As-	MP 2070 Tank E/O sensor system performance in winter, an overview.
MP 2605	sur, A. [1980, p 47-53] MP 1345	Lacombe, J. et al. (1985, 26p) MP 2073
Dynamic aerosol flow chamber. Hewitt, AD, 1988, 13p ₁ SR 88-21	Resins and non-portland cements for construction in the cold Johnson, R., (1980, 19p.) SR 80-35	Measurement and evaluation of tire performance under win- ter conditions Blaisdell, G.L., [1985, p. 198-228]
Cloud droplets	U.S. Soviet seminar on building under cold climates and on	MP 2387
Lidar-derived particle concentrations in plumes from arctic leads Andreas, E.L., et al. [1990, p.9-12] MP 2758	permafrost (1980, 365p) SR 80-40 Regulated set concrete for cold weather construction	Cold factor Abele, G., (1985, p.480-481) MP 2024 Use and application of PRESTO in Snow-III West Stallings,
Cloud seeding	Sayles, F.H., et al, (1980, p 291-314) MP 1359	E.S. et al. (1986, p 11-24) MP 2658
Compressed air seeding of supercooled fog Hicks, J.R., 1976, 9p 1 SR 76-09	Excavation of frozen materials Moore, H E, et al. (1980, p 323-345) MP 1360	Cold climate utilities manual Smith, DW, ed. (1986, var.p.) MP 2135
Laboratory studies of compressed air seeding of supercooled	Window performance in extreme cold. Flanders, S.N. et al.	Corps of Engineers research in the Arctic Smallidge, P.D., et al., §1987, p.81-87, MP 2411
fog. Hicks, J R., et al. [1977, 19p] SR 77-12 Clouds (meteorology)	(1981, p 396-408) MP 1393 Drainage facilities of airfields and heliports in cold regions	Aircraft operations in the Arctic DenHartog, S L., (1987,
Polarization of skylight Bohren, C., [1984, p 261-265]	Lobacz, E F, et al, [1981, 56p] SR 81-22	p 271-272 ₁ MP 2422 Mobility working group report Blassdell, GL, et al.
MP 1794 Lidar detection of leads in Arctic sea ice. Schnell, R.C., et	Piling in frozen ground Crory, F.E., [1982, p 112-124] MP 1722	(1987, p 273-274) MP 2423
al, (1989, p 530-532) MP 2602	Comparative analysis of the USSR construction codes and the US Army technical manual for design of foundations on	SNOW III WEST field experiment report Volume 1 La- combe, J., et al., [1988, 170p] SR 88-28
Coal Effects of ice on coal movement via the inland waterways	permafrost Fish, A.M., (1982, 20p.) CR 82-14	Preliminary design guide for arctic equipment Walsh, M.R., et al. (1989, 35p) SR 89-13
Lunardini, V J, et al. (1981, 72p) SR 81-13	Window performance in extreme cold Flanders, S.N., et al, [1982, 21p] CR 82-38	Cold regions weather data systems Bates, RE, et al.
Coastal topographic features Coastal marine geology of the Beaufort, Chukchi and Bering	Chena Flood Control Project and the Tanana River near Fair-	(1989, p 139-145) MP 2568 Cold weather performance
Scas Gatto, L.W., (1980, 357p) SR 80-05	banks, Alaska Buska, JS, et al, (1984, 11p. + figs.) MP 1745	Effect of snow cover on obstacle performance of vehicles
Shore ice pile-up and ride-up field observations, models, theoretical analyses Kovacs, A, et al. [1980, p.209-	lce forces on rigid, vertical, cylindrical structures Sodhi, D.S., et al. (1984, 36p.) CR 84-33	Hanamoto, B. (1976, p 121-140) MP 933 Field performance of a subarctic utilidor, Reed, S.C.,
298 ₁ MP 1295 Coastal subsea permafrost and bedrock observations using de	Cold factor. Abele, G. (1985, p 480-481) MP 2024	(1977, p 448-468) MP 930
resistivity. Sellmann, P.V., et al, (1989, 13p) CR 89-13	Cold climate utilities manual Smith, DW, ed. (1986, MP 2135	Effects of subgrade preparation upon full depth pavement performance in cold regions Eaton, R.A., (1978, p.459-
Coatings	Effect of cold weather on productivity Abele, G., (1986,	473 ₁ MP 1087 Construction equipment problems and procedures: Alaska
Evaluation of shear strength of freshwater ice adhered to icephobic coatings. Mulherin, N.D., [1990, p.149-154]	p 61-66; MP 2152 Arctic and subarctic construction general provisions.	pipeline project. Hanamoto, B., (1978, 14p.) SR 78-11
MP 2578	Lobacz, E F. (1986, 75p) SR 86-17	Performance of overland flow land treatment in cold climates.
Sceking low ice adhesion Sayward, J.M., (1979, 83p.)	Effects of cold environment on rapid runway repairs Abele, G, (1986, p 1-9) MP 2169	Jenkins, T.F. et al. (1978, p.61-70) MP 1152 Wastewater treatment in cold regions by overland flow.
SR 79-11	Engineering surveys along the Trans-Alaska Pipeline God- frey, R.N., et al., [1986, 85p] SR 86-28	Martel, CJ, et al. (1980, 14p) CR 80-07
COLD CHAMBERS Cold room studies on frost susceptible soils (1950, 25p.)	Summary of proper cold weather pavement repair methods	Operation of the CRREL prototype air transportable shelter. Flanders, SN, [1980, 73p] SR 80-10
ACFEL MP BL 1	Eaton, R.A., (1987, p 1013-1027) MP 2235 Benchmark design and installation: a synthesis of existing	Spray application of waste-water effluent in a cold climate.
Cold storage Polar ice-core storage facility Langway, C.C., Jr., 1976.	information. Gatto L.W. (1987, 73p) SR 87-10	Cassell, E.A., et al. (1980, p.620-626) MP 1403 Structural evaluation of porous pavement in cold climate
p.71-75; MP 874 Cold stress	Mechanical and physical properties of soils in cold regions Chamberlain, E.J., [1987, p.155-161] MP 2415	Eaton, R.A., et al. (1980, 43p.) SR 80-39 Cold regions testing of an air-transportable shelter. Flan-
Effect of cold weather on productivity. Abele, G, (1986,	Buildings and utilities in very cold regions overview and re- search needs Tobiasson, W. (1987, p. 299-303)	ders, S.N., [1981, 20p.] CR 81-16
p.61-66 ₁ MP 2152 Cold tolerance	MP 2424	Mine/countermine problems during winter warfare. Lunar- dini, V.J., ed. (1981, 43p.) SR 81-20
Aquatic plant growth in relation to temperature and unfrozen	Foundation technology in cold regions Quinn, W.F., [1987, p.305-310] MP 2425	Shallow snow model for predicting vehicle performance. Harrison, W.L., [1981, 21p.] CR 81-20
water content Palazzo, A J, et al, [1984, 8p] CR 84-14	Arctic construction working group report Marvin, E.L., et al., (1987, p. 311-314) MP 2426	Case study of land treatment in a cold climate-West Dover,
COLD WEATHER CONSTRUCTION Effects of permafrost on engineering Stearns, S.R., 1966.	Buildings and utilities in very cold regions overview and re-	Vermont Bouzoun, J.R., et al., (1982, 96p.) CR 82-44
77p ₁ M I-A2	search needs Tobiasson, W., (1988, p.4-11) MP 2552	Optical engineering for cold environments Aitken, G W., ed. (1983, 225p) MP 1646
Methods of building on permanent snowfields Mellor, M., [1958, 43p] MIII-A2a	Thermosyphons and foundation design in cold regions Haynes, F.D., et al., 1988, p. 251-2591 MP 2443	Lithty services for remote military facilities Reed, S.C. et
Investigation and exploitation of snowfield sites [1969, 57p] Mill-A2b	Thermosyphon for horizontal applications DenHartog.	al, [1984, 66p] SR 84-14 Wetlands for wastewater treatment in cold climates Reed,
Foundations of structures in cold regions Sanger, F.J.	S L., (1988, p.319-321) MP 2444 Airfields in Arctic Alaska Crory, F.E., (1988, p.49-55)	S.C., et al. (1984, 9p. + figs.) MP 1945 Prevention of freezing of wastewater treatment facilities.
(1969, 91p) M III-C4 Utilities on permanent snowfields Mellor, M. (1969,	WP 2451 Use of low viscosity asphalts in cold regions Janoo, V.C.	Reed, S.C., et al., [1985, 49p] SR 85-11
42p ₁ M III-A2d	(1989, p 70-80) MP 2462	ISTVS workshop on tire performance under winter condi- tions, 1983 [1985, 177p] SR 85-15
Cold weather construction Life-cycle cost effectiveness of modular megastructures in	Performance of pavement at Central Wisconsin Airport Stark, J., et al. (1989, p. 92-103) MP 2463	Need for snow tire characterization and evaluation. Youg.
cold regions Wang, L. RL., et al. [1976, p.760-776] MP 892	Rebuilding infrastructure for pleasure boating. Wortley,	Vehicle for cold regions mobility measurements. Blaisdell,
Computer derived heat requirements for buildings in cold	Unique new cold weather testing facility Eaton, R.A.	G I., 1985, p 9-20; MP 2044 Winter tire tests 1980-81 Blaisdell, G I., et al., 1985.
regions Bennett, F L., (1977, 113p) SR 77-03 Observation and analysis of protected membrane roofing sys	[1989, p. 335-342] MP 2468 Unfriren water contents of six antarctic soil materials And-	p 135-151; MP 2045
tems Schaefer, D., et al. (1977, 40p) CR 77-11	erson, D.M., et al. (1989, p.353-366) MP 2470	Radial tire and traction aid performance on ice and in snow, Rogers, T. et al. (1986, 20p.) SR 86-07
Mid-winter installation of protected membrane roofs in Alas- ka Aamot, H.W.C., [1977, 5p.] CR 77-21	Ice runways near the South Pole Swithinbank C. (1989) 42p 1 SR 89-19	Effect of cold weather on productivity. Abele, G., 1986, p. 01-66; MP 2152
Architects and scientists in research for design of buildings in Alaska Ledbetter, C.B., [1977, 8p.] CR 77-23	COLD WEATHER OPERATION	Cold-temperature characterization of polymer concrete.
Winter earthwork construction in Upper Michigan Haas,	Water supply in cold regions Alter A J. (1969, 85p.) M III-C5a	Bigl. S.R., 1986, 46p.; MP 2521 Airport pavement distress in cold regions Vinson, T.S., et
W.M., et al. [1977, 59p] SR 77-40 Temporary protection of winter construction Bennett, F.L.	Sewerage and sewage disposal in cold regions Alter, A.J., 11969, 106p. MIII-C5b	al, (1987, p.981-1012) MP 2234
(1977, 41p) SR 77-39	Cold weather operation	Structural fiber composite materials for cold regions Dutta, P.K., (1988, p. 124-134) MP 2405
Roof construction under wintertime conditions a case study Bennett, F.L., [1978, 34p] SR 78-24	Regionalized feasibility study of cold weather earthwork Roberts, W.S., §1976, 190p.) SR 76-02	Performance of an omni-directional wheel on snow and tee Blaisdell, GS, (1989, 21p + appends) MP 2711
Communication in the work place an ecological perspective Ledbetter, CB, (1979, 19p) SR 79-03	Storm drainage design considerations in cold regions	Evaluation of the Caterpillar Challenger tractor for use in
Snow and ice roads in the Arctic Johnson, P.R., [1979,	Effects of winter military operations on cold regions terrain	Antarctica Biassfell, G L., et al., [1989, 12p + figs ; MP 2718
p 1063-1071 ₁ MP 1223 Extending the useful life of DYE-2 to 1986, Part 1 Tobias-	Abele, G., et al. (1978, 34p.) SR 78-17. Snow fortific itions as protection against shaped charge an-	Wheeled versus tracked vehicle snow mobility test program Green, C.E., et al. (1989, 19p.) MP 2715
son, W. et al. (1979, 15p) SR 79-27	titank projectiles Farrell, D.R., [1980, 19p.]	Porous portland cement concrete as an airport runway over-
Snow fortifications as protection against shaped charge antitiank projectiles Farrell, D.R., [1980, 19p.]	SR 80-11 Engine starters in winter Courts, H J. (1981, 37p)	lay Korhonen, C. et al. (1989, 20p.) SR 89-12 Land mines in winter Richmond, P.W., (1989, 10p.)
SR 80-11 Construction of an embankment with frozen so.l Botz, J.J.	SR 81-32 CRREL instrumented vehicle for cold regions mobility meas-	SR 89-11 Impact of the winter environment on infrared target signa-
ct al. (1980, 105p) SR 80-21	urements Blaisdell, G.L., (1982, 11p) MP 1515	tures Lacombe, J., (1989, n.p.) MP 2587
Time constraints on measuring building R values Flanders, S.N., (1980, 30p.) CR 80-15	Low temperature automotive emissions Courts, HJ, (1983, 2 vols) MP 1703	Cold weather survival Liflects of a 0 covers on late-fall seedings of four tall fescue
Snow pads for pipeline construction in Alaska Johnson, P.R. et al. [1980, 28p.] CR 80-17	Observations during BRIMFRONT 33 Bouzoun J.R., et al., 1984, 36p.; SR 84-ID	varieties Fauto A.J., (1982), Sp. SR 89-17 Cold weather tests
Use of piling in frozen ground Crory, F.E., (1980, 21 p.)	Maintaining frosty facilities Reed, S.C., et al., [1985, p.7.	Waste water reuse in cold regions. Iskandar, I K., (1978,
MP 1407	15 ₁ MP 1942	p 361-3683 MP 1144

Cold weather tests (cont.)	Confined compressive strength of multi-year pressure ridge sea ice samples Cox, G.F.N., et al. (1988, p.295-301)	Computer-generated graphics of river ice conditions Bilello, MA, et al. (1988, p 211-219) MP 2509
Nondestructive testing of in-service highway pavements in Maine Smith, N., et al. (1979, 22p) CR 79-06	MP 2403	QuickDraw data structures for image processing LaPotin,
Construction and performance of membrane encapsulated	Uniaxial tension/compression tests on ice-preliminary re-	P.J., ct al. (1989, 17p) SR 89-08
soil layers in Alaska. Smith, N., (1979, 27p)	sults. Cole, D.M., et al. [1989, p. 37-41] MP 2482	Computerized simulation
CR 79-16	Effect of ice pressure on marginal ice zone dynamics Flato, G M, et al. (1989, p.514-521) MP 2522	Computer simulation of the snowmelt and soil thermal regime
Land treatment of waste water in cold climates. Jenkins, T.F., et al. (1979, p.207-214) MP 1279	GM, et al. [1989, p 514-521] MP 2522 Resilient modulus determination for frost conditions	at Barrow, Alaska. Outcalt, S I., et al, (1975, p.709-715) MP 857
Air-transportable Arctic wooden shelters. Flanders, S.N., et	Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569	Computer modeling of terrain modifications in the arctic and
al, (1982, p.385-397) MP 1558	Cyclic loading of saline ice- initial experimental results	subarctic. Outcalt, S1, et al, (1977, p 24-32)
Blisters in built-up roofs due to cold weather Korhonen, C.	Cole, D.M., (1990, p 265-271) MP 2581	MP 971
et al, (1983, 12p.) SR 83-21 Mine detection using non-sinusoidal radar: laboratory tests	Comparison of the compressive strength of antarctic frazilice and laboratory-grown columnarice. Richter-Menge, J.A.	Finite element model of transient heat conduction Guy- mon, G L., et al. (1977, 167p) SR 77-38
Dean, A.M., Jr., et al. (1984, 99p) SR \$4-22	et al. [1990, p 79-84] MP 2731	Computer model of municipal snow removal Tucker, W.B.,
Radial tire and traction aid performance on ice and in snow.	COMPRESSIVE STRENGTH	(1977, 7p) CTR 77-30
Rogers, T., et al. (1986, 20p) SR 86-07	Mechanical properties of sea ice. Weeks, W.F., et al., [1967]	Bubbler induced melting of ice covers Keribar, R, et al. (1978, p. 362-366) MP 1160
Unique new cold weather testing facility Eaton, R.A., (1988, p.745-750) MP 2542	80p ₁ M II-C3	(1978, p 362-366) MP 1160 Computer simulation of urban snow removal. Tucker, W.B.
Instrumented vehicle for the measurement of mobility param-	Compressive strength Mechanics and hydraulics of river ice jams. Tatinelaux, J.C.	ct al, [1979, p 293-302] MP 1238
eters Blaisdell, G.L., [1988, p.377-388] MP 2486	et al. (1976, 97p) MP 1060	Numerical modeling of sea ice in the seasonal sea ice zone.
Impact of the winter environment on infrared target signa-	Effect of temperature on the strength of frozen silt Haynes,	Hibler, W.D., III, [1980, p.299-356] MP 1296
tures. Lacombe, J. (1989, n.p.) MP 2587	FD. et al. (1977, 27p) CR 77-03	Dynamic simulations of iceberg-seabed interactions Bass, D.W., et al., [1989, p 137-151] MP 2684
Compacting Temperature effects in compacting an asphalt concrete over-	Measuring the uniaxial compressive strength of ice Haynes, FD, et al., [1977, p. 213-223] MP 1027	Simulation of oil slicks in rivers and lakes. Shen, H.T., et al,
lay. Eaton, R A., et al, (1978, p 146-158) MP 1083	Unconfined compression tests on snow, a comparative study.	(1990, 29p) CR 90-01
Composition	Kovacs, A., et al. (1977, 27p) SR 77-20	Computers
Acoustic emissions from composites at decreasing tempera-	Compressive and shear strengths of fragmented ice covers	Microcomputer-based image-processing system Perovich, D.K., et al. (1988, p. 249-252) MP 2385
tures. Dutta, P.K., et al. (1988, p.1090-1095) MP 2430	Cheng, S.T., et al. (1977, 82p.) MP 951 Axial double point-load tests on snow and ice. Kovacs, A.	D.K., et al, [1988, p 249-252] MP 2385 Concrete admixtures
Compressed air	1978, 11p 3 CR 78-01	Cements for structural concrete in cold regions Johnson, R.,
Use of compressed air for supercooled fog dispersal Wein-	Increasing the effects eness of soil compaction at below-freez-	(1977, 13p) SR 77-35
stein, A.I., et al. (1976, p 1226-1231) MP 1614	ing temperatures Haas, W.M., et al. (1978, 58p)	Antifreeze admixtures for cold weather concreting Prelimi-
Compressive properties	SR 78-25 Effect of temperature on the strength of snow-ice. Haynes,	nary test results Korhonen, C.J., et al. (1990, 8p.) MP 2742
Laboratory investigation of the mechanics and hydraulics of river ice jams Tatinclaux, J.C., et al., (1977, 45p)	F.D., (1978, 25 _{2.3} CR 78-27	Concrete curing
CR 77-09	Grouting silt and sand at low temperatures—a laboratory	Detection of moisture in construction materials. Morey,
Strength of frozen silt as a function of ice content and dry unit	investigation. Johnson, R., (1979, 33p.) CR 79-05	R.M., et al. [1977, 9p] CR 77-25
weight. Sayles, F.H., et al. (1980, p.109-119) MP 1451	Grouting silt and sand at low temperatures Johnson, R. (1979, p. 937-950) MP 1078	Cements for structural concrete in cold regions. Johnson, R., r1977, 13p y SR 77-35
Regulated set concrete for cold weather construction	(1979, p 937-950) MP 1078 Temperature effect on the uniaxial strength of ice. Haynes.	[1977, 13p] SR 77-35 Concrete durability
Sayles, F.H., et al. (1980, p 291-314) MP 1359	F.D., (1979, p 667-681) MP 1231	Freeze-thaw tests of liquid deiging chemicals on selected
Investigation of the snow adjacent to Dye-2, Greenland.	Computer applications	pavement materials. Minsk, L.D., (1977, 16p.)
Ueda, H.T., et al. (1981, 23p) SR 81-03 Measuring mechanical properties of ice Schwarz, J., et al.	Flexible pavement resilient surface deformations. Smith, N.	CR 77-28
(1981, p 245-254) MP 1556	et al. (1975, 13 lentes) MP 1264 Landsat data for watershed management. Cooper, S. et al.	Fabric installation to reduce cracking on runways. Eaton, R A, et al. [1981, 26p] SR 81-10
Acoustic emissions from polycrystalline ice. St. Lawrence.	(1977, c150p) MP 1114	Concrete heating
W.F., et al. (1982, 15p) CR 82-21	Safe ice loads computed with a pocket calculator Nevel,	Regulated set concrete for cold weather construction.
Creep behavior of frozen silt under constant uniaxial stress. Zhu, Y., et al. (1983, p 1507-1512) MP 1805	DE, (1979, p 203-223) MP 1249	Sayles, F.H., et al. (1980, p.291-314) MP 1359
Isothermal compressibility of water mixed with montmorallo-	Conference on Computer and Physical Modeling in Hydrau- lic Engineering, 1980 Ashton, G.D., ed., (1980, 492p.)	Concrete pavements
nite. Oliphant, J L., et al. (1983, p 45-50) MP 2066	MP 1321	Freezing and thawing tests of liquid descing chemicals on selected pavement materials. Minsk, L.D., (1979, p.51-
Summary of the strength and modulus of ice samples from	Topical databases Cold Regions Technology on-line. Lis-	58 ₁ MP 1220
multi-) car pressure ridges Cox, G.F.N. et al. [1984, p.126-133] MP 1679	ton, N , et al. (1985, p 12-15) MP 2027	Detection of cavities under concrete pavement. Kovacs, A.
Variation of ice strength within and between multiyear pres-	Computer interfacing of meteorological sensors in severe weather Rancourt, K, et al., [1985, p 205-211]	ct al. (1983, 41p) CR 83-18
sure ridges in the Beaufort Sea Weeks, W.F., [1984.	MP 2175	Salt action on concrete Sayward, J.M., 1984, 6903 SR 84-25
p.134-139 ₃ MP 1680	Data acquisition in USACRREL's flume facility Daly. S.F.	Cold-temperature characterization of polymer concrete
Preliminary examination of the effect of structure on the com- pressive strength of ice samples from multi-year pressure	et al. (1985, p 1053-1058) MP 2089	Bigl, S.R., (1986, 46p) MP 2521
ridges Richter, J.A., et al., r1984, p.140-1441	Cazenovia Creek Model data acquisition system Bennett, B.M., et al., [1985, p.1424-1429] MP 2090	Porous portland cement concrete as an airport runway over- lay. Korhonen, C., et al. r1989, 20p s SR 89-12
MP 1685	Instrumentation for an uplifting ice force model Zabilansky,	lay. Korhonen, C., et al. (1989, 20p.) SR 89-12. Concrete placing
Influence of grain size on the ductility of ice Cole, D.M., [1984, p.150-157] MP 1686	LJ. (1985, p.1430-1435) MP 2091	Cold weather construction materials, Part 2—Regulated-set
Mechanical properties of multi-year sea ice Testing tech-	Is advanced technology "the gateway to irresponsibility"	cement for cold weather concreting, field validation of
niques Mellor, M., et al. [1984, 39p] CR 84-08	Zufelt, J E., (1989, p.434-437) MP 2529 Computer programs	laboratory tests Houston, BJ, et al. [1981, 33p] MP 1466
Compressive strength of frozen silt. Zhu, Y, et al. [1984.	Long distance heat transmission with steam and hot water	Concrete strength
p 3-15) MP 1773 Crushing ice forces on cylindrical structures. Morris, C.E.	Aamot, H.W.C. et al. (1976, 39p.) MP 938	Cements for structural concrete in cold regions Johnson, R.,
et al. (1924, p 1-9) MP 1834	Computer program for determining electrical resistance in	[1977, 13p] SR 77-35
Grain size and the compressive strength of ice Cole, D.M.	nonhomogeneous ground Arcone, SA, 1977, 16p; CR 77-02	Regulated set concrete for cold weather construction Sayles, F.H., et al. [1980, p.291-314] MP 1359
(1985, p 220-226) MP 1858	Computer derived heat requirements for buildings in cold	Structural evaluation of porous pavement in cold climate
Strength and modulus of ice from pressure ridges Cox, GF,N, et al., [1985, p.93-98] MP 1848	regions Bennett, F.L., (1977, 113p) SR 77-03	Eaton, R.A., et al. (1980, 43p) SR 80-39
Structure and the compressive strength of ice from pressure	Computer routing of unsaturated flow through snow Tuck-	Fabric installation to reduce cracking on runways Eaton,
ridges Richter, J.A., et al. (1985, p.99-102)	er, WB, et al. (1977, 44p) SR 77-10 Finite element model of transient heat conduction Guy-	RA, et al. (1981, 26p) SR 81-10 Cold weather construction materials, Part 2 - Regulated-set
MP 1849 Compressive strength of pressure ridge ice samples Richter-	mon, G L., et al, (1977, 167p) SR 77-38	cement for cold weather concreting, field validation of
Menge, J.A., et al. (1985, p.465-475) MP 1877	Land treatment mode's of the CAPDET program Merry,	laboratory tests. Houston, BJ, et al, (1981, 33p)
Trianal compression testing of ice Cox. G.F.N. et al.	C.J., et al., (1977, 4p.) MP 1112	MP 1466
(1985, p476-488) MP (878	Computer procedure for comparing wastewater treatment systems. Spaine, P.A., et al., (1978, p. 335-340)	Deteriorated concrete panels on buildings at Sondrestrom. Greenland Korhonen, C., (1984, 11p.) SR 84-12
Pressure ridge strength in the Beaufort Sea Weeks, W.F., 1985, p 167-1721 MP 2121	MP 1155	Chemical solutions to the chemical problem Minsk, L.D.
Mechanical properties of multi-year pressure ridge samples	Computer file for existing land application of wastewater sys-	(1985, p.238-244) MP 2224
Richter-Menge, J.A., (1985, p.244-251) MP 1936	tems Iskandar, I.K., et al. (1978, 24p) SR 78-22	Brittleness of reinforced concrete structures under arctic con- ditions Kivekas, L., et al. (1985, p. 111-121)
Grain size and the compressive strength of ice Cole, D.M., [1985, p. 369-374] MP 1907	Design of figured waster land application [Iskandar, IK, 1979, p.65-88] MP 1415	MP 2272
Confined compressive strength of multi-year pressure ridge	Multivariable regression algorithm Blaisdell, G I., et al.	Low temperature cracking susceptibility of asphalt concrete.
sea ice samples Cox, GFN, et al. (1986, p.365-373)	[1983, 4]p] SR 83-32	Janoo, V.C., et al. (1987, p. 397-415) MP 2233
MP 2035	Numerical simulation of seater induced gouges on the shelves of the polar oceans. Weeks, W.F., et al. [1985, p.259.	Porous portland coment concrete as an airport runway over- lay kothonen, C, et al. (1989, 20p.) SR 89-12
Compressive deformation of columnar sea icc Brown, R. L., et al., §1986, p. 241-252; MP 2124	265) MP 1938	Concrete structures
Compressive behavior of saline ice Richter-Menge, J.A.	Fortran subroutines for zero-phase digital frequency filters	Deteriorated concrete panels on huildings at Sondrestrom.
(1986, p.331-350) MP 2200	Albert, D.G., (1986, 26p.) SR 86-04	Greenland Kothonen, C., (1984, 11p.) SR 84-12
Confined compressive strength of horizontal first-year sea icc	Tracking freezing front movement using boundary element method. Hromadka, TV, II, (1987, 58p.) SR 87-08	Brittleness of reinforced concrete structures under arctic con- ditions Kivekas, L., et al., (1985, 28 + 14p)
samples Richter-Menge, J.A., §1937, p. 197-207 ₁ MP 2193	Information systems planning study. Atkins, RT, et al,	MP 1969
Results from indentation tests on freshwater ice Sodhi,	(198°, 48p) SR 87-23	Brittleness of reinforced concrete structures under arctic con-
D.S., et al., [1988, p.341-350] MP 2495	XYFREZ4 user's manual O'Neill, K., (1987, 55p.) SM 87-28	ditions Kisekas, I., et al., [1986, 20p.] CR 85-02.
Triatial compressive strength of frozen soils under constant strain rates. Zhu, Y, et al. (1988, p 1200-1205b)	Phase change heat transfer program for microcomputers	Concretes Cold-temperature characterization of polymer concrete
MP 2371	Burrell, G.M., et al. (1988 p.645-650) MP 2383	Higi, S.R., (1986, 46p.) MP 2521

Condensation	Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., £1978, 175p.; SR 78-19	Countermeasures
Condensation control in low-slope roofs Tobiasson, W., [1985, p.47-59] MP 2039	Convection	Ice fog suppression using monomolecular films. McFadden, T., [1977, p.361-367] MP 956
Vapor drive maps of the U.S.A. Tobiasson, W., et al., 1986,	Heat transfer over a vertical melting plate. Yen, YC, et al.	Fabric installation to reduce cracking on runways Eaton, R.A. et al. r1981, 260 3 SR 81-10
Tp. + graphs; MP 2041 Roof design in cold regions. Tobiasson, W., [1989, p.1029-	[1977, 12p] CR 77-32 Free convection heat transfer characteristics in a melt water	R.A., et al. [1981, 26p.] SR 81-10 Stabilizing fire breaks in tundra vegetation Patterson, W.A.,
1037 ₁ MP 2651	layer. Yen, YC., (1980, p.550-556) MP 1311	III, et al, [1981, p.188-189] MP 1804
Conduction	Transport equation over long times and large speces.	Decontamination of chemical agents on the winter battlefield.
Soil hydraulic conductivity and moisture retention features. Ingersoll, J., (1981, 11p) SR 81-02	O'Neill, K., [1981, p.1665-1675] MP 1497 Boundary integral equation solution for phase change prob-	Parker, L.V., [1988, 48p] CR 88-07 Use of off-road vehicles and mitigation of effects in Alaska
Heat conduction in snow. Yen, Y.C., (1989, p 21-32)	lems. O'Neill, K. (1983, p.1825-1850) MP 2093	permafrost environments a review Slaughter, C.W., et al,
MP 2546	Computation of porous media natural convection flow and	(1990, p 63-72) MP 2682
Conservation	phase change. O'Neill, K., et al, [1984, p.213-229] MP 1895	Crack propagation Mechanisms of crack growth in quartz. Martin, R.J., III, et
Energy conservation in buildings. Ledbetter, C.B., (1976, \$p.) SR 76-17	Experiments on thermal convection in snow. Powers, D, et	al, (1975, p 4837-4844) MP 855
Construction	al, [1985, p 43-47] MP 2006	Resistance of elastic rock to the propagation of tensile cracks.
Haines-Fairbanks pipeline d tign, construction and opera-	Theory of natural convection in snow Powers, D, et al, [1985, p 10,641-10,649] MP 1957	Peck, L., et al, [1985, p.7827-7836] MP 2052 Cracking (fracturing)
tion. Garfield, D.E., et al. (1977, 20p.) SR 77-04 Environmental engineering, Yukon River-Prudhoe Bay Haul	Convective heat transfer in water over melting ice sheet.	Thermal and load-associated distress in pavements. John-
Road. Brown, J, ed, [1980, 187p.] CR 80-19	Lunardini, V.J., (1986, p.42-51) MP 2600	son, T.C., et al. (1978, p 403-437) MP 1209
Environment of the Alaskan Haul Road Brown, J., (1980, p.3-52) MP 1350	Field observations of thermal convection in a subarctic snow cover. Johnson, J.B., et al. (1987, p 105-118)	Asphalt concrete for cold regions Dempsey, B.J., et al. [1980, 55p.] CR 80-05
p.3-52 ₁ MP 1350 Haul Road performance and associated investigations in Alas-	MP 2439	Acoustic emission and deformation response of finite ice
ka. Berg, R.L., (1980, p.53-100) MP 1351	Conversion tables	plates. Xirouchakis, P.C., et al. [1981, p 123-133] MP 1436
Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p.129-150) MP 1353	Improved millivolt-temperature conversion tables for copper constantan thermocouples. 32F reference temperature.	Fabric installation to reduce cracking on runways Eaton,
L.A., (1980, p.129-150) MP 1353 Construction costs	Stallman, P E, et al, (1976, 66p) SR 76-18	R A, et al. (1981, 26p) SR 81-10
Life-cycle cost effectiveness of modular megastructures in	Cooling	Airport pavement distress in cold regions. Vinson, T.S., et al., r1987, p.981-1012; MP 2234
cold regions. Wang, L.RL., et al, [1976, p.760-776] MP 892	Performance of a thermosyphon with an inclined evaporator and vertical condenser. Zarling, J.P., et al. (1984, p.64-	al, [1987, p.981-1012] MP 2234 Fracture of S2 columnar freshwater ice: floating double can-
Construction equipment	68 ₁ MP 1677	tilever beam tests Bentley, D.L., et al, (1988, p.152-
Specialized pipeline equipment. Hanamoto, B. (1978,	Heating and cooling method for measuring thermal conduc-	161 ₃ MP 2493 Fracture experiments on freshwater and urea model ice.
30p.) SR 78-05	tivity. McGaw, R, (1984, 8p) MP 1891 Laboratory tests and analysis of thermosyphons with inclined	Bentley, D.L., et al. (1988, 152p) MP 2502
Construction equipment problems and procedures: Alaska pipeline project. Hanamoto, B. (1978, 14p.)	evaporator sections. Zarling, J.P., et al, (1985, p.31-37)	Performance of pavement at Central Wisconsin Airport.
SR 78-11	MP 1853	Stark, J, et al. (1989, p 92-103) MP 2463 Use of soft grade asphalts in airfields and highway pavements
Excavation of frozen materials. Moore, H.E. et al. (1980, p.323-345) MP 1360	Thermal stabilization of permafrost with thermosyphons. Zarling, J.P., et al. (1990, p.323-328) MP 2583	in cold regions Janoo, V.C., (1990, 47p.) SR 99-12
p.323-345; MP 1360 Planing machines for building runways on ice. Mellor, M.,	Cooling rate	Cracks
[1989, Sp. + attachments] MP 2505	Temperature effects in compacting an asphalt concrete over-	Firn quake (a rare and poorly explained phenomenon). Den- Hartog, S L., [1982, p.173-174] MP 1571
Construction materials	Isy. Eaton, R.A., et al. [1978, p.146-158] MP 1063 Field cooling rates of asphalt concrete overlays at low temper-	Use of low viscosity asphalts in cold regions. Janoo, V.C.,
Detection of moisture in construction materials. Morey, R.M., et al., [1977, 9p] CR 77-25	atures. Eaton, R.A., et al, (1980, 11p.) CR 80-30	(1989, p 70-80) MP 2462
Remote sensing for reconnaissance of proposed construction	International Symposium on Cold Regions Heat Transfer,	Creep Isua, Greenland: glacier freezing study. Ashton, G.D.,
site. McKim, H L., et al. (1978, 9 leaves) MP 1167	1989. [1989, 314p.] MP 2636 Cooling systems	(1978, p 256-264) MP 1174
Roof construction under wintertime conditions: a case study. Bennett, F.L., [1978, 34p] SR 78-24	Ice engineering complex adopts heat pump energy system	Application of the Andrade equation to creep data for ice and
Mechanical properties of frozen ground. Ladanys, B, et al,	Aamot, H.W.C., {1977, p 25-26} MP 893	frozen soil. Ting, J.M., et al. (1979, p 29-36) MP 1802
(1979, p.7-18) MP 1726 Time constraints on measuring building R-values. Flanders,	Experimental scaling study of an annular flow ice-water heat sink. Stubstad, J.M., et al. (1977, 54p.) CR 77-15	Creep model for constant stress and constant strain rate.
S.N., (1980, 30p.) CR 90-15	Some experiences with tunnel entrances in permafrost. Li-	Fish, A.M., (1984, p 1009-1012) MP 1766
Remote sensing for earth dam site selection and construction	neil, K.A., et al. [1978, p 813-819] MP 1107	Creep of a strip footing on ice-rich permafrost Sayles, FH, [1985, p 29-51] MP 1731
materials. Merry, C.J., et al. (1980, p 158-170) MP 1316	Waste heat utilization through soil heating. McFadden, T., et al., [1980, p 105-120] MP 1363	Creep properties
Resins and non-portland cements for construction in the cold.	Core samplers	Thermal and creep properties for frozen ground construction. Sanger, F.J., et al. r1978, p.95-1171 MP 1624
Johnson, R., (1980, 19p) SR 80-35	Subsurface explorations in permafrost areas. Cass, J.R., Jr.,	Sanger, F.J., et al. (1978, p.95-117) MP 1624 Thermal and creep properties for frozen ground construction.
Cold weather construction materials; Part 2—Regulated-set cement for cold weather concreting, field validation of	(1959, p 31-41) MP 885	Sanger, F.J., et al. (1979, p.311-337) MP 1227
laboratory tests. Itouston, B.J., et al. (1981, 33p.)	Drilling and coring of frozen ground in northern Alaska, Spring 1979. Lawson, D.E., et al. (1980, 14p)	CREVASSE DETECTION
MP 1466 In-situ thermal conductivity measurements. Atkins. R.T.,	SR 90-12	Oversnow transport. Mellor, M., (1963, 58p. plus appends.) M III-A4
(1983, 38p.) MP 2214	Development of a frazil ice sampler. Brockett, B.E., et al. [1986, 12p] SR 86-37	Crevasses
Building materials and acid precipitation Merry, C.J., et al.	Corrocion	Small-scale strain measurements on a glacter surface. Col- beck, S.C., et al. (1971, p. 237-243) MP 993
(1985, 40p.) SR 85-01 Structure data bases for predicting building material distribu-	Salt action on concrete. Sayward, J.M., (1984, 69p.)	Depth of water-filled crevasses of glaciers Weertman, J.
tion. Merry, C.J., et al. [1985, 35p.] SR 85-07	SR 84-25 Chemical solutions to the chemical problem Minsk, L.D.	(1973, p 139-145) MP 1044
Description of the building materials data base for New Haven, Connecticut. Merry, C.J., et al., [1985, 129p.]	(1985, p 238-244) MP 2224	Depth of water-filled crevasses that are closely spaced in, G de Q, et al. (1974, p 543-544) MP 1038
SR 85-19	Cost analysis	leeberg thickness and crack detection Kovacs, A. (1978.
Models for predicting building material distribution in NE	Propene dispenser for cold fog dissipation system. Hicks. J.R. et al. (1973, 38p.) MP 1033	p 131-145 ₁ MP 1120
cities. Merry, C.J., et al. (1985, 50p.) SR 85-24 Construction engineering community: materials and diagnos-	Management of power plant waste heat in cold regions. Aa-	Modified theory of bottom crevasses Jezek, K.C., (1984, p. 1925-1931) MP 2059
tics. (1986, 54p.) SR 86-01	mot, H W.C., (1975, p 22-24) MP 942 Protected membrane roofs in cold regions. Aamot, H W C.	Can relict crevasse plumes on antarctic ice shelves reveal a
Construction materials data base for Pittsburgh, PA Merry, C.J. et al. (1986, 87p.) SR 86-08	et al. (1976, 27p.) CR 76-02	history of ice-stream fluctuation MacAyeal, D.R., et al., [1988, p.77-82] MP 2460
C.J., et al. (1986, 87p.) SR 86-08 Description of the building materials data base for Portland,	Evaluation of an air cushion vehicle in Northern Alaska.	Cryobiology
Maine Merry, C.J., et al. (1986, 83p) SR 06-13	Abele, G, et al, (1976, 7p) MP 894	Sea ice and ice algae relationships in the Weddell Sea Ack-
Description of the building materials data base for Cincinnati, Ohio. Merry, C.J., et al. (1986, 85p.) SR 86-31	Long distance heat transmission with steam and hot water Aamot, H.W.C., et al. (1976, 39p.) MP 938	ley, S.F., et al. (1978, p.70-71) MP 1203 Standing crop of algae in the sea ice of the Weddell Scaregion.
Inventorying building materials Merry, C.J., [1986, 25p]	Some economic benefits of ice booms. Perham, R.E.,	Ackley, S.F., et al. (1979, p. 269-281) MP 1242
SR 84-33	[1977, p.570-591] MP 959 Waste heat recovery for building heating. Sector, P.W.,	Choanoflagellata from the Weddell Sea, summer 1977.
Acoustic emissions from composites at decreasing tempera- tures. Dutta, P.K., et al. (1988, p 1090-1095)	(1977, 24p) SR 77-11	Buck, K.R., (1980, 26p.) CR 80-16 Physical mechanism for establishing algal populations in frazil
MP 2430	Installation of loose-laid inverted roof system at Fort Wain-	ice Gatrison, D L., et al. (1983, p.363-365)
On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al. (1938, p.435-	wright, Alaska Schaefer, D., (1977, 27p.) SR 77-18 Investigation of ice clogged channels in the St. Marys River	MP 1717 Relative abundance of diatoms in Weddell Sca pack ice
458 ₁ MP 2395	Mellor, M., et al. (1978, 73p) MP 1170	Clarke, D.B., et al., [1983, p.181-182] MP 1786
Structural fiber composite materials for cold regions Dutta,	Cost-effective use of municipal wastewater treatment ponds	Sea ice and biological activity in the Amarctic Clarke, D.B.
P.K., (1988, p. 124-134) MP 2405 Distribution of building materials exposed to acid rain. Mer-	Reed, S.C., et al., [1979, p.177-200] MP 1413 Cost of land treatment systems. Reed, S.C., et al., [1979,	et al. [1984, p. 2087-2095] MP 1701 Sea ice microbial communities in Antarctica Garrison.
ry, C.J., et al. (1989, 156p.) SR 89-01	135p ₁ MP 1387	D I., et al. (1986, p 243-250) MP 2026
Fiber composite materials in an arctic environment Dutta,	Cost of ice damage to shoreline structures during navigation	Cryogenic processes
P.K., (1989, p. 216-225) MP 2559 Simple and economical thermal conductivity measurement	Carey, K L., (1980, 33p) SR 80-22 Least life-cycle costs for insulation in Alaska Flanders,	Morphology of the North Slope Walker, H.J., (1973, p.49- 52) MP 1004
system. Atkins, R.T., (1989, p 108-116) MP 2566	S.N., et al., (1982, 47p) CR 82-27	Cryogenic soils
Continuous belt machines	Simple design procedure for heat transmission system piping	Bibliography of soil conservation activities in USSR perma-
Kinematics of continuous belt machines Mellor, M., (1976, 24p) CR 76-17	Phettepiace, G., (1985, p. 1748-1752) MP 1942 Simulation of district heating systems for piping design	frost areas Andrews, M. [1977, 116p.] SR 77-07 Antarctic soil studies using a scanning electron microscope.
Continuous permafrost	Phetteplace, G. (1989, 27p.) MP 2746	Kumai, M., et al. (1978, p.106-112) MP 1386
Permafrost and active layer on a northern Alaskan foad	Optimal sizing of district heating pipes Phetteplace, G., (1939, 25p.) MP 2747	Bibliography of permafrost soils and vegetation in the USSR Andrews, M., £1978, 175p.; SR 78-19
Berg, R.L., et al, (1978, p.615-621; MP 1102	(1939, 25p) MP 2747	

Crystal growth	Ice formation downstream of Oahe Dam—1987-1988 winter Ashton, G.D., r1988, 37p 1 MP 2506	Compacted-snow runways: design and construction guide- lines for Antarctica. Russett-Head, D.S., et al. (1989.
Simulation of planar instabilities during solidification Sul- livan, J.M., Jr., et al. (1987, p.81-111) MP 2585	Ashton, G.D., [1988, 37p.] MP 2506 Ice cover formation downstream of a reservoir. Ashton,	68p) SR 89-10
livan, J.M., Jr., et al, (1987, p.81-111) MP 2585 Crystal orientation	G.D., [1988, p.189-198] MP 2498	Roof design in cold regions. Tobiasson, W., [1989, p.1029-
Structural growth of lake ice. Gow, A J., et al, [1977, 24p.]	Effect of Toston dam on upstream icc conditions. Ashton,	1037; MP 2651
CR 77-01	G.D., (1989, 9p) SR \$9-16	Development and design of sludge freezing beds Martel.
Crystal study techniques	Unconventional power sources for ice control at locks and	C.J., (1989, p.799-808) MP 2556
Producing strain-free flat surfaces on single crystals of ice.	dams Nakato, T., et al, [1989, p 107-126]	Remote water-temperature measurement. Daly, S., (1989, 60). MP 2722
comments. Tobin, T.M., (1973, p.519-520)	MP 2572	• • • • • • • • • • • • • • • • • • • •
MP 1000	Data processing	New approach for sizing rapid infiltration systems (discussion
Crystals	Remote sensing plan for the AIDJEX main experiment.	and closure) Reed, S.C., et al. (1989, p.879-882) MP 2712
Synoptic meteorology, crystal habit, and snowfall rates in	Weeks, W.F., et al. [1975, p.21-48] MP 862	Design criteria
Northeastern snowstorms. Ryerson, CC, et al. (1989,	Analysis of snow water equivalent using LANDSAT data. Merry, C.J., et al., [1977, 16 leaves] MP 1113	Snow load design criteria for the United States. Tobiasson,
p.335-345 ₁ MP 2599	Merry, C.J., et al. [1977, 16 leaves] MP 1113 Automatic data collection equipment for oceanographic ap-	W., ct al. [1976, p.70-72] MP 947
Cubic ice	plication Dean, A M. Jr., (1978, p 1111-1121)	Bibliography on harbor and channel design in cold regions.
Abnormal internal friction peaks in single-crystal icc Stall- man, P.E., et al. (1977, 15p.) SR 77-23	MP 1028	Haynes, F.D., (1976, 32p) CR 76-03
man, P.E., et al, (1977, 15p.) SR 77-23 Calverts	Multivariable regression algorithm Blaisdell, G L., et al,	Changes coming in snow load design criteria. Tobiasson, W.,
Interaction of gravel, surface drainage and culverts with per-	(1983, 41p) SR 83-32	(17. 19. p 413-418) MP 2612
mafrost. Brown, J., et al. [1984, 35p.] MP 2215	User's guide for the BIBSORT program for the IBM-PC per-	Chan-es coming in snow load design criteria. Tobiasson, W., 1949, p. 918-920; MP 2650
Cutting tools	sonal computer. Kyriakakis, T., et al. (1985, 61p.)	(
Kinematics of axial rotation machines Mellor, M., (1976,	SR 85-04	Simulation of district heating systems for piping design. Phetteplace, G. (1989, 27p.) MP 2746
45p. ₁ CR 76-16	Arctic research of the United States, Vol 2. [1988, 76p] MP 2379	Optimal sizing of district heating pipes. Phetteplace, G.,
Kinematics of continuous belt machines. Mellor, M.		(1989, 25p) MP 2747
[1976, 24p] CR 76-17	Alaska SAR facility: an update. Weller, G, et al, (1988, p 27-31) MP 2380	Preliminary design guide for arctic equipment. Walsh, M R.,
Damage	QuickDraw data structures for image processing LaPotin,	et al. [1989, 35p] SR 89-13
Ecological effects of oil spills and seepages in cold-dominated	P.J., et al, (1989, 17p) SR 89-06	Detection
environments. McCown, B H., et al. (1971, p.61-65) MP 905	Interfacing geographic data with real-time hydrologic fore-	Detecting wet roof insulation with a hand-held infrared cam-
	casting models Eagle, T.C., et al. (1989, p 857-861)	era. Korhonen, C., et al. [1978, p A9-A15]
Effects of hovercraft, wheeled and tracked vehicle traffic on tundra. Abele, G., 1976, p 186-215; MP 1123	MP 2527	MP 1213
De-icing using lasers Lane, J.W., et al. (1976, 25p)	Data reduction of GOES information from DCP networks.	Research on roof moisture detection. Tobiasson, W., et al.
CR 76-10	DeCoff, G.W., et al. (1989, 15p) SR 89-29	[1978, 6p] SK 78-29 Bibliography on techniques of water detection in cold regions.
Air-cushion vehicle effects on surfaces of Alaska's Arctic	Data transmission	Smith, D.W., comp. (1979, 75p) SR 79-10
Slopes. Slaughter, C.W., [1976, p 272-279]	Near real time hydrologic data acquisition utilizing the	Detection of Arctic water supplies with geophysical tech-
MP 1384	LANDSAT system McKim, H.L., et al. (1975, p 200- 211) MP 1055	niques. Arcone, S.A., et al. (1979, 30p.) CR 79-15
Le damage to tundra soil and vegetation Walker, D.A.	Communication in the work place: an ecological perspective.	Roof moisture survey. Korhonen, C. et al. (1980, 31p)
e' ai, (1977, 49p) SR 77-17	Ledbetter, C.B. [1979, 19p] SR 79-03	SR 90-14
Ef of low ground pressure vehicle traffic on tundra at	Landsat data collection platform, south central Alaska. Hau-	Detection of sound by persons buried under snow avalanche.
Lo. eiy, Alaska. Abele, G., et al. (1977, 32p) SR 77-31	gen, R.K., et al. (1979, 17 refs.) SR 79-02	Johnson, J.B., [1984, p.42-47] MP 1920
Second progress report on oil spilled on permafrost. McFad-	CRREL's experiences of remote sensing technology transfer	Detection of buried utilities Bigl. S.R., et al. [1984, 36p.]
den, T., et al. [1977, 46p] SR 77-44	to the Corps user. Merry, C.J., (1987, p.271-273;	CR 84-31
Inundation of vegetation in New England. McKim, H L., et	MP 2550	Locating buried utilities. Bigl, S.R., (1985, 48p.) SR 85-14
al. [1978, 13p.) MP 1169	Satellite data collection platforms for temperature measure-	Mine detection in cold regions using short-pulse radar. Ar-
1977 tundra fire at Kokolik River, Alaska. Hall, D K, et al.	ments Daly, S.F., et al. (1989, 14p.) SR 89-37	cone, S A., (1985, 16p) SR 85-23
(1978, 11p) SR 78-10	Decomposition	Construction engineering community materials and diagnos-
Effects of low ground pressure vehicle traffic on tundra.	Proceedings 1972 Tundra Biome symposium, (1972, 211p.) MP 1374	tics. (1986, 54p.) SR 86-01
Abele, G , et al, (1978, 63p) SR 78-16	Decontamination	Effects of water and ice on the scattering of diffuse reflectors.
Effects of winter military operations on cold regions terrain Abele, G., et al. (1978, 34p.) SR 75-17	Decontamination of chemical agents on the winter battlefield.	Jezek, K.C., et al. (1986, p 259-269) MP 2664
	Parker, L.V., (1988, 48p.) CR 88-07	Detecting underground objects/utilities. Hironaka, M.C., et
Crude oil spills on black spruce forest Jenkins, T.F., et al.		al (1987, p 36-43) MP 2281
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p.305-323] MP 1185	Delects	al (1987, p 36-43) MP 2281 Preliminary development of a fiber optic sensor for TNT.
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p.305-323] MP 1185 Undersca pipelines and cables in polar waters. Mellor, M.		al (1987, p.36-43) MP 2281 Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) SR 88-64
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p.305-323] Mel 1185 Mel 1185 Mel 1185 Mel 1185 Graph of the spills of the	Defects Guide to managing the pothole problem on roads. Eaton,	al (1987, p.36-43) MP 2281 Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) SR #8-84 Experimental and theoretical studies of acoustic-to-seismic
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p.305-323] MP 1185 Undersca pipelines and cables in polar waters. Mellor, M.	Defects Guide to managing the pothole problem on roads. Eaton, RA, et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated	al (1987, p. 36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-seismic coupling. Altert, D.G., (1988, p.19-31) MP 2432
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permaffost soils and vegetation in the USSR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Law-	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al. (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianal testing. Cole, D.M., (1978, p.426-429)	al (1987, p.36-43) MP 2281 Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) SR #8-84 Experimental and theoretical studies of acoustic-to-seismic
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 305-323) MP 1185 Lindersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. (1978, 81p.) CR 78-28	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al. (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157	al [1937, p 36-43] Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. [1988, 16p.] Experimental and theoretical studies of acoustic-to-sensine coupling. All-rit, D G. [1988, p.19-31] Analytical method for determining tetrazene in soil. Walsh, M.E., et al. [1988, 22p.] Detection of coarse sediment movement using radio transmit-
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p.305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of perma-	Defects Guide to managing the pothole problem on roads. Eaton, RA, et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamber-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. All-zrit, D.G., (1988, p.19-31) MP 2432 Analytical method for determining tetrazene in soil. Walsh, M.E., et al., (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(8))
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p.305-323] MP 1185 Lindersea pipelines and cables in polar waters. Mellor, M. (1978, 34p.) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J. et al. [1979, 42p.] SR 79-05	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., [1981, 24p] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. Lin, E.J., [1981, 10p] CR 81-15	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-seismic coupling. Alt-rit, D.G., (1988, p.19-31) MP 2432 Analytical method for determining tetrazene in soil. Waish, M.E., et al. (1988, 22p.) SR 88-15 Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 305-323) MP 1185 Lidersea pioles and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al. (1978, 81p.) CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J. et al. (1979, 42p.) SR 79-9 Cost of ice damage to shoreline structures during navigation.	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al. [1981, 24p] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. Chamber-lain, E.J., [1981, 10p] Blisters in built-up roofs due to cold weather. Kothonen, C.	al (1987, p 36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D.G. (1988, p.19-31) MP 2432 Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p 367-373(B)) MP 2752 Single fiber measurements for remote optical detection of
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al. [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation, Carey, K.L., [1980, 33p.] SR 88-22	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., [1981, 24p.] Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. LJ., [1981, 10p.] Blisters in built-up roofs due to cold weather. Korhonen, C., et al., [1983, 12p.] Resilient modulus determination for frost conditions.	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, D.G., (1988, p.19-31) MP 2432 Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmit- ters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) SR 89-18
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Lindersea pipelines and cables in polar waters. Mellor, M. (1978, 34p.) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. SR 80-22 Effects of a tundra fire on soil and vegetation Racine, C.	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) CR 81-15 Blisters in built-up roofs due to cold weather. Eat., (1983, 12p.) SR 83-21	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-acismic coupling. All-rit, D.G., (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373/8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) Detenation wares
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-2323) MR 187 MR 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al., (1978, 81p.) CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) SR 80-37	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., [1981, 24p] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p. 426-425] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p.] Chamberlain, E.J., [1981, 10p.] CR 81-15 Blusters in built-up roofs due to cold weather. Korhonen, C., et al., [1981, 12p.] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p. 320-333] MP 2569 Degradation	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D.G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, 7p.) SR 89-18 Detenmation waves Review of antitank obstacles for winter use. Richmond.
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permaffost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] Physical and thermal disturbance and protection of permaffost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Cr. 80-37 Crude oil spills on subarretic permaffost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] CR 80-29	Defects Guide to managing the pothole problem on roads. Eaton, R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. L.J., (1981, 10p) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1983, 12p) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) Degradation Modifications of permafrost, East Oumalik, Alaska. Law-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, D.G., (1988, p.19-31) MP 2432 Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) SR 89-18 Detenation waves Review of antitank obstacles for winter use. Richmond, CR 84-25
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] Mr. 1978, p. 305-323 Mr. 1979, p.	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al. [1981, 24p] Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p] Blisters in built-up roofs due to cold weather. Korhonen. C., et al., [1981, 12p] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p.320-333] MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., [1982, 33p] CR 82-36	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albeit, D.G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al. (1989, 7p.) SR 29-18 Detenation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Retrief River Water quality during winter river navigation seasons. Slet-
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] SR 79-05 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. (1979, 42p.) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.) CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole problem. Eaton, R.A.	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for cold	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, D.G., (1988, p.19-31) MP 2432 Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) SR 89-18 Detenation waves Review of antitank obstacles for winter use. Review of antitank obstacles for winter use. Review of antitank obstacles for winter use. SR 88-25 Detroit River Water quality during winter river nasigation seasons. Sletten, R.S., (1988, 56p.) SR 88-16
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-2323) MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al., (1978, 81p.) Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A. et al., (1980, 67p.) CR 80-27 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A. MP 1416	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., (1981, 24p.) Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p.426-429) MP 1157 Pavement deflection after freezing and thawing. CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p.435-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessing coupling. All-rit, DG., (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al., (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) SR 89-18 Deteoaction waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) CR 84-25 Detroit River Water quality during winter river navigation seasons. Sletten, R.S., (1988, 56p.) Devolverium oxide for
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M., (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., (1978, 81p.) CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) SR 79-05 Cost of ice damage to shorteline structures during navigation. Carey. K L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., (1980, 67p.) Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., cootd, (1981, 24p.) MP 146 Ecological impact of vehicle traffic on tundra Abele, G.	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al. [1981, 24p] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p] Blisters in built-up roofs due to cold weather. Korhonen, C., et al., [1983, 12p] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p.320-333] MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., [1982, 33p] On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., [1988, p.435-458] MP 2395	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D.G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al. (1989, 7p.) SR 29-18 Detenation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Detroit River Water quality during winter river navigation seasons. Sletten, R.S., (1988, 56p.) Deuterium oxide ice Mass transfer along ice surfaces. Tobin, T.M., et al. (1977)
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] SR 79-05 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation Racine, C., [1980, 21p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A. et al., [1980, 67p.] CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole pioblem Eaton, R.A., coord, [1981, 24p.] Ecological impact of vehicle traffic on tundra Apr. 1463	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., [1981, 24p.] Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. List, [1981, 10p.] Blisters in built-up roofs due to cold weather. Korthonen, C., et al., [1981, 12p.] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p.320-333] MP 2549 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., [1982, 33p.] On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., [1988, p.435-458] Degree days Unified degree-day method for river ice cover thickness smu-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. All-art, D.G., (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) SR 89-18 Detonation waves Review of antitank obstacles for winter use. Richmond, P.W., (1984, 12p.) Detroit River Water quality during winter river nasigation seasons. Sletten, R.S., (1988, 56p.) SR 88-19 Deuterlain axide fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37)
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. [1978, 34p] CR 78-22 Bibliography of permafrost soils and vegetation in the USS Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation [1980, 21p.] SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, [1981, 24p.] Ecological impact of schiele traffic on tundra Abele, G., MP 1416 Surface disturbance and protection during economic develop-	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al. [1981, 24p] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p.426-429] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p] Blisters in built-up roofs due to cold weather. Korhonen, C., et al., [1983, 12p] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p.320-333] MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., [1982, 33p] On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., [1988, p.435-458] MP 2395	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of accountic-to-sessing coupling. All-rit, DG., (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Betometical waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) CR 34-25 Detroit River Water quality during winter river nasigation seasons. Sletten, R.S., (1985, 56p.) SR 88-19 Deuterleism saidle fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37), MP 1091 Delectric properties
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] SR 79-05 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation Racine, C., [1980, 21p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A. et al., [1980, 67p.] CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole pioblem Eaton, R.A., coord, [1981, 24p.] Ecological impact of vehicle traffic on tundra Apr. 1463	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Isin, E.J., (1981, 10p.) Blusters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafroit, East Oumalik, Alaska. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for R. 82-36 On the design of polymeric composite structures for R. 2395 Unified degree-day method for river ice cover thickness umulation. Shen, H.T., et al., (1985, p. 54-62) MP 2665 Thin ice growth Ashten, G.D., (1989, p. 564-566)	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, D.G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al. (1989, 7p.) SR 29-18 Detenation wares Review of antitank obstacles for winter use. P.W., (1984, 12p.) Detroit River Water quality during winter river navigation seasons. Sletter, R.S., (1988, 56p.) Deuteriom oxide ice Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P.
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M., [1978, 34p] CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] MP 1446 Ecotogical impact of vehicle traffic on tundra Abele, G., MP 1446 Sunace, G. MP 1467 Alaska Good Friday carthquake of 1964. Swinzew, G.K.	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blusters in built-up roofs due to cold weather. Korhonen. Cet al., (1983, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2549 Degradation Modifications of permafrost, East Oumalik, Alaxia. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-459) Degree days Unified degree-day method for river ice cover thickness mulation. Shen, H.T., et al., (1985, p. 54-62) MP 2865	al [1987, p.36-43] Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al, [1988, 16p.] Experimental and theoretical studies of acoustic-to-seismic coupling. All-art, D.G., [1988, p.19-31] MP 2432 Analytical method for determining tetrazene in soil. Walsh, M.E., et al, [1988, 22p.] Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al, [1989, p.367-373(B)] MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., [1989, 7p.] SR 89-18 Detoaction waves Review of antitank obstacles for winter use. Richmond, P.W., [1984, 12p.] Detvoit River Water quality during winter river nasigation seasons. Sletten, R.S., [1925, 56p.] SR 88-19 Deuterium axide fee Mass transfer along ice surfaces. Tobin, T.M., et al, [1977, p.34-37] Diehectric properties Electrical resistivity profile of permaftost. Hockstra, P., (1974, p.38-34)
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M., (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] SR 79-05 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation, Carey, K.L., (1980, 33p.) SR 89-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) SR 89-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] SR 89-37 Pothole primer, a public administrator's guide to undersanding and managing the pothole problem Eaton, R.A., coord, (1981, 24p.) Ecological impact of vehicle traffic on tundra Abele, G., (1981, p.11-37) MP 1463 Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] MP 1467 Alaska Good Friday carthquake of 1964. Swinzow, G. K., (1982, 26p.) CR 82-01	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blusters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., (1985, p. 54-62) MP 2657 Delaware Bay	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, D.G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chacho, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) MP 2752 Detenoted waves Review of antitank obstacles for winter use. Review of antitank obstacles for winter use. P.W., (1984, 12p.) CR 34-25 Detroit River Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 38-10 Deuterium walke fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Diehetric properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) Excavating fock, ice, and froten ground by electromagnetic
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-2323) MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USS R 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. (1978, 81p) CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. (1979, 42p) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carcy, K.L., (1980, 33p) SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation. Carcy, K.L., (1980, 33p) SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation, L/A, et al., (1980, 67p) CR 80-22 Pothole primer, a public administrator's guide to understanding and managing the pothole piohem Eaton, R.A. (1981, 24p) Ecological impact of schiele traffic on tundra Abele, G. (1981, 24p) Surface disturbance and protection during economic development of the North. Brown, J., et al., (1981, 88p) MP 1467 Alaska Good Friday carthquake of 1964. Swinzow, G.K., CR 82-01 Potholes: the problem and solutions. Eaton, R.A., (1982, 26p)	Guide to managing the pothole problem on roads. Eaton. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pasement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) Chamberlain, E.J., (1981, 10p) Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafroit, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) MP 2569 Degradation Modifications of permafroit, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) MP 2569 Degradation Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., (1985, p. 54-62) MP 2665 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. All-rit, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmiters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, 7p.) SR 89-18 Deteoation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Review of antitank obstacles for winter use. Water quality during winter river navigation seasons. Slet- ten, R.S., (1988, 56p.) SR 88-10 Deuterium oxide ice Water quality during winter river navigation seasons. Slet- ten, R.S., (1988, 56p.) SR 88-10 Deuterium oxide ice Water stansfer along ice surfaces. Tobin, T.M., et al. (1977, p.34-37) Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P. (1974, p.28-34) Excavating tock, ice, and frozen ground by electromagnetic readiation. Hockstra, P., (1976, 17p.) CR 76-36
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. [1978, 34p] CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska. Coord., [1981, 24p.] Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., (1981, 1981, p. 11-37) Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] MP 1467 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) MP 1564	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blusters in built-up roofs due to cold weather. CR 81-15 Blusters in built-up roofs due to cold weather. SR 83-21 Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2549 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymene composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-454) MP 2395 Degree days Unified degree-day method for river ice cover thickness umulation. Shen, H.T., et al., (1985, p. 54-62) MP 2695 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2655 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 112)-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D. G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, 7p.) SR 29-18 Detendation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Retroit River Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 28-19 Deuterium oxide ice Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.23-34) Excavaing rock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-36 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T. E., et al., (1978, 12p.)
Crude oil spills on black spruce forest [1978, p. 305-323] Undersee pipelines and cables in polar waters. [1978, 34p] Rellor, M., (1978, 34p) Robiography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] Rellor, R. (2000) Rellor Research CR 78-28 Rellor, M., (2000) Research Research	Defects Guide to managing the pothole problem on roads. Eaton, R.A., et al., [1981, 24p.] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p. 426-429] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p.] CR 81-15 Blusters in built-up roofs due to cold weather. Korhonen, C., et al., [1981, 12p.] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p. 320-333] MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., [1982, p. 435-458] Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., [1985, p. 54-65] MP 2055 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., [1985, p. 1123-1129] MP 1999	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. All-rit, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmiters. Chache, E.F., Jr., et al. (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al. (1989, 7p.) SR 89-18 Detonation waves Review of antitank obstacles for winter use. Rechmond, P.W., (1984, 12p.) Detroit River Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) SR 88-10 Deuterium oxide tee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) MP 1091 Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, 12p.) Excavating fock, ice, and frozen ground by electromagnetic reduction. Hockstra, P., (1976, 17p.) CR 78-64
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. [1978, 34p] CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. [1978, 81p.] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation. Carey, K.L., [1980, 34p.] SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al. [1980, 67p.] CR 80-22 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord. [1981, 24p.] Ecological impact of schiele traffic on tundra Abele, G. (1981, 24p.) MP 1446 Alaska Good Friday carthquake of 1964. Swinzow, G.K., [1982, 26p.] MP 1447 Alaska Good Friday carthquake of 1964. Swinzow, G.K., [1982, 26p.] MP 1467 Potholes the problem and solutions Eaton, R.A., [1982, p.160-162] Effects of inundation on six varieties of turfgrass. Erbssch, E.H., et al., [1982, 25p.] SR 82-12	Defects Guide to managing the pothole problem on roads. Eaton. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triasual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Lain, E.J., (1981, 10p.) Chamberlain, E.J., (1981, 10p.) Blisters in built-up roofs due to cold weather. Korhonen. C., et al., (1983, 12p.) Resilient modulus determination for frost Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafroit, East Oumalik, Alaska. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-43) Degree days Unified degree-day method for river ice cover thickness unulation. Shen, H.T., et al., (1985, p. 54-62) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume)	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albrit, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) SR 89-18 Deteoaction waves Review of antitank obstacles for winter use. Review of antitank obstacles for winter use. P.W., (1984, 12p.) CR 34-25 Detroit River Water quality during winter river nasigation seasons. Sletten, R.S., (1988, 56p.) SR 88-10 Deteoted man saide fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37), MP 1091 Dielectric grouperties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) (1974, p.28-34) Excavating rock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) (IR 76-36) Internal properties of the ice sheet at Cape Folger by radio ocho sounding. Keither, T.E., et al., (1978, 12p.) CR 78-84 Interaction of a surface wave with a dielectric slab discon-
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 89-22 Effects of a tundra fire on soil and vegetation racine, C., [1980, 21p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Rescine, C., SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] MP 1416 Ecological impact of vehicle traffic on tundra Abele, G., MP 1416 Ecological impact of vehicle traffic on tundra Abele, G., MP 1463 Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] Alaska Good Friday carthquake of [1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., [1982, 26p.] Effects of inundation on six varieties of turfgrass. Erbssch, SR 22-12 Effects of off-road vehicle traffic on tundra terrain	Defects Guide to managing the pothole problem on roads. Eston. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C. et al., (1983, 12p.) SR 83-21 Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaxia. Lawson, D. E., (1982, 33p.) CR 82-36 On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness mulation. Shen, H.T., et al., (1985, p. 54-62) MP 2865 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete over-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D. G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, 7p.) SR 29-18 Detendation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Retroit River Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 28-19 Deuterium oxide ice Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.23-34) Excavaing rock, i.ec, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Interaction of a surface wave with a dielectric slab discoontinuity. Arcone, S.A., et al., (1978, 10p.) CR 78-64
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M., (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation, Carey, K.L., (1980, 33p.) SR 89-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, (1981, 24p.) Ecological impact of vehicle traffic on tundra Abele, G., (1981, p.11-37) MP 1463 Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 18p.] MP 1463 Alaska Good Friday carthquake of 1964. Smirzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, p.160-162) MP 1504 Effects of inundation on six varieties of turfgrass. Erbsech, F.H., et al., [1982, 25p.] MP 1504 Long-term effects of off-road vehicle traffic on tundra tundra Abele, G., et al., [1984, p.283-294]	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blisters in built-up roofs due to cold weather. CR 81-15 Blisters in built-up roofs due to cold weather. SR 83-21 Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness smulation. Shen, H.T., et al., (1985, p. 54-62) MP 2695 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p.1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete over-	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of accoustic-to-sensine coupling. All-rit, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 2p.) Detection of coarse sediment morement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(8)) SR 88-15 Detection of coarse sediment morement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(8)) TNT Zhang, Y., et al., (1989, 7p.) SR 89-18 Detection waves Review of antitank obstacles for winter use. Richmond, P.W., (1984, 12p.) Detroit River Water quality during winter river navigation seasons. Sletter, R.S., (1988, 56p.) SR 88-19 Deuterium oxide ice Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, 12p.) Elecavating tock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 10p.) CR 78-64 Interaction of a surface wave with a dielectric slab discontinuity. Accore. S.A., et al., (1978, 10p.) CR 78-64 Anisotropic properties of sea ice. Kovacs, A., et al., (1979, 1879) Anisotropic properties of sea ice. Kovacs, A., et al., (1979, 1879)
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 89-22 Effects of a tundra fire on soil and vegetation racine, C., [1980, 21p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Rescine, C., SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] MP 1416 Ecological impact of vehicle traffic on tundra Abele, G., MP 1416 Ecological impact of vehicle traffic on tundra Abele, G., MP 1463 Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] Alaska Good Friday carthquake of [1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., [1982, 26p.] Effects of inundation on six varieties of turfgrass. Erbssch, SR 22-12 Effects of off-road vehicle traffic on tundra terrain	Defects Guide to managing the pothole problem on roads. Eaton. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-425) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness umulation. Shen, H.T., et al., (1985, p. 54-65) MP 2065 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete over-lay. Eaton, R.A., et al., (1978, p. 146-158) MP 1803	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, D. G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al., (1989, 7p.) MP 2752 Strape fiber measurements for remote optical detection of TNT Zhang, Y. et al., (1989, 7p.) MP 289-18 Detenotion waves Review of antitank obstacles for winter use. Rechmond, CR 84-25 Detenote River Water quality during winter river navigation seasons. Sletter, R.S. (1988, 56p.) SR 88-10 Detenote movible fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Defective properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) Internal properties of the ice sheet at Cape Folger by radio ceho sounding Reither, T.E., et al., (1978, 12p.) CR 78-86 Interaction of a surface wave with a dielectric slab discontinuity. Arcone, S.A., et al., [1978, 10p.) Anisotropic properties of sea ice Kovacs, A., et al., [1979, p.749-5759] MP 1258
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-223) Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) Robbiography of permafrost soils and vegetation in the USS RA-didews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al., (1978, 81p.) Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., (1980, 67p.) Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, (1981, 24p.) Surface disturbance and protection during economic development of the North. Brown, J., et al., (1981, 88p.) MP 1467 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, p.160-162) Effects of inundation on six varieties of turfgrass. Erbisch, E.H., et al., (1982, 25p.) SR 82-12 Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1984, p.28)-294. MP 1820	Defects Guide to managing the pothole problem on roads. Eaton. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p) SR 83-21 Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) MP 2569 Degradation Lord, H.W., et al., (1988, p. 435-458) Degraded degree-day method for river ice cover thickness sumulation. Shen, H.T., et al., (1985, p. 54-62) MP 2065 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands Ackieson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay. Easton, R.A., et al., (1978, p. 146-158) MP 1909 Soil infiltration on land treatment sites. Abele, G., et al., (1980, 41p). S.R. 80-36 Artic Ocean temperature, salinity and density, March. May	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D. G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, 7p.) SR 29-18 Detendation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Retroit River Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 28-19 Deteroit River Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 28-19 Deteroit reposerties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.23-34) Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Interaction of a surface wave with a dielectric slab discontinuity. Arcone, S.A., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovaes, A., et al., (1979, p.5749-5759). Laqued distribution and the dielectric constant of weshness.
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 205-223] Undersea pipelines and cables in polar waters. Mellor, M. [1978, 34p] Elbiography of permafrost soils and vegetation in the USS R 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. [1978, 81p] SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. [1978, 81p] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. [1979, 42p] Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p] Effects of a tundra fire on soil and vegetation gravigation. Carey, K.L., [1980, 33p] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A. et al. [1980, 67p] Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, [1981, 24p] Ecological impact of vehicle traffic on tundra Abele, G., (1981, 24p) Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p] Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p) Potholes the problem and solutions Eaton, R.A., (2022, p.160-162) Effects of inundation on six varieties of turfgrass. Erbisch, F.H., et al., [1982, 25p.] Effects of inundation on six varieties of turfgrass. Erbisch, F.H., et al., [1982, 25p.] Commission of the Chena River 1975 and 1976 CR 77-14 Working group on ice forces on structures. Carstens, T., ed.	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blusters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2549 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymene composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-454) MP 2395 Degree days Unified degree-day method for river ice cover thickness umulation. Shen, H.T., et al., (1985, p. 54-62) MP 2695 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 112)-1129 Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p. 146-158). MP 1983 Soil infiltration on land treatment zites. Abele, G., et al., (1980, 41p.) Aretic Ocean temperature, salinity and density, March-May 1979. MP 265, M. C. 182-65.	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D. G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y. et al. (1989, 7p.) SR 29-18 Detenation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Review of antitank obstacles for winter use. Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) SR 28-19 Deterion oxide ice Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) SR 28-19 Deuterion oxide ice Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 28-19 Deuterion oxide ice Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) Exception oxide ice Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) CR 38-25 Deuterion oxide ice Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) CR 28-42 Deuterion oxide ice Water quality during winter river navigation seasons. Sletter, R.S., (1985, 15p.) CR 78-84 Internal properties CR 76-36 Internal properties of the ice sheet at Cape Folger by radio cho sounding. Keither, T.E., et al., (1978, 12p.) CR 78-84 Interaction of a surface wave with a dielectric slab discontinuity. Arcone, S.A., et al., (1978, 10p.) Anisotropic properties of sea ice. Kovacs, A., et al., (1979, p.5749-5759) Liquid distribution and the dielectric constant of wet snow
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 89-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Reson, R.A., coord., [1981, 24p.] Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., Coord., [1981, 24p.] Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., [1982, 26p.] Potholes: the problem and solutions Eaton, R.A., [1982, 26p.] Effects of inundation on six varieties of turfgrass. Erbisch, F.H., et al., [1982, 25p.] Effects of off-road vehicle traffic on tundra iterrain Abele, G., et al., [1984, p. 283-294] Dome lee oreakup on the Chena River 1975 and 1976 McFadden, T., et al., [1977, 44p.] Working group on ice forces on structures. Carstens. T., ed., [1970, 146p.] SR 206-26	Defects Guide to managing the pothole problem on roads. Eaton. R.A., et al., [1981, 24p.] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p. 426-429] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p.] CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., [1981, 12p.] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p. 320-333] MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., [1988, p. 435-458] Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., [1985, p. 54-62] MP 2657 Thin ice growth Ashton, G.D., [1989, p. 564-566] MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., [1985, p.1123-1129] Density (smass/volume) Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., [1978, p.146-158] MP 1999 Density (smass/volume) Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., [1978, p.146-158] Soil infiltration on land treatment sites. Abele, G., et al., [1980, 41p.] Arctic Ocean temperature, salinity, and density, March-May. [1979. McPine, M.G., [1981, 20p.] Laboratevy and field use of seel tensioometers above and below	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of accoustic-to-sensine coupling. All-rit, D. G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) SR 88-15 Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(B)) SR 89-18 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, 7p.) SR 89-18 Detecation waves Review of antitank obstacles for winter use. Richmond, P.W., (1984, 12p.) Detroit River Water quality during winter river navigation seasons. Sletter, R.S., (1985, 56p.) SR 88-10 Deuterium oxide ice Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dielectric properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) Excavating tock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-36 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovaes, A., et al., (1979, p.5749-5759) Laqued distribution and the dielectric constant of wet snow Colbeck, S.C., (1980, p.21-39) VIII electrical properties of A., et al., (1978, 10p.) CR 78-64 NP 1349 VIII electrical properties of Sea ice. Kovaes, A., et al., (1979, NP 1288 Laqued distribution and the dielectric constant of wet snow Colbeck, S.C., (1980, p.21-39) VIII electrical properties of A., et al., (1987), 13p.) CR 8-10
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-2123) Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) Elbilography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. (1978, 81p.) Physical and thermal disturbance and protection of permafrost. Brown, J., et al. (1979, 42p.) Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al. (1980, 67p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 67p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson (1981, 24p.) Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord. (1981, 24p.) Ecological impact of schiele traffic on tundra Abele, G., (1981, 191-37) Surface disturbance and protection during economic development of the North. Brown, J., et al., (1981, 88p.) Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Pothole the problem and solutions Eaton, R.A., (1982, p.160-162) Effects of inundation on six varieties of turfgrass. Erbisch, E.H., et al., (1982, 25p.) SR 82-12 Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1984, p. 283-294) Domas lee oreakup on the Chen River 1975 and 1976 McFadden, T., et al., (1977, 44p.) CR 77-14 Working group on ice forces on structures. Carstens, T., ed., (1980, 146p.) Elimology of Lake Koecanusz, MT, the 1967-1972 study	Guide to managing the pothole problem on roads. Eaton. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load transal testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pasement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) Chamberlain, E.J., (1981, 10p) Chamberlain, E.J., (1981, 12p) Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafroit, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) MP 2569 Degradation Modifications of permafroit, East Oumalik, Alaska. Lawson, D.E., (1982, 33p) MP 2569 Degradation Lord, H.W., et al., (1988, p. 435-458) MP 2395 Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., (1985, p. 54-62) MP 2657 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay. Easton, R.A., et al., (1978, p. 146-158) MP 1909 Soil infiltration on land treatment zites. Abele, G., et al., (1930, 41p.) Arctic Ocean temperature, salinity and density, March-May 1979 McPrice, M.G., (1981, 20p.) SR 81-67 Laboratory and field use of soil tensioneters above and below of deg. C. Ingersoil, J., (1981, 17p.) SR 81-67 SR 81-67	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. All-rit, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1984, 12p.) CR 84-25 Detected wwwes Review of antitank obstacles for winter use. Richmond, F.W., (1984, 12p.) Detected www. MP 1895 Electrical resistivity profile of permafrost. Hockstra, P., (1974, 192-34) Excavating rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 78-84 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-84 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) All properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-84 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) All properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-84 Internal
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 305-323) MP 188 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., (1978, 81p.) CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 67p.) CR 80-39 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, (1981, 24p.) Ecotogical impact of vehicle traffic on tundra Abele, G., MP 1446 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 212) Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1984, p. 283-294) Potholes: the problem and solutions Eaton, R.A., (1982, 212) Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1974, 44p.) Potholes: the problem and solutions Eaton, R.A., (1982,	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blisters in built-up roofs due to cold weather. Critical, (1983, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaka. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness smulation. Shen, H.T., et al., (1985, p. 54-62) MP 2895 Thin ice growth Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay Eaton, R.A., et al., (1978, p. 146-158) MP 1899 Actic Ocean temperature, salinity and density, March-May 1979 McPince, M.G., (1981, 20p.) S.R. 21-6 Laboratory and field use of soil tensiometers above and below 0 deg C. Ingresolf, J., (1981, 17p.) Approximate solution to conduction freezing with density	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessing coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(B)) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al. (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al. (1989, 7p.) SR 89-18 Deteonation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) SR 89-18 Deteorite fiver Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) SR 88-19 Deteorite mostile fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Defective properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) Excavating fock, tee, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-36 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-64 Interaction of a surface wave with a dielectire slab discontinuity. Aerone, S.A., et al., (1978, 10p.) Anisotropic properties of sea ice. Kowacs, A., et al., (1979, p.5749-5759) Liquid distribution and the dielectire constant of wet snow Colbeck, S.C., (1980, p.21-39) VIII electrical properties of forcen ground near Point Barrow, Alaska. Aerone, S.A., et al., (1981, 13p.) CR 82-66 CR 82-66
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 89-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] Orthole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, [1981, 24p.] Dethole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., MP 1416 Ecological impact of vehicle traffic on tundra Abele, G., (1981, p.11-37) MP 1463 Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., [1982, 25p.] Effects of inundation on six varieties of turfgrass. Erbisch, E.H., et al., [1982, 25p.] Dems Lec oreakup on the Chena River 1975 and 1976 McFadden, T., et al., [1977, 44p.] Working group on ice forces on structures. Carstens. T., ed., [1977, 44p.] Working group on ice forces on structures. Carstens. T., ed., [1977, 44p.] Working group on ice forces on structures. Carstens. T., ed., [1977, 44p.] Working group on the Chena River 1975 and 1976 McFadden, T., et al., [1977, 44p.] Working group on the Chena River 1975 and 1976 McFadden, T., et al., [197	Defects Guide to managing the pothole problem on roads. Eaton. R.A., et al., [1981, 24p] SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., [1978, p. 426-425] MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., [1981, 10p.] Russers in built-up roofs due to cold weather. Korhonen, C., et al., [1981, 12p.] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p. 320-333] MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., [1982, 33p.] On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., [1988, p. 435-458] Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., [1985, p. 54-62] MP 2395 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., [1985, p.123-1129] Density (smass/volume) Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., [1978, p.146-158] MP 1999 Density (smass/volume) Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., [1978, p.146-158] MP 1999 Laboratory and field use of sed tensioometers above and below 0 deg C. Ingersolf, J., [1981, 17p.] S.R. 80-36 Approximate solution to conduction freeing with density variation. Lumardini, V.J., [1981, p.43-45] MP 1598	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. All-rit, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 2p.) Detection of coarse sediment morement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) SR 88-15 Detection of coarse sediment morement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) TNT Zhang, Y., et al. (1989, 7p.) SR 89-18 Detection waves Review of antitank obstacles for winter use. Richmond, P.W., (1984, 12p.) Detection waves Review of antitank obstacles for winter use. Richmond, P.W., (1984, 12p.) Detection waves Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Deleteric properties Electrical resistivity profile of permafrost. Light, p. 28-34, MP 1891 Excavating tock, ice, and frozen ground by electromagnetic radiation. Hoeksita, P., (1976, 17p.) Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Laguad distribution and the dielectric constant of set snow Colbeck, S.C., (1980, p.21-39) Liquid distribution and the dielectric constant of set snow Colbeck, S.C., (1980, p.21-39) Laguad distribution and the dielectric constant of set snow Colbeck, S.C., (1980, p.21-39) Laguad distribution and the dielectric constant of set snow Colbeck, S.C., (1980, p.21-39) Laguad distribution and the dielectric properties between
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-232) Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) Elbilography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al., (1978, 81p.) Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., (1980, 67p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., (1980, 67p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., (1980, 67p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson (1981, 24p.) Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., (1981, 1917) Surface disturbance and protection during economic development of the North. Brown, J., et al., (1981, 88p.) MP 1446 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) MP 1447 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) MP 1447 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) MP 1449. Effects of inundation on six varieties of turfgrass. Erbisch, E.H., et al., (1982, 25p.) SR 82-12 Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1984, p. 283-294) MP 1820 Domas Ice loreakup on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) CR 77-14 Working group on ice forces on structures. Carstens, T., ed., (1980, 146p.) Limnology of Lake Koecanusz, MT, the 1967-1972 study Bonde, T.J. H., et al., (1982, 184p.) CR 83-07	Defects Guide to managing the pothole problem on roads. Eaton. R.A., et al., (1981, 24p.) R.A., et al., (1981, 24p.) S.R. 81-21 Deformation Technique for measuring radial deformation during repeated load triaxual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D.E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degraded degree-day method for river ice cover thickness simulation. Shen, H.T., et al., (1995, p. 54-62) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay. Easton, R.A., et al., (1978, p. 146-158). MP 1909 Soil infiltration on land treatment sites. Abele, G., et al., (1980, 4)p., S.R. 80-36 Artic Ocean temperature, salinity and density. March.May 1979. McPince, M.G., (1981, 20p.). S.R. 81-67 Approximate solution to conduction freezing with density variation. Lunardini, V.J., (1983, p. 43-45). MP 1598 Depth hoor	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chacho, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements fiber manifestion scasons. Sletters, R.S., (1984, 12p.) CR 34-25 Detention wares Review of antitank obstacles for winter use. Rechmond, CR 34-25 Single fiber measurements of permafrost. The fiber measurement of the resident of the content of the content of the permafrost. Hockstra, P., (1974, 12p.) MP 1845 Excavating fock, i.e., and froten ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-36 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-88 Anisotropic properties of sea ice. Kovacs, A., et al., (1978, 12p.) Signed distribution and the delectine constant of wet snow. Alaska. Arcone, S.A., et al., (1981, 13p.) CR 82-86 Laboratory measurements of soil electric properties between 0.1 and 5 GHz. Delancy, AJ., et al., (1982, 12p.) Laboratory measurements of soil electric properties between 0.1 and 5 GHz.
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] Millersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permaîtost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, [1981, 24p.] Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 21) Potholes: the problem and solutions Eaton, R.A., (1982, p.160-162) MP 1467 Effects of inundation on six varieties of turigrass. Erbsch, F.H., et al., [1982, 25p.] Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1982, 23p.) MP 1820 Dams lee breakup on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) GR 77-14 Working group on nec forces on structures. Carstens, T., et al., (1970, 144p.) SR 82-21 Tailwater flow conditions. Ferrick, M.G., et al., (1983, 31p.) Modeling rapidly varied flow in tailwaters.	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) GR 81-15 Blisters in built-up roofs due to cold weather. Critical, (1983, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2549 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., (1985, p. 54-62) MP 2395 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay. Easton, R.A., et al., (1978, p. 146-158) MP 1999 Laboratory and field use of seel tensiometers above and below Odeg C. Ingersoll, J., (1981, 17p.) S.R. 80-36 Approximate solution to conduction freezing with density variation. Lunardini, V.J., (1981, 17p.) MP 1598 Depth hour Growth of faceted crystals in a snow cover. Colbeck, S.C.	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, p. 367-373(8)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al. (1989, p. 7p.) SR 89-18 Detonation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) SR 89-18 Detonation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) SR 88-19 Detroit River Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) SR 88-19 Deuterium oxide fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Deleterite properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.23-34) SE reavaint frock, tee, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-36 Internal properties of the see sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovacs, A., et al., (1979, p.5749-5759) Laqued distribution and the dielectric constant of wet snow Colbeck, S.C., (1980, p.21-39) VIII electrical properties of frozen ground near Point Barrow, Alaska. Arcone, S.A., et al., (1981, 13p.) CR 82-46 Laboratory measurements of soil electric properties between 0.1 and 5 GHz. Delaney, A.J., et al., (1982, 12p.) CR 82-66 CR
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] MP 1185 Undersee pipelines and cables in polar waters. Mellor, M., (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-28 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation, Carey, K.L., [1980, 33p.] SR 89-22 Effects of a tundra fire on soil and vegetation Racine, C., (1980, 21p.) SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 67p.] R8-29 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., (1981, 24p.) Deffects of a tundra fire on tundra Abele, G., (1981, p.11-37) MP 1463 Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 18p.] Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Effects of inundation on six varieties of turfgrass. Erbisch, E.H., et al., [1982, 25p.) Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., [1982, 184p.] MP 1820 Dems lec bereatup on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) SR 80-26 Limnology of Lake Koocanusz, MT, the 1967-1972 study Bonde, T.J. H., et al., [1982, 184p.] SR 82-21 Tallwater flow conditions. Ferrick, M.G., et al., [1983, 31p.] Modeling rapidly varied flow in tailwaters. Ferrick, M.G., et al., [1984, p. 271-289]	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blisters in built-up roofs due to cold weather. Korhonen. C., et al., (1983, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness included agree-day method for river ice cover thickness included agree-day method for river ice cover thickness included adjacent wetlands. Ackleson, S.G., et al., (1988, p. 58-456) Thin ice growth. Ashton, G.D., (1989, p. 56-4-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overlay. Easton, R.A., et al., (1978, p. 146-158). MP 1909 Arctic Ocean temperature, salinity and density. March-May 1979. McPince, M.G., (1981, 17p.). S.R. 81-67 Laboratory and field use of soil tensiometers above and below 0 deg. C. Ingersolf, J., (1981, 17p.). S.R. 81-67 Approximate solution to conduction freering with density variation. Lunardini, V.J., (1983, p. 43-45). MP 1598 Depth hoor Growth of faceted crystals in a snow cover. Colbeck, S.C.	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chacho, E.F., Jr., et al., (1989, p.367-373(B)) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) MP 2752 Single fiber measurements fiber manifestion scasons. Sletters, R.S., (1984, 12p.) CR 34-25 Detention wares Review of antitank obstacles for winter use. Rechmond, CR 34-25 Single fiber measurements of permafrost. The fiber measurement of the resident of the content of the content of the permafrost. Hockstra, P., (1974, 12p.) MP 1845 Excavating fock, i.e., and froten ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-36 Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-88 Anisotropic properties of sea ice. Kovacs, A., et al., (1978, 12p.) Signed distribution and the delectine constant of wet snow. Alaska. Arcone, S.A., et al., (1981, 13p.) CR 82-86 Laboratory measurements of soil electric properties between 0.1 and 5 GHz. Delancy, AJ., et al., (1982, 12p.) Laboratory measurements of soil electric properties between 0.1 and 5 GHz.
Crude oil spills on black spruce forest Jenkins, T.F., et al. [1978, p. 305-323] Millersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permaîtost soils and vegetation in the USSR Andrews, M., [1978, 175p.] SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., [1978, 81p.] CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., [1979, 42p.] SR 79-05 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Effects of a tundra fire on soil and vegetation (1980, 21p.) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] SR 80-37 Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., [1980, 67p.] CR 80-29 Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord, [1981, 24p.] Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p.] Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 21) Potholes: the problem and solutions Eaton, R.A., (1982, p.160-162) MP 1467 Effects of inundation on six varieties of turigrass. Erbsch, F.H., et al., [1982, 25p.] Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1982, 23p.) MP 1820 Dams lee breakup on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) GR 77-14 Working group on nec forces on structures. Carstens, T., et al., (1970, 144p.) SR 82-21 Tailwater flow conditions. Ferrick, M.G., et al., (1983, 31p.) Modeling rapidly varied flow in tailwaters.	Defects Guide to managing the pothole problem on roads. Eston. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-425) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p) CR 81-22 Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness simulation. Shen, H.T., et al., (1985, p. 54-62) MP 2395 Thin ice growth. Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p.123-1129) Density (smass/volume) Temperature effects in compacting an asphalt concrete overlay. Eaton, R.A., et al., (1978, p.146-158) MP 1993 Soil infiltration on land treatment sites. Abele, G., et al., (1993, 41p). SR 80-34 Arctic Ocean temperature, salimity, and density, March-May 1979. McPinee, M.G., (1981, 17p) SR 81-07. Approximate solution to conduction freezing with density variation. Lumardini, V.J., (1981, 17p) SR 81-07. Approximate solution to conduction freezing with density variation. Lumardini, V.J., (1981, p.43-45). MP 1598 Depth home.	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, D.G. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) SR 88-15 Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) SR 97-18 Single fiber measurements for remote optical detection of TNT Zhang, Y., et al., (1989, 7p.) SR 89-18 Deteoaction waves Review of antitank obstacles for winter use. Reckmond, P.W., (1984, 12p.) CR 84-25 Deteoaction waves Review of antitank obstacles for winter use. Richmond, P.W., (1984, 12p.) CR 84-25 Deteoaction waves Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Deleteric properties Electrical resistivity profile of permafrost. (1974, p.23-34) Excavating rock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Anisotropic properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovacs, A., et al., (1979, p.5749-5759) Luquid distribution and the dielectric constant of wet snow MP 1349 VIIF electrical properties of sea ice. Kovacs, A., et al., (1979, 129) Laboratory measurements of soil electric properties between 0 1 and 5 GHz. Delancy, A.J., et al., (1982, 12p.) CR 82-86 Dielectric properties of thawed active layers Alexand.
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-323) MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. (1978, 81p.) CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. (1979, 42p.) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carcy, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation. Carcy, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation. Carcy, CR 80-27 Pothole primer, a public administrator's guide to understanding and managing the pothole pioblem Eaton, R.A. coord, (1981, 24p.) Ecological impact of schiele traffic on tundra Abele, G., (1981, 197) Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Effects of inundation on six varieties of turfgrass. Erbisch, F.H., et al., (1982, 25p.) SR 82-12 Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1984, p. 283-294) MP 1820 Domas lee oreakup on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) CR 77-14 Working group on ice forces on structures. Carstens, T., ed., (1980, 146p.) Limnology of Lake Koecanusz, MT, the 1967-1972 study Bonde, T.J.H., et al., (1982, 184p.) Talwater flow conditions. Ferrick, M.G., et al., (1984, p. 271-289) MP 1711 Design and performance of water-retaining embankments in permafrost. Sayles, F.H., (1984, p. 314-42) MP 1850 Survey of ice problem areas in navigable waterways. Mcfeli.	Defects Guide to managing the pothole problem on roads. Eaton. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 CR 81-16 CR 81-17 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-17 CR 81-16 CR	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) SR 89-18 Deteoaction waves Review of antitank obstacles for winter use. Rechmond, P.W., (1984, 12p.) CR 34-25 Detroit River Water quality during winter river nasigation seasons. Sletten, R.S., (1988, 56p.) SR 88-10 Deteoted mossible fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dishertic properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) Internal properties of the see sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-36 Internal properties of the see sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovacs, A., et al., (1978, p.5749-5759) Laquid distribution and the dielectine constant of wet snow. Alaska. Arcone, S.A., et al., (1981, 13p.) GR 82-36 Dielectric properties of frozen ground near Point Barrow, Alaska. Arcone, S.A., et al., (1981, 13p.) GR 82-36 Dielectric properties of shawed active layers. Accone, S.A., et al., (1982, p.618-626) Dielectric properties of thawed active layers. Accone, S.A., et al., (1982, p.618-626) Fifect of X-ray urradiation on internal friction and delectric relaxation of tee. Ragask, N., et al., (1983, p.8) 418-4317,
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-223) Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) Ebliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., (1978, 81p.) Tundra recovery since 1949 near Fish Creek, Alaska Lawson, D.E., et al., (1978, 81p.) Cry 7-82 Physical and thermal disturbance and protection of permafrost. Brown, J., et al., (1979, 42p.) Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) Effects of a tundra fire on soil and vegetation (1988, 24p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 67p.) Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 67p.) Pothole primer, a public administrator's guide to understanding and managing the pothole problem Eaton, R.A., coord., (1981, 24p.) Ecotogical impact of vehicle traffic on tundra Abele, G., MP 1446 Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1981, 24p.) Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 25p.) Effects of inundation on six varieties of turigrass. Erbsch, F.H., et al., (1982, 25p.) Effects of inundation on six varieties of turigrass. Erbsch, F.H., et al., (1977, 44p.) Swing group on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) Working group on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) Working group on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) Working group on the Grees on structures. Carstens, T., ed., (1980, p. 271-289) Modeling rapidly varied flow in tailwaters. Ferick, M.G., et al., (1983, p. 271-289) Modeling rapidly varied flow in tailwaters. Ferick, M.G., et al., (1983, p. 271-289) Swing Green effects of cores on structures and analyments in permafrost. Sayles, F.H., (1984, p. 31-42)	Defects Guide to managing the pothole problem on roads. Eston. R.A., et al., (1981, 24p.) R.A., et al., (1981, 24p.) Technique for measuring radial deformation during repeated load trianual testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p.) Blisters in built-up roofs due to cold weather. Korhonen, C., et al., (1981, 12p.) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2549 Degradation Modifications of permafrost, East Oumalik, Alaska. Lawson, D. E., (1982, 33p.) On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al., (1988, p. 435-458) Degree days Unified degree-day method for river ice cover thickness umulation. Shen, H.T., et al., (1985, p. 54-62) MP 2695 Thin ice growth. Ashton, G.D., (1989, p. 564-566) MP 2657 Delaware Bay Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al., (1985, p. 1123-1129) Density (mass/volume) Temperature effects in compacting an asphalt concrete overla). Eaton, R.A., et al., (1978, p. 146-158). MP 1803. Soil infiltration on land treatment zites. Abele, G., et al., (1980, 41p.) Aretic Ocean temperature, salinity and density, March-May 1979. McPace, M.G., (1981, 17p.) Agricularion Lunardini, V.J., (1981, 17p.) SR 81-65 Laboratory and field use of soil tensioneters above and below 0 deg. C. Ingersoll, J., (1981, 17p.) Agricularion Lunardini, V.J., (1981, 17p.) SR 81-65 Lepsh hoose Growth of faceted crystals in a snow cover. Colbeck, S.C., (1982, 19p.) Estimates and the desire of the desire of the control of the control architecture more accessible. Ledbetter, C.R., (1978, p. 1978, P. 1989.) SR 78-92	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sensine coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al. (1989, p.367-373(8)) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al. (1989, P.367-373(8)) Betonation waves Review of antitank obstacles for winter use. P.W., (1984, 12p.) Detroit River Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) Detroited River Water quality during winter river navigation seasons. Sletten, R.S., (1985, 56p.) Detertien wable fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dehertrie properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.23-34) Internal properties of the ice sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-94 Internation of a surface wave with a dielectric slab discontinuity. Arcone, S.A., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovacs, A., et al., (1979, p.5749-5759) Liquid distribution and the dielectric constant of wet snow Colbeck, S.C., (1980, p.21-39) Will electrical properties. Arcone, S.A., et al., (1982, 12p.) CR 23-64 CR 23-64 Delectric properties of thaved active layers of and S GHr. Delancy, A.J., et al., (1982, 12p.) CR 23-65 Fifect of X-ray irradiation on internal friction and dielectric relaxation of ice. Ragaki, k., et al., (1983, p.4314-4317, MP. 1476
Crude oil spills on black spruce forest Jenkins, T.F., et al. (1978, p. 205-323) MP 1185 Undersea pipelines and cables in polar waters. Mellor, M. (1978, 34p) CR 78-22 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska Lawson, D.E., et al. (1978, 81p.) CR 78-22 Physical and thermal disturbance and protection of permafrost. Brown, J., et al. (1979, 42p.) SR 79-05 Cost of ice damage to shoreline structures during navigation. Carcy, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation. Carcy, K.L., (1980, 33p.) SR 80-22 Effects of a tundra fire on soil and vegetation gnavigation. Carcy, CR 80-27 Pothole primer, a public administrator's guide to understanding and managing the pothole pioblem Eaton, R.A. coord, (1981, 24p.) Ecological impact of schiele traffic on tundra Abele, G., (1981, 197) Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Potholes: the problem and solutions Eaton, R.A., (1982, 26p.) Effects of inundation on six varieties of turfgrass. Erbisch, F.H., et al., (1982, 25p.) SR 82-12 Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., (1984, p. 283-294) MP 1820 Domas lee oreakup on the Chena River 1975 and 1976 McFadden, T., et al., (1977, 44p.) CR 77-14 Working group on ice forces on structures. Carstens, T., ed., (1980, 146p.) Limnology of Lake Koecanusz, MT, the 1967-1972 study Bonde, T.J.H., et al., (1982, 184p.) Talwater flow conditions. Ferrick, M.G., et al., (1984, p. 271-289) MP 1711 Design and performance of water-retaining embankments in permafrost. Sayles, F.H., (1984, p. 314-42) MP 1850 Survey of ice problem areas in navigable waterways. Mcfeli.	Defects Guide to managing the pothole problem on roads. Eaton. R.A. et al. (1981, 24p) SR 81-21 Deformation Technique for measuring radial deformation during repeated load triaxial testing. Cole, D.M., (1978, p. 426-429) MP 1157 Pavement deflection after freezing and thawing. Chamberlain, E.J., (1981, 10p) CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-15 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. Korhonen. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 CR 81-16 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-16 CR 81-16 CR 81-17 Blisters in built-up roofs due to cold weather. CR 81-16 CR 81-17 CR 81-16 CR	al (1987, p.36-43) Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p.) Experimental and theoretical studies of acoustic-to-sessinic coupling. Albert, DG. (1988, p.19-31) Analytical method for determining tetrazene in soil. Walsh, M.E., et al. (1988, 22p.) Detection of coarse sediment movement using radio transmitters. Chache, E.F., Jr., et al., (1989, p.367-373(B)) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) Single fiber measurements for remote optical detection of TNT. Zhang, Y., et al., (1989, 7p.) SR 89-18 Deteoaction waves Review of antitank obstacles for winter use. Rechmond, P.W., (1984, 12p.) CR 34-25 Detroit River Water quality during winter river nasigation seasons. Sletten, R.S., (1988, 56p.) SR 88-10 Deteoted mossible fee Mass transfer along ice surfaces. Tobin, T.M., et al., (1977, p.34-37) Dishertic properties Electrical resistivity profile of permafrost. Hockstra, P., (1974, p.28-34) Internal properties of the see sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) CR 78-36 Internal properties of the see sheet at Cape Folger by radio echo sounding. Keither, T.E., et al., (1978, 12p.) Anisotropic properties of sea ice. Kovacs, A., et al., (1978, p.5749-5759) Laquid distribution and the dielectine constant of wet snow. Alaska. Arcone, S.A., et al., (1981, 13p.) GR 82-36 Dielectric properties of frozen ground near Point Barrow, Alaska. Arcone, S.A., et al., (1981, 13p.) GR 82-36 Dielectric properties of shawed active layers. Accone, S.A., et al., (1982, p.618-626) Dielectric properties of thawed active layers. Accone, S.A., et al., (1982, p.618-626) Fifect of X-ray urradiation on internal friction and delectric relaxation of tee. Ragask, N., et al., (1983, p.8) 418-4317,

Dielectric measurements of frozen silt using time domain re-		
	Roof moisture surveys Tobiasson, W , (1982, p 163 166)	Preliminary results of ice modeling in the East Greenland
flectometry. Delaney, A.J., et al., 1984, p. 39-461 MP 1775	MP 1505	area. Tecker, W.B., et al. [1981, p.867-878] MP 1458
Coaxial waveguide reflectometry for frozen ground and ice.	Hydrology and climatology of a drainage basin near Fair- banks, Alaska Haugen, R.K., et al., 1982, 34p ₁	Application of a numerical sea see model to the East Green-
Delaney, A.J., et al., [1984, p.428-431] MP 2048	CR 82-26	land area Tucker, W.B., (1981, 109p) MP 1535
Dielectric studies of permafrost. Arcone, S.A., et al., [1985,	Interaction of gravel, surface drainage and culverts with per- mafrost. Brown, J., et al., (1984, 35p.) MP 2215	Dynamics of near-shore ice Kovacs, A., et al. [1981, p.125-135] MP 1599
p 3-5 ₁ MP 1951 Analysis of wide-angle reflection and refraction measure-	Rating unsurfaced roads. Eaton, R.A., et al. (1987, 34p.)	p 125-135) MF 1599 Sea see drag laws and boundary layer during rapid melting.
ments. Morey, R.M., et al., (1985, p.53-60)	SR 87-15	McPhee, M.G., [1982, 17p] CR 82-04
MP 1953	Deep frost effects on a longitudinal edge drain Allen, W L.,	Application of a numerical sea see model to the East Green-
Structure and dielectric properties at 48 and 9.5 GHz of saline ice Arcone, S.A., et al., §1986, p.14,281-14,303 ₁	[1989, p 343-352] MP 2449 Roof design in cold regions Tobiasson, W., [1989, p.462-	land area. Tucker, W.B., §1982, 40p.; CR 82-16 Offshore mechanics and Arctic engineering, symposium,
MP 2182	472 ₁ MP 2613	1983 (1983, 813p) MP 1581
Single-horn reflectometry for in situ dielectric measurements	Roof design in cold regions. Tobiasson, W., (1989, p. 1029-	Numerical simulation of the Weddell Sea pack ice Hibler,
at microwave frequencies. Arcone, S.A., et al., (1988, p.89-92) MP 2333	1037 ₃ MP 2651	W.D., III, et al., [1983, p.2873-2887] MP 1592
Electromagnetic measurements of a second-year sea ice floe	Dredging Effect of open water disposal of dredged sediments Blom,	Offshore petroleum production in sce-covered waters. Tuck- er, W.B., (1983, p. 207-215) MP 2006
Kovacs, A, et al. (1988, p 121-136) MP 2346	BE, ct al. (1976, 183p) MP 967	Modeling of ice discharge in river models. Calkins, D.J.
Unfrozen water content of soils. Smith, M.W., et al., [1988, 11p] CR 88-18	Consolidating dredged material by freezing and thawing.	(1983, p.285-290) MP 2061
CR 88-18 Correlation function study for sea ice. Lin, F.C., et al.	Chamberlain, E.J. [1977, 94p] MP 978	East Greenland Sea see variability in large-scale model simulations. Walsh, J.E., et al. [1984, p.9-14] MP 1779
[1988, p 14,055-14,063] MP 2511	Densification by freezing and thawing of fine material dredged from waterways. Chamberlain, E.J., et al., §1978.	Mechanism for floe clustering in the marginal ice zone. Lep-
Investigations of dielectric properties of some frozen materi-	p 622-628 ₁ MP 1103	păranta, M., et al. (1984, p.73-76) MP 1785
als. Arcone, S.A., et al. (1989, 18p.) CR 89-04 Estimating sea ice thickness using data from impulse radar	Subsex trenching in the Arctic. Mellor, M., [1981, 31p]	Sea ice data buoys in the Weddell Sea. Ackley, S.F., et al., 1984, 1803. CR 84-11
soundings. Kovacs, A, et al. (1989, 10p.) CR 89-22	CR 81-17	[1984, 18p] CR 84-11 Model simulation of 20 years of northern hemisphere sea-ice
Diffesion	Restoration of acidic dredge soils with sewage slidge and lime Palazzo, A.J., (1983, 11p.; CR 83-28	fluctuations Walsh, J.E., et al. (1984, p.170-176)
Transport equation over long times and large spaces.	Impact of dredging on water quality at Kewaunee Harbor,	MP 1767
O'Neill, K. [1981, p.1665-1675] MP 1497 Wetting fronts in porous media. Nakano, Y. [1983, p.71-	Wisconsin Iskandar, IK, et al. (1924, 16p) CR 84-21	Ice dynamics Hibler, W.D., III, [1984, 52p.] M 84-03
78 ₁ MP 1720	Use of remote sensing for the U.S. Army Corps of Engineers	Mechanical properties of sea see a status report. Weeks,
Soil-water diffusivity of unsaturated frozen soils at subzero	dri iging program McKim, H L., et al. (1985, p 114).	W.F., et al., [1984, p.135-198] MP 1800
temperatures. Nakano, Y., et al, (1983, p 889-893) MP 1664	1150 ₃ MP 1890	Sea see penetration in the Arctic Ocean. Weeks, W.F., [1934, p 37-65] MP 1993
Diffusivity of horizontal water flow through porous media	Potential of remote sensing in the Corps of Engineers dredg- ing program. McKim, H L., et al., (1985, 42p.)	Arctic sea are and naval operations Hibler, W.D., III, et al.,
Nakano, Y., (1985, p 26-31) MP 1881	SR 85-20	(1944, p 67-91) MP 1994
Transport of water in frozen soil 6. Effects of temperature	Use of SPOT HRV data in a Corps dredging operation in Lake	Numerical modeling of sea ace dynamics and ice thickness. Hibler, W.D., III, 1795, 500.1 CR 85-05
Nakano, Y., et al. [1987, p. 44-50] MP 2213 Effects of water and ice layers on the scattering properties of	Erie. Metry, C.J., et al. (1987, p.49-58; MP 2548 Use of SPOT HRV data in the Corps of Engineers dredging	Hibler, W.D., III., (1985, 50p.) CR 85-05 Numerical simulation of Northern Hemisphere sea see varia-
diffuse reflectors. Jezek, K.C., et al. (1987, p.5143-	program Merry, C.J., et al., (1988, p 1295-1299)	bility, 1951-1980 Walsh, J.E., et al. (1985, p.4847-
5147 ₁ MP 2301	MP 2528	4165 ₁ MP 1882
Discontinuous permetrost Combinida methodo foe budeslessed in serienticos en tro-	Drift	Sea ice and the Fairway Rock icefoot Kmacs, A., et al., (1985, p.25-32) MP 2145
Geophysical methods for hydrological investigations in per- mafrost regions. Hockstra, P., (1976, p.75-90)	Results of the US contribution to the Joint US/USSR Bering Sea Experiment Campbell, W.J., et al. (1974, 197p.)	Large-scale sce-ocean modeling. Hibler, W.D., III, 11986,
MP 932	MP 1032	p.165-184 ₁ MP 2142
Climatic and dendroclimatic indices in the discontinuous per-	Meso-scale strain measurements on the Beaufourt sea pack	lee dynamics Hibler, W.D., III, (1934, p.577-640) MP 2211
mafrost zone of the Central Alaskan Uplands. Haugen, RK, et al. [1978, p.392-398] MP 1899	nce (AIDJEX 1971) H:Ner, W.D., III, et al., e1974, p.119-138 ₁ NeP 1035	Mesocale sease deformation in the East Greenland margin-
Permafrost and active layer on a northern Alaskan road	Ice dynamics, Canadian Archipelago and adjacent Arctic Sa-	al see rone Lepparanta, M., et al. (1987, p.7060-7070)
Berg, R L., et al., (1978, p.615-621; MP 1102	sin Ramserer, R.O., et al. (1975, p.853-877;	MP 2241
Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., (1978, 175p.) SR 78-19	MP 1585	Alaska SAR facility Weeks, W.F., et al. (1988, p.10)-
	Remote measurement of sea see doft 10 blee W.D. III et	110 ₁ MP 2344
Sediment load and channel characteristics in subarctic upland	Remote measurement of sea ice drift Hibler, W.D., III, et al., (1975, p.541-554) MP 849	Evaluation of an operational see forecasting model during
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al. (1981, p 39-48)	al, (1975, p.541-554) MP 849 Sea ice drift and deformation from LANDSAT imagery Hi-	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 159-174)
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. MP 1518	al, (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery Hibler, W.D., III, et al., (1976, p.115-135) MP 1059	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. [1988, p.159-174]. MP 2347
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al. (1981, p 39-48)	al. (1975, p.541-554) MP 849 Sea we drift and deformation from LANDSAT imagery. Hibber, W.D. III, et al. (1976, p.115-135) MP 1059 Techniques for studying sea we drift and deformation at sites	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 159-174)
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al., [1981, p. 39-43]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in dis-	al., [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hiber, W.D. III. et al., [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D., III., et al., [1976, p.395-409] MP 846	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato. G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage.
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al. (1981, p. 19-48) MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al. (1983, p. 115-120) MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost: Sayles, F.H., (1984, p.61-62)	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hiber, WD, III, et al. (1976, p. 115-115) MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, WD, III, et al. (1976, p.595-609) MP 866 Sea ice conditions in the Arctic. Weeks, WF, (1976,	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 129-174). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Menge, J.A., et al. (1989, p. 87-99). MP 2667
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al., [1981, p. 39-43]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in dis-	al. (1975, p.541-554) MP 849 Sea we drift and deformation from LANDSAT imagery. Hisber, W.D., III, et al., (1976, p.115-135) MP 1059 Techniques for studying sea we drift and deformation at sites far from land using LANDSAT imagery. Hitber, W.D., III, et al., (1976, p.595-409) MP 846 Sea ice conditions in the Arctic Weeks, W.F., (1976, p.173-205) MP 910	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato. G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage.
Sediment load and channel characteristics in subarctic upland catchments. Slaughter, C.W., et al., [1981, p. 30-48]. MP 1518 Runoff from a small subarctic watershed, Alaska. Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. History, W.D., III., et al., (1976, p.115-135) MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. History, W.D., III., et al., (1976, p.173-205) Sea ice conditions in the Arctic Weeks, W.F., (1976, p.173-205) Seasonal variations in apparent sea see viscosity on the geophysical scale. History, W.D., III., et al., (1977, p. 87-96)	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 129-172). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al. (1989, p. 87-99). On modeling the baroclimit, adjustment of the Arctic Ocean Hilder, W.D., III, (1990, p. 247-250). Drift stations.
Sediment load and channel characteristics in subartice upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-932]. MP 2365	al., [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hiber, W.D. III. et al., [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at sites far from fand using LANDSAT imagery. Hibler, W.D. III. et al., [1976, p.595-609] MP 846 Sea ice conditions in the Aretic Weeks, W.F., [1976, p.173-205] MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D., III., et al., [1977, p. 87-90] MP 900	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 129-174). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Menge, J.A., et al. (1989, p. 87-99). MP 2647 On modeling the baroclini, adjustment of the Arctic Ocean. Hibler, W.D., III., (1990, p. 247-250). MP 2739 Drift stations. Some results from a linear-viscous model of the Arctic ice.
Sediment load and channel characteristics in subarctic upland catchiments. Slaughter, C.W., et al. [1981, p.30-43]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al. [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1976 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-921]. Water and suspended solids discharge during snowmelt.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. History, W.D., III., et al. (1976, p.115-135) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. History, W.D., III., et al. (1976, p.595-409) Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205) Prayanal variations in apparent sea see viscosity on the geo-physical scale. History, W.D., III., et al. (1977, p.823-90) Dynamics of near-shore see. Koyzes, A., et al. (1977,	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 129-172). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al. (1989, p. 87-99). On modeling the baroclimit, adjustment of the Arctic Ocean Hilder, W.D., III, (1990, p. 247-250). Drift stations.
Sediment load and channel characteristics in subartice upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 157-173]. MP 2765 Dislocations (moterials)	al., [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hiber, W.D. III. et al., [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at sites far from fand using LANDSAT imagery. Hibler, W.D. III. et al., [1976, p.595-609] MP 846 Sea ice conditions in the Aretic Weeks, W.F., [1976, p.173-205] MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D., III., et al., [1977, p. 87-90] MP 900	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1988, p. 129-172). MP 2347. Effect of see pressure on marginal see zone dynamics. Falso, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclinit, adjustment of the Arritic Ocean. Hibler, W.D., III., (1990, p. 247-250). MP 2739. Drift stations. Some results from a linearisticous model of the Arctic ice cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salinity and density, March-May
Sediment load and channel characteristics in subarictic upland catchments. Slaughter, C.W., et al., [1981, p. 30-48]. Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p.157-173]. Dislocations (motoriels). Dielectric properties of dathenition-free see. Itagaki, K.	al. (1975, p.541-554) Sea wee drift and deformation from LANDSAT imagery. Hibler, W.D., III., et al., (1976, p.115-135) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D., III., et al., (1976, p.595-409) Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205) Seasonal variations in apparent sea see viscosity on the geo-physical scale. Hibler, W.D., III., et al., (1977, p.87-90) MP 900 Dynamics of near-shore see. Koszek, A., et al., (1977, p.151-163)	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-172). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the bareclini, adjustment of the Artici Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2739 Drift stations. Some results from a linear-viscous model of the Artici ice cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1248 Artic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 207). SR 81-85.
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48], MP 1518 Runoff from a small subarctic watershed, Alaska, E.F., et al., [1983, p.115-120], MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62], MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-932], MP 2365 Water and suspended solids discharge during snowmelf Chacho, E.F., Jr., (1940, p.147-173). MP 2765 Dislocations (moteriels) Dielectric properties of dathscatton-free see [1978, p. 927-217]. MP 1171	al. (1975, p.541-554) Sea we drift and deformation from LANDSAT imagery. Hibler, W.D., III., et al., (1976, p.115-135) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D., III., et al., (1976, p.595-409) Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205) Seasonal variations in apparent sea see viscosity on the geo-physical scale. Hibler, W.D., III., et al., (1977, p.87-90) MP 900 Dynamics of near-shore see. Koszek, A., et al., (1977, p.151-163) Ice arching and the drift of pack tee through restricted channels. Sodhi, D.S., (1977, 1197) Nearshore see section near Frishnel Bay, Alaska. Turker,	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al. (1989, p. 87-99). MP 2687. On modeling the baroclimi, adjustment of the Artic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2799. Drift stations. Some results from a linear-viscous model of the Artic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Artic Ocean temperature, salinity and density, March-May 1979. McPiec, M.G. (1981, 202). SR 81-85. Aut-see-secan interaction experiments in Arctic marginal see.
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. Runoff from a small subarctic watershed, Alaska E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delancy, A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1940, p.167-173]. Dislocations (moteriels). Dislocations (moteriels). Dislocations (moteriels). Dislocation (moteriels). Light, N. MP 1171 X-ray measurement of charge density in ice. [1978, 120-7]. (P. 79-25).	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.115-115) MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.595-609) MP 846 Sea ice conditions in the Aretic Weeks, W.F., (1976, p.173-205) MP 910 Seasonal variations in apparent sea see suscessity on the geophysical scale. Hibler, W.D. III. et al. (1977, p. 87-90) MP 900 Dynamics of near-shore see. Konzes, A., et al. (1977, p. 151-163) Ice arching and the drift of pack ice through restricted channels. Sodhi, D.S., (1977, 119) Nearshore ice anotion near Frudhoe Bay, Alaska. Turker, W.B., et al. (1977, p. 23-31)	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2542 Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the barochini, adjustment of the Artistic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2339 Drift stations. Some results from a linear-viscous model of the Artistic cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1248 Artistic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 207). SR 84-28. Ait-see-socean interaction experiments in Arctic marginal see zones. (1984, 569). Methodale actote-social interaction experiments. Johan-
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-1932]. Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1990, p.167-173]. MP 2365 Dislocations (moteriels). Delective properties of dalacinton-free ice [1984, p. 207-217]. X-ray measurement of charge density in ice. [1928, L2p., [1978, L2p.]. Charged d-docation in ice. 2. Contribution of delective	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. History, W.D., III., et al., (1976, p.115-135) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. History, W.P. (1976, p. 173-205) Sea see conditions in the Arctic. Weeks, W.F., (1976, p.173-205) Seasonal synations in apparent sea see suscessity on the geo-physical scale. History, W.D., III., et al., (1977, p. 27-90) Dynamics of near-shore see. Koszek, A., et al., (1977, p. 151-163) Ice arching and the drift of pack tee through restricted channels. Sodds, D.S., (1977, 119) Nearshore see assotion near Prudhoe Bay, Alaska. Turker, W.B., et al., (1977, p. 23-31) Finite element formulation of a sea see drift model. Sodit, D.S., et al., (1977, p. 87-76). MP 1165	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 120-172). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al. (1989, p. 87-99). On modeling the baroclimi, adjustment of the Artist Ocean Hibler, W.D., III, (1990, p. 247-250). Drift stations. Some results from a linear-riseous model of the Artist ice cover. Hibler, W.D., III, et al. (1979, p. 293-304). MP 1248 Artist Ocean temperature, salonity and density, March-May 1979. McPine, M.G. (1981, 20p.). S.R. 84-28. Mesocale astroconcan interaction experiments. Arcist marginal see zones. (1984, 56p.). Mesocale astroconcan interaction experiments. Johannessen, O.M., ed. (1984, 176p.). S.R. 84-29.
Sediment load and channel characteristics in subartice upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska. Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J. et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 187-173]. MP 2765 Dislocations (moterials) Dielectric properties of dishocution-free icc. lingals, K., [1978, p. 207-217]. MP 1171 X-ray measurement of charge density in icc. lingals, K., [1978, 12p]. Charged Ashocation in icc. 2. Contribution of delectric relaxation. lingski, K., [1982, 15p.). CR 82-07	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.115-115) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.395-409) Sea ice conditions in the Aretic. Weeks, W.F., (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D. III. et al. (1977, p.27-90) MP 900 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163) Ice arching and the drift of pack see through restricted channels. Sodhi, D.S., (1977, p.23-31) Nearshoes see tootion near Prudhoe Bay, Alaska. Turker, W.B., et al. (1977, p.23-31) MP 1162 Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p.47-76) MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p.17-76) MP 1165	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 120-172). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al. (1989, p. 87-99). On modeling the barochini, adjustment of the Artisto Ocean Hibler, W.D., HI, (1990, p. 247-250). MP 2739 Drift stations. Some results from a linearioriscous model of the Artist ice cover. Hibler, W.D., HI, et al. (1979, p. 293-304). MP 1248 Artisto Ocean temperature, salanty and density, Marchi-May 1979. McPhee, M.G. (1981, 207). SR 84-28 Autoco-scean interaction experiments in Arctic marginal see zones. (1984, 569). Messocial extrace-ocean interaction experiments. Johannessen, O.M., ed. (1984, 1769). SR 84-29 Oceanic heat fins in the Fram Strait measured by a dofting bussy. Personich, D.K., et al. (1990, p. 291-294).
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mingative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Ir., [1940, p.167-173]. MP 2365 Dislocations (moterials). Dislocations (moterials). Delectine properties of dislication-free ice. [1938, p.207-217]. X-ray necuterment of charge density in ice. [1978, 12p]. CR 79-25 Charged dislocation in ice. 2. Contribution of delective relaxation. Itageks, K., [1982, 13p]. CR 82-07 sbeckt.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.115-115) MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.595-409) MP 846 Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-05), MP 910 Seasonal variations in apparent sea see viscosity on the geo-physical scale. Hisber, W.D., III., et al. (1977, p.87.90) MP 900 Dynamics of near-shore see. Koszes, A., et al. (1977, p.151-163) Ice arching and the drift of pack see through restricted channels. Soddit, D.S., (1977, 115) Nearshore see asotton near Frudhoe Bay, Alasta. Turker, W.B., et al., (1977, p.23-31; MP 1162 Finite element formulation of a sea see drift model. Soddit, D.S., et al., (1977, p.87-76). MP 1165 Dynamics of near-shore see. Koszes, A., et al., (1977, p.501-510). MP 1200	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al. (1988, p. 120-172). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al. (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al. (1989, p. 87-99). On modeling the baroclimi, adjustment of the Artist Ocean Hibler, W.D., III, (1990, p. 247-250). Drift stations. Some results from a linear-riseous model of the Artist ice cover. Hibler, W.D., III, et al. (1979, p. 293-304). MP 1248 Artist Ocean temperature, salonity and density, March-May 1979. McPine, M.G. (1981, 20p.). S.R. 84-28. Mesocale astroconcan interaction experiments. Arcist marginal see zones. (1984, 56p.). Mesocale astroconcan interaction experiments. Johannessen, O.M., ed. (1984, 176p.). S.R. 84-29.
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. MP 1518 Runoff from a small subarctic watershed, Alaska. Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927, 932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1990, p.187-173]. MP 2365 Dislocations (moteriels) Dielectric properties of dishonition-free see. [lingals, K., [1978, p.207-217]. Cr. procusurement of charge density in see. [lingals, K., [1978, 12p]. Charged dislocation in see. 2. Contribution of delectric relaxation. [lingals, K., [1982, 15p.]. CR 32-07 stocks. [lee engineering. O'Steen, D.A., [1920, p.41-47]. MP 1602.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.115-115) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.395-409) Sea ice conditions in the Aretic. Weeks, W.F., (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D. III. et al. (1977, p.27-90) MP 900 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163) Ice arching and the drift of pack see through restricted channels. Sodhi, D.S., (1977, p.23-31) Nearshoes see tootion near Prudhoe Bay, Alaska. Turker, W.B., et al. (1977, p.23-31) MP 1162 Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p.47-76) MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p.17-76) MP 1165	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclini, adjustment of the Arctic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2487. Some results from a linear-viscous model of the Arctic ice cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1248. Arctic Ocean temperature, salinity and density, March-May 1979. McPice, M.G., (1981, 20p.). SR 81-85. Autocovecan interaction experiments in Arctic marginal see zones, (1984, 58p.). Meloscale astrocovecan interaction experiments. Johannesten, O.M., ed., (1994, 176p.). Oreanic Acat fins in the Fram Strait measured by a dofting busy. Perovich, D.K., et al., (1990, p. 291-294). MP 2740. Drill core analysis.
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. Runoff from a small subarctic watershed, Alaska E.F., et al., [1983, p.115-120]. MP 1654 Mingative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1940, p.147-173]. MP 2365 Dislocations (moteriels) Dislocations (moteriels) Dislocations (moteriels) Dislocations (moteriels) Liggals, K., [1972, 120]. CR 79-25 Charged dislocation in i.e. 2. Contribution of dielectric relaxation. Itagels, K., [1982, 15p]. CR 82-07 Dockt Ice engineering. O'Steen, D.A., [1920, p.41-47]. MP 1602. Rebuilding infrastructure for pleasure boating. Westley.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.115-115). MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.595-409). MP 846 Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-05). MP 910 Seasonal variations in apparent sea see viscosity on the geo-physical scale. Hisber, W.D., III., et al. (1977, p.87-90). MP 900 Dynamics of near-shore see. Koszes, A., et al. (1977, p.151-163). MP 1073 Ice arching and the drift of pack see through restricted channels. Soddi, D.S., (1977, 119). MP 1073 Nearshore see asotton near Frudhoe Bay, Alaska. Turker, W.B., et al., (1977, p.87-16). MP 1168 Dynamics of near-shore see. Koszes, A., et al., (1977, p.501-510). MP 1168 Dynamics of near-shore see. Koszes, A., et al., (1977, p.501-510). MP 1200 Ice arching and the drift of pack see through channels. Sodhi, D.S., et al., (1978, p.415-443). MP 1200 Ice arching and the drift of pack see through channels. Sodhi, D.S., et al., (1978, p.415-443). MP 1108 Dynamics of near-shore see. Koszes, A., et al., (1978, p.11-180). MP 1108	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2542 Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the barochini, adjustment of the Artistic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2349 Drift stations. Some results from a linear-viscous model of the Artistic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1248 Artistic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., (1981, 207). SR 84-28 Meisscale activite-ocean interaction experiments. Johannessen, O.M., ed., (1994, 1707). Oceanic heat fins in the Fram Strait measured by a diffining busy. Perovich, D.K., et al., (1990, p. 291-294). Drill core analysis. Byrd. Land., quaternary. volcanism. Le Masurer, W.E.,
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 167-173]. MP 2365 Dislocations (moterials). Delecting properties of dishonition-free icc., [1978, p. 207-217]. X-ray measurement of charge density in icc., [1978, p. 207-217]. Charged dislocation in .cc. 2. Contribution of dielecting relaxation. Itagaka, K., [1982, 15p.]. Charged dislocation in .cc. 2. Contribution of dielectric relaxation. Itagaka, K., [1982, 15p.]. Charged dislocation in .cc. 2. Contribution of dielectric relaxation. Itagaka, K., [1982, 15p.]. CR 82-07 Docks. Icc. engineering. O'Steen, D.A., [1920, p. 41-47]. MP 1462. Rebuilding infrastructure for pleasure boating. CA., et al., [1989, p. 188-201].	al., [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al., [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al., [1976, p.595-609] MP 846 Sea ice conditions in the Arctic. Weeks, W.F., [1976, p.173-205] MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D., III., et al., [1977, p.87-90] MP 900 Dynamics of near-shore see. Kovics, A., et al., [1977, p.151-163] Ice arching and the drift of pack ice through restricted channels. Sodhi, D.S., [1977, p.1751-17] Finite element formulation of a sea see drift model. Sodhi, D.S., et al., [1977, p.87-76] Dynamics of near-shore see. Kovics, A., et al., [1977, p.503-510] Entitle element formulation of a sea see drift model. Sodhi, D.S., et al., [1977, p.87-76] Dynamics of near-shore see. Kovics, A., et al., [1977, p.503-510] Lee arching and the drift of pack ice through channels. Sodhi, D.S., et al., [1978, p.415-442] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163] Dynamics of near-shore see. Kovics, A., et al., [1978, p.115-163]	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclinic adjustment of the Arctic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2487 On modeling the baroclinic adjustment of the Arctic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2799 Drift stations. Some results from a linear-viscous model of the Arctic ice cover. Hibler, W.D., III., et al., (1979, p. 29)-304). MP 1248 Arctic Ocean temperature, salinity and density, March-May 1979. McPice, M.G., (1981, 20p.). SR 81-85 Autocovecan interaction experiments in Arctic marginal see zones, (1984, 549). Mesoscale active-ocean interaction experiments. SR 84-29 Oceanic heat flux in the Fram Strait measured by a dufting busy. Perovich, D.K., et al., (1990, p. 291-296). MP 2740 Drill core analysis. By 41 Land. quaternary. volcanism. Le Masuret, W.E., (1972, p. 139-141). Gras inclusions in the Antarctic see sheet. Gon., A.J., et al., et al.
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. Runoff from a small subarctic watershed, Alaska E.F., et al., [1983, p.115-120]. MP 1654 Mingative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927-932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1940, p.147-173]. MP 2365 Dislocations (moteriels) Dislocations (moteriels) Dislocations (moteriels) Dislocations (moteriels) Liggals, K., [1972, 120]. CR 79-25 Charged dislocation in i.e. 2. Contribution of dielectric relaxation. Itagels, K., [1982, 15p]. CR 82-07 Dockt Ice engineering. O'Steen, D.A., [1920, p.41-47]. MP 1602. Rebuilding infrastructure for pleasure boating. Westley.	al. (1975, p.541-554) Sea we drift and deformation from LANDSAT imagery. Hiber, W.D., III, et al. (1976, p.115-115). MP 1059 Techniques for studying sea we drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D., III, et al. (1976, p.595-409). MP 346 Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205). MP 910 Seasonal variations in apparent sea ice viscosity on the geo-physical scale. Hibler, W.D., III, et al. (1977, p.37-90). MP 910 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163). The arching and the drift of pack ice through restricted channels. Sodhi, D.S., (1977, p.19-1). MP 1167 Nearshore ice asotion near Frisidhee Bay, Alaska. Turker, W.B., et al. (1977, p.23-11). MP 1165 Dynamics of near-shore ice. Konzes, A., et al. (1977, p.503-510). MP 1165 Dynamics of near-shore ice. Konzes, A., et al. (1977, p.503-510). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1977, p.475-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p.415-431). MP 1200 Ice arching and the drift of pack ice through channels. Soding and the drift of pack ice through channels. Soding and the drift of pack ice through channels. Soding and the drift of pack ice through channels. Soding and the drift of pack ice through channels. Soding and the drift of pack ice through channels. Sodi	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1983, p. 129-174]. MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2522. Models of the mechanical properties of see. Richter-Menge, J.A., et al., [1989, p. 87-99]. On modeling the barocium, adjustment of the Arctic Ocean. Hilder, W.D., III., [1990, p. 247-250]. Dirlift stations. Some results from a linear-viscous model of the Arctic ice cover. Hilder, W.D., III., et al., [1970, p. 293-104]. Arctic Ocean temperature, salinity and density. March-May 1979. McPhee, M.G., [1981, 207]. Alti-sceocean interaction experiments in Arctic marginal see zones. [1984, 549]. Mresecale act-re-ocean interaction experiments. Johannessee, O.M., ed., [1994, 1769]. SR 84-28. Oreanic heat flux in the Fram Strait measured by a diffung busy. Perovisch, D.K., et al., [1990, p. 291-296]. MP 2740. Drill core analysis. Byrd Land. quanternary. volcanism. Le-Masurier, W.E., [1972, p. 139-141]. Gas inclusions in the Antarctic ice sheet. Gon., A.J., et al., [1973, p. 5101-5104]. MP 847
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 30-48]. MP 1518 Runoff from a small subarctic watershed, Alaska E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 147-173]. MP 2365 Dislocations (moteriels). Delective properties of dishoniton-free icc., [1978, p. 207-217]. X-ray measurement of charge density in icc., [1978, p. 207-217]. Charged dislocation in .ce. 2. Contribution of dielective relaxation. Itagaki, K., [1982, 15p.]. CR 32-67 Oocks. Icc. engineering. O'Steen, D.A., [1920, p. 41-47]. MP 1462. Rehuilding infrastructure for pleasure boating. C.A., et al., [1939, p. 188-201]. MP 2466 Doped fee. Properties of urea-doped icc. in the CRREL, test basin. CR 33-68	al. [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hitber, W.D. III. et al. [1976, p.595-609] Sea ice conditions in the Arctic. Weeks, W.F. [1976, p.173-205] MP 946 Sea ice conditions in apparent sea see suscessity on the geophysical scale. Hibber, W.D. III. et al. [1977, p.87-80] MP 949 Dynamics of near-shore see. Koszek, A., et al. [1977, p.151-163] Ice arching and the drift of pack see through restricted channels. Soddii, D.S. [1977, p.17-16] MP 1162 Finite element formulation of a sea see drift model. Soddii, D.S. et al. [1977, p.87-76] Dynamics of near-shore see. Koszek, A., et al. [1977, p.501-510] MP 1162 Finite element formulation of a sea see drift model. Soddii, D.S. et al. [1977, p.87-76] MP 1162 Dynamics of near-shore see. Koszek, A., et al. [1977, p.501-510] Me arching and the drift of pack see through channels. Soddii, D.S., et al. [1978, p.415-442] MP 1138 Dynamics of near-shore see. Koszek, A., et al. [1972, p.113-122] MP 1139 Me assurement of mesoscale deformation of Resultert sea see (AIDJEA-1971). Hibler, W.D., III. et al. [1978, p.131-172] MP 1179	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). MP 2487. On modeling the baroclini, adjustment of the Arctic Geen. Hibler, W.D., III., (1990, p. 247-250). MP 2739. Drift stations. Some results from a linear-riseous model of the Arctic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salinity and density, March-May 1979. McPire, M.G., (1981, 207). SR 81-85. Air-sec-scean interaction experiments in Arctic marginal researce, (1984, 569). ME 1240. Mesocale ast-re-scean interaction experiments. Johannessen, O.M., ed., (1994, 1769). Oceanic heat fluts in the Fram Strait measured by a dinfung busy. Perovich, D.K., et al., (1990, p. 291-294). MP 2740. Drill core analysis. Byrd Land. quaternary. volcanism. LeMasurer, W.E., (1977, p. 191-141). Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., (1975, p. 5101-5104). Internal structure and crystal fabrics of the West Antarctic see.
Sediment load and channel characteristics in subartics upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. Runoff from a small subarctic watershed, Alaska. E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927, 932]. Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1990, p.187-173]. MP 2365 Dislocations (moteriels) Dielectric properties of dishocution-free icc. [1824], K., [1978, p.207-217]. X-ray incasurement of charge density in icc. [1824], K., [1978, 12p]. Charged dislocation in icc. 2. Contribution of delectric relaxation. [1824], K., [1982, 15p]. Rehulding infrastructure for pleasure boating. C.A., et al., [1989, p.188-201]. MP 2466 Doped icc. Properties of urea-doped icc in the CRREL test haun. Dralonge.	al. (1975, p.541-554) Sea we drift and deformation from LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.115-115). MP 1059 Techniques for studying sea we drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.595-409). MP 346 Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205). MP 910 Seasonal variations in apparent sea see viscosity on the geo-physical scale. Hisber, W.D., III. et al. (1977, p.37-90). MP 910 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163). MP 1673 Ice arching and the drift of pack tee through restricted channels. Sodhi, D.S., (1977, 119). MP 1167 Nearshore see asotion near Frisidhee Bay, Alaska. Turker, W.B., et al. (1977, p.23-11). MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p.503-510). MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p.503-510). MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p.503-510). MP 1168 Dynamics of near-shore see. Konzes, A., et al. (1978, p.113-121). MP 1179 Edited of the oceanic boundary layer on the mean drift of pack iffect of the oceanic boundary layer on the mean drift of pack. Iffect of the oceanic boundary layer on the mean drift of pack.	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclinic adjustment of the Arctic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2487 Drift stations. Some results from a linear-viscous model of the Arctic ice cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241 Arctic Ocean temperature, salinity and density, March-May 1979. McPice, M.G., (1981, 20p.). SR 81-85 Autocovecan interaction experiments in Arctic marginal see zones, (1984, 549.). Methoscale actoreocean interaction experiments. SR 84-29 Oceanic heat finis in the Fram Strait measured by a defining busy. Perovich, D.K., et al., (1990, p. 291-296). MP 2740 Drill core analysis. By 4 Land, quaternary, volcanism. Le Massiret, W.E., (1972, p. 139-141). Gas inclusions in the Antarctic see sheet. Gon, A.J., et al., (1975, p. 5101-5104). MP 847 Internal structure and crystal fabrics of the West Antarctic see sheet. Gon, A.J., et al., (1975, p. 5101-5104).
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-1932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 157-173]. MP 2365 Dislocations (moteriels). Delective properties of datacnition-free ice [1978, p. 207-217]. MP 2765 Charged dislocation in ice. 2. Contribution of dielective relaxation. Itagals, K., [1982, 15p]. CR 82-07 shocks. Ice engineering. O'Steen, D.A., [1920, p. 41-47]. MP 1602. Rehuilding infrastructure for pleasure boating. C.A., et al., [1989, p. 188-201]. MP 2466 Doped fee. Properties of urea-doped ice in the CRREL test haun. Hirayama, K., [1983, 44p]. CR 83-66 Dersionge.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.115-115) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.595-609) MP 846 Sea ice conditions in the Arctic. Weeks, W.F. (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D. III. et al. (1977, p.87-90) MP 900 Dynamics of near-shore see. Kovics, A. et al. (1977, p.87-91) Ice arching and the drift of pack see through restricted channels. Sodhi, D.S. (1977, p.171-117) Near-shore see southern near Frudhoe Bay, Alaska. Tucker, W.B., et al. (1977, p.87-74) Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p.87-74) Dynamics of near-shore see. Kovics, A., et al. (1977, p.891-510) Ice arching and the drift of pack see through channels. Sodhi, D.S., et al. (1978, p.87-84) Dynamics of near-shore see. Kovics, A., et al. (1977, p.87-184) Dynamics of near-shore see. Kovics, A., et al. (1977, p.87-184) Dynamics of near-shore see. Kovics, A., et al. (1978, p.113-22) MP 1108 Measurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hiber, W.D., III. et al. (1978, p.113-172) MERSHOPPING MERSHOPPING OF SMIPH See (AIDJEX-1971). Hiber, W.D., III. et al. (1978, p.113-172) Effect of the occasise boundary layer on the mean drift of pack see application of a sumple model. Method, M. (1979).	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see rone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclim, adjustment of the Arctic Georgia states. Some results from a linearosiscous model of the Arctic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salonty and density, March-May 1979. McPice, M.G., (1981, 20p.). SR 81-85. Air-rec-socian interaction experiments in Arctic marginal see rones (1984, 56p.). SR 84-28. Mesocale selecte-ocean interaction experiments. Johannessen, O.M., ed., (1994, 176p.). Decanic heat fins in the Fram Strait measured by a dofting busy. Perosich, D.K., et al., (1990, p. 291-294). MP 2740. Defill core analysis. Byrd. Land. quaternary. volcanism. LeMasiner, W.E., (1972, p. 191-141). Gas inclusions in the Antarctic see sheet. Gow., A.J., et al., (1975, p. 191-141). Gas inclusions in the Antarctic see sheet. Gow., A.J., et al., (1972, p. 191-141). Defineation and ergineering chargiteristics of permateus see sheet. Gow., A.J., et al., (1976, p. 291-291). Defineation and ergineering chargiteristics of permateus see sheet. Health of the Resident Sea. Seliminer, P.V., et al., (1978, p. 201-271).
Sediment load and channel characteristics in subaricts upland catchments. Slaughter, C.W., et al., [1981, p.30-48]. MP 1518 Runoff from a small subarctic watershed, Alaska. Chacho, E.F., et al., [1983, p.115-120]. MP 1654 Mingative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p.927, 932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Ir., [1990, p.187-173]. MP 2365 Dislocations (moteriels) Dielectric properties of dalmention-free see. [1978, p.207-217]. MP 2765 Dislocations (moteriels) Dielectric properties of dalmention-free see. [1838k, K., [1978, p.207-217]. CR 79-25 Charged dadocation in see. 2 Contribution of delectric relaxation. [1838k, K., [1982, 15p.]. CR 79-25 Charged dadocation in see. 2 Contribution of delectric relaxation. [1838k, K., [1982, 15p.]. CR 82-07 sucks. [16 engineering. O'Steen, D.A., [1920, p.41-47]. MP 1642 Rebuilding infrastructure for pleasure boating. CA., et al., [1989, p.188-201]. MP 2466 Doped fee. Properties of urea-doped see in the CRREI, test hasin Hirayama, K., [1983, 44p]. CR 83-60 Dralonge. Topological properties of some trellis pattern chainel networks. Mock, S.J., [1976, 54p]. CR 76-64 Roof loads resulting from rain-on-show. Calbeck, S.C.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.115-115) MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D., III. et al. (1976, p.595-409) Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geo-physical scale. Hisber, W.D., III. et al. (1977, p.87-90) Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163) Ice arching and the drift of pack tee through restricted channels. Sodii, D.S., (1977, 119) Nearshore see asotion near Frudhoe Bay, Alaska. Turker, W.B., et al. (1977, p.23-31) MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1978, p.18-10) Dynamics of near-shore see. Konzes, A., et al. (1977, p.503-510) Ice arching and the drift of pack ise through channels. Sodii, D.S., et al. (1977, p.23-31) Dynamics of near-shore see. Konzes, A., et al. (1972, p.503-510) Ice arching and the drift of pack ise through channels. Sodii, D.S., et al. (1973, p.87-84) Dynamics of near-shore see. Konzes, A., et al. (1978, p.11-22) Measurement of mesoscale deformation of Beaution vas see (AIDJEX-1971). Hisber, W.D., III. et al. (1978, p.113-174) Iffect of the oceanic boundary layer on the mean drift of pack ise application of a simple model. Medical Sea pack ise. Aci. MP 1199 Diffining boop measurements on Weddell Sea pack ise.	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1983, p. 129-174]. MP 2347. Effect of see pressure on marginal see fore dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2522. Models of the mechanical properties of see. Richter-Menge, J.A., et al., [1989, p. 87-99]. On modeling the barocium, adjustment of the Arctic Ocean. Hibler, W.D., III., [1990, p. 247-250]. Drift stations. Some results from a linear-viscous model of the Arctic ice cover. Hibler, W.D., III., et al., [1970, p. 293-304]. Arctic Ocean temperature, salonity and density. March-May 1979. McPhee, M.G., [1981, 207]. SR 81-82. Air-teconcean interaction experiments in Arctic marginal see roots. [1984, 549]. Mesoscale astractorican interaction experiments. Incisen, O.M., ed., [1994, 1769]. SR 88-28. Oceanic heat first in the Fram Strait measured by a diffung busy. Perovisch, D.K., et al., [1990, p. 291-294]. MP 2740. Drill core analysis. Byrd Land. quanternary. volcanism. Le Masurier, W.E., [1972, p. 130-15104]. Gas inclusions in the Antarctic see sheet. Gow., A.J., et al., [1972, p. 130-15104]. Internal structure and crystal fabrics of the West Antarctic see sheet. Gow., A.J., et al., [1972, 179]. Delineation and cogimeering chargiteristics of permaftost beneath the Beaulout Sca., Sellowann, P.V., et al., [1975, p. 51-60].
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska, E.F., et al., [1983, p. 215-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-7932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1990, p. 157-173]. MP 2365 Dislocations (moteriels). Delective properties of dalacintion-free ice [1984, p. 207-217]. X-ray incasurement of charge density in ice. [1978, p. 207-217]. Charged d-discassion in .ce. 2. Contribution of dielective relaxation. Itagrik, K., [1982, 15p.]. CR 79-25 Charged d-discassion in .ce. 2. Contribution of delective relaxation. Itagrik, K., [1982, 15p.]. CR 82-07 shocks. Ice engineering. O'Steen, D.A., [1920, p.41-47]. MP 1642 Rebuilding infrastructure for pleasure boating. CA., et al., [1989, p. 188-201]. MP 2466 Doped fee. Properties of urea-doped ice in the CRREL test hasin. Hirayama, K., [1983, 44p.]. CR 83-66 Dopological properties of some trellis pattern channel networks. Mock, S.J., [1976, 54p.]. CR 77-12 Rof loads resulting from rain-on-show. Colbeck, S.C., [1973, 18p.].	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.115-115) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.595-609) MP 846 Sea ice conditions in the Arctic. Weeks, W.F. (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D. III. et al. (1977, p.87-90) MP 920 Dynamics of near-shore see. Konzek, A. et al. (1977, p. 151-163) Ice arching and the drift of pack ice through restricted channels. Sodhi, D.S. (1977, p.17-16) Near-shore ice associon near Fradhoe Bay, Alaska. Tucker, W.B., et al. (1977, p. 27-31) Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p. 97-76) Dynamics of near-shore see. Konzek, A., et al. (1977, p. 501-510) Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p. 415-442) MP 1138 Dynamics of near-shore see. Konzek, A., et al. (1977, p. 1981-191) Me assurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hibler, W.D., III. et al. (1978, p. 11-22) Measurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hibler, W.D., III. et al. (1978, p. 11-22) Measurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hibler, W.D., III. et al. (1978, p. 1198, p. 11-22) Measurement of assurpte model. Met Plands ice application of a sumple model. Met Plands ice application of a sumple model. Met Plands ice, S.F., (1979, p. 104-104). MP 1139	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347 Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522 Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclini, adjustment of the Arctic Ocean Hibler, W.D., III., (1990, p. 247-250). MP 2487 Drift stations. Some results from a linear-viscous model of the Arctic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 12481 Arctic Ocean temperature, salinity and density, March-May 1979. McPice, M.G., (1981, 20p.). SR 81-85. Autocovecan interaction experiments in Arctic marginal see zones, (1984, 58p.). Meloscale astricovecan interaction experiments. Johannesten, O.M., ed., (1994, 176p.). Oreane heat fins in the Fram Strait measured by a dofting busy. Perovich, D.K., et al., (1990, p. 291-294). MP 2740. Drill core analysis. Byrd. Land. quaternary. volcanism. LeMasurier, W.E., (1972, p. 139-141). Gas inclusions in the Antarctic see sheet. Gom, A.J., et al., (1975, p. 510-5104). MP 394. Cas inclusions and expineering share, teristics of permatrost beneath the Readout Sea. Sellmann, P.V., et al., (1972, p. 51-60). Defineation and expineering characteristics of permatrost beneath the Readout Sea. Sellmann, P.V., et al., (1973, p. 51-60).
Sediment load and channel characteristics in subartice upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1990, p. 167-173]. MP 2365 Dislocations (moteriels). MP 2765 Dislocations (moteriels). MP 1713 X-ray measurement of charge density in see [1884], K., [1978, p. 207-217]. CR 79-25 Charged Aslocation in .ce. 2. Contribution of delection relaxation. Itagkis, K., [1982, 15p.]. CR 82-97 sbocks. Ice engineering. O'Steen, D.A., [1980, p. 41-47]. MP 1692 Rehulding infrastructure for pleasure boating. CA., et al., [1989, p. 188-201]. MP 2466 Doped fee. Properties of urea-doped ice in the CRREL test haun Hirayama, K., [1989, p. 188-201]. CR 82-98 Draionge. Topological properties of some trellis pattern channel networks. Mock, S.J., [1976, 549]. CR 76-46 Roof loads resulting from rain-on-snow. CnBeck, S.C., [1971, 18p.]. CR 77-12. Storm stranage design considerations in cold reports.	al. (1975, p.541-554) Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.115-115). MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.395-609). MP 366 Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205). MP 910 Seasonal variations in apparent sea see suscessity on the geophysical scale. Hisber, W.D. III. et al. (1977, p.37-90). MP 900 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163). Ite arching and the drift of pack ice through restricted channels. Sodih, D.S., (1977, p.23-31). MP 1162 Finite element formulation of a sea see drift model. Sodih, D.S., et al. (1977, p.23-31). MP 1162 Finite element formulation of a sea see drift model. Sodih, D.S., et al. (1977, p.37-76). MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p.503-510). Lea arching and the drift of pack see through channels. Sodih, D.S., et al. (1978, p.415-442). MP 1138 Dynamics of near-shore see. Konzes, A., et al. (1973, p.141-22). MP 1105 Measurement of mesoscale deformation of Beautiert sea see (AIDJEN-1971). Hisber, W.D. III. et al. (1978, p.143-172). MP 1179 Effect of the oceanic boundary layer on the mean drift of pack see application of a simple model. SiePhee, M.G., 1979, p.331-400). MP 139 Duffing busy measurements on Weddell Sea pack see. Aci. (1978, p.191-105). MP 139 Oceanic boundary-layer features and oscillation at drift sta-	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1983, p. 129-174]. MP 2347. Effect of see pressure on marginal see aron dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2352. Models of the mechanical properties of see. Richter-Menge, J.A., et al., [1989, p. 87-99]. On modeling the barection, adjustment of the Arctic Ocean. Hilber, W.D., III., [1990, p. 247-250]. MP 2739. Differ stations. Some results from a linear-resours model of the Arctic ice cover. Hilber, W.D., III., et al., [1979, p. 293-304]. MP 1248. Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., [1981, 207]. SR 81-85. Air-recoveran interaction experiments in Arctic marginal see 2002. [1984, 549]. Mreweale actore-ocean interaction experiments. Johannessen, O.M., ed., [1984, 1769]. SR 84-28. Drill cove analysis. Byrd Land. quaternary. solicanism. Le-Maurier, W.E., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1972, p. 139-140]. Define the Beaulest Sea. Sellmann, P.V., et al., [1973, p. 510-50]. Dehication and engineering characteristics of permafrost beneath the Beaulest Sea. Sellmann, P.V., et al., [1973, p. 413-440).
Sediment load and channel characteristics in subartice upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 167-173]. MP 2365 Dislocations (moterials). MP 2165 Dislocations (moterials). MP 1713 X-ray measurement of charge density in see [lingals, K., [1978, p. 207-217]. CR 79-25 Charged dislocation in see 2 Contribution of delection relaxation. [lagals, K., [1982, 15p.]. CR 82-97 shocks. [c. engineering. O'Steen, D.A., [1920, p. 41-47]. MP 1602 Rehulding infrastructure for pleasure boating C.A., et al., [1989, p. 188-201]. MP 2466 Doped fee Properties of urea-doped see in the CRREL test haun Hirayama, K., [1989, p. 188-201]. CR 82-99 Draionge. Topological properties of some trellis pattern channel networks. Mock, S.J., [1976, 549]. CR 77-12, [1971, 1591]. Storm stranage design considerations in cold repons.	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.115-115) Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D. III. et al. (1976, p.595-609) MP 846 Sea ice conditions in the Arctic. Weeks, W.F. (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hibler, W.D. III. et al. (1977, p.87-90) MP 920 Dynamics of near-shore see. Konzek, A. et al. (1977, p. 151-163) Ice arching and the drift of pack ice through restricted channels. Sodhi, D.S. (1977, p.17-16) Near-shore ice associon near Fradhoe Bay, Alaska. Tucker, W.B., et al. (1977, p. 27-31) Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p. 97-76) Dynamics of near-shore see. Konzek, A., et al. (1977, p. 501-510) Ice arching and the drift of pack ice through channels. Sodhi, D.S., et al. (1978, p. 415-442) MP 1138 Dynamics of near-shore see. Konzek, A., et al. (1977, p. 1981-191) Me assurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hibler, W.D., III. et al. (1978, p. 11-22) Measurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hibler, W.D., III. et al. (1978, p. 11-22) Measurement of mesoscale deformation of Beautiest sea see (AIDJEX-1971). Hibler, W.D., III. et al. (1978, p. 1198, p. 11-22) Measurement of assurpte model. Met Plands ice application of a sumple model. Met Plands ice application of a sumple model. Met Plands ice, S.F., (1979, p. 104-104). MP 1139	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1983), p. 129-1751. MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclini, adjustment of the Arctic Gean. Hibler, W.D., III., (1990, p. 247-250). MP 2347. On modeling the baroclini, adjustment of the Arctic Gean. Hibler, W.D., III., (1990, p. 247-250). MP 2739. Drift stations. Some results from a linearisticous model of the Arctic Geover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salinity and density, March-May 1979. McPiter, M.G., (1981, 207). SR 81-85. Air-sec-socian interaction experiments in Arctic marginal expenses, (1984, 569). MF 2449. Mesociale astistic-ocean interaction experiments. Johannessen, O.M., ed., (1994, 1769). Oceanic heat flux in the Fram Strait measured by a dinfung busy. Perovich, D.K., et al., (1990, p. 291-294). MP 2740. Drill core analysis. Byrd Land. quaternary. volcanism. LeMasurer, W.E., (1977), p. 191-151. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., (1975, p. 5101-5104). Internal structure and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1974, p. 5104-5104). Delineation and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1974, p. 51-605). Delineation and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1975, p. 51-605). Delineation and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1974, p. 51-60). Delineation and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1974, p. 51-60). Delineation and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1974, p. 51-60). Delineation and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., (1974, p. 51-60). MP 2197-1975, CRRF1-1-505 permafrost program Resulten
Sediment load and channel characteristics in subartice upland catchments. Slaughter, C.W., et al., [1981, p. 30-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1990, p. 167-173]. MP 2365 Dislocations (moteriels). MP 2165 Dislocations (moteriels). MP 1713 X-ray measurement of charge density in see [lingals, K., [1978, p. 207-217]. CR 79-25 Charged dislocation in .ce 2 Contribution of delection relaxation. [lagaks, K., [1982, 15p.]. CR 82-97 sbocks. [c. engineering. O'Steen, D.A., [1980, p. 41-47]. MP 1692 Rehulding infrastructure for pleasure boating C.A., et al., [1989, p. 188-201]. MP 2466 Doped fee Properties of urea-doped ice in the CRREL test haun Hirayama, K., [1989, p. 188-201]. MP 2466 Doped fee Properties of urea-doped ice in the CRREL test haun Hirayama, K., [1989, p. 188-201]. CR 82-69 Proporties of urea-doped ice in the CRREL test haun CR 83-68 Dopical properties of some trellis pattern channel networks. Mock, S.J., [1976, 549]. CR 77-12 Storm stranage design considerations in cold repons. Lobace, E.F., et al., [1973, p. 474-489]. MP 1608. CR 77-12 Forst action in New Jersey highways. Berg. R.L., et al., [1972, 80p.]. SR 78-69	al. (1975, p.541-554) Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.115-115). MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.P. 101, et al. (1976, p.395-407). MP 346 Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205). MP 910 Seasonal variations in apparent sea see suscessity on the geophysical scale. Hisber, W.D., III. et al. (1977, p.37-90). MP 900 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-162). MP 1073 Ice arching and the drift of pack see through restricted channels. Sodhi, D.S., (1977, p.23-31). MP 1162 Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p. 97-76). MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p. 503-510). VP 1200 Ice arching and the drift of pack see through channels. Sodhi, D.S., et al. (1977, p. 47-76). MP 1165 Dynamics of near-shore see. Konzes, A., et al. (1977, p. 503-510). VP 1200 Ice arching and the drift of pack see through channels. Sodhi, D.S., et al. (1973, p. 415-442). MP 1105 Measurement of mesoscale deformation of Beaution sea see (AIDJEN-1971). Hisber, W.D., III., et al., (1973, p. 143-172). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEN-1971). Hisber, W.D., III., et al., (1973, p. 143-172). MP 1179 Effect of the oceanic boundary layer on the mean drift of pack see application of a sample model. McPhee, M.G., (1979, p. 198-104) Diffing busy measurements on Weddell Sea pack see. Ack ice, S.F., (1979, p. 106-106). MP 1390 Oceanic boundary-layer features and oscillation at drift stations. McPhee, M.G., (1980, p. 270-2844). MP 1396 Sea see gravith, drift, and deeay. Hisber, W.D., III., et al., (1970, p. 104-106). MP 1298	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1983, p. 129-174]. MP 2347. Effect of see pressure on marginal see aron dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2352. Models of the mechanical properties of see. Richter-Menge, J.A., et al., [1989, p. 87-99]. On modeling the barection, adjustment of the Arctic Ocean. Hilber, W.D., III., [1990, p. 247-250]. MP 2739. Differ stations. Some results from a linear-resours model of the Arctic ice cover. Hilber, W.D., III., et al., [1979, p. 293-304]. MP 1248. Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., [1981, 207]. SR 81-85. Air-recoveran interaction experiments in Arctic marginal see 2002. [1984, 549]. Mreweale actore-ocean interaction experiments. Johannessen, O.M., ed., [1984, 1769]. SR 84-28. Drill cove analysis. Byrd Land. quaternary. solicanism. Le-Maurier, W.E., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1972, p. 139-140]. Define the Beaulest Sea. Sellmann, P.V., et al., [1973, p. 510-50]. Dehication and engineering characteristics of permafrost beneath the Beaulest Sea. Sellmann, P.V., et al., [1973, p. 413-440).
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska, E.F., et al., [1983, p.115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p.61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelf (Chacho, E.F., Jr., [1940, p.167-173]. MP 2365 Dislocations (moteriels). Delective properties of dathention-free see [1978, p. 207-217]. K-ray measurement of charge density in see [lagaki, K., [1978, 12p]. CR 82-07 shocks. Ite engineering. O'Steen, D.A., [1920, p.41-47]. MP 1602. Rebuilding infrastructure for pleasure boating. C.A., et al., [1989, p. 183-201]. MP 2466 Doped fee Properties of urea-doped see in the CRREL test hasin Hirayama, K., [1983, 44p]. CR 83-66 Prological properties of some trellis pattern channel networks. Mock, S.J., [1976, 54p]. CR 76-46, Sep. Roof loads resulting from rain-on-soom. Colbeck, S.C., [1971, 18p]. Storm strainage design considerations in cold repons to have the surface and training from rain-on-soom. Colbeck, S.C., [1971, 18p]. Storm strainage design considerations in cold repons Lobacz, E.F., et al., [1972, p. 474-489]. MP 1608 Frost action in New Jersey highways. Berg. R.L., et al., [1972, 80p]. Study of water drainage from columns of snow. Denoth, A.	al, [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III, et al., [1976, p.115-115]. MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D. III, et al., [1976, p.595-609]. MP 846 Sea ice conditions in the Aretic. Weeks, W.F., [1976, p.173-205]. MP 910 Seasonal variations in apparent sea see suscensity on the geophysical scale. Hisber, W.D., III, et al., [1977, p. 87-90]. MP 900 Dynamics of near-shore see. Kovics, A., et al., [1977, p. 151-163]. MP 1167 Ice arching and the drift of pack see through restricted channels. Sodiu, D.S., [1977, 117]. CR 77-18 Nearshoe see assistion near Frishne Bay, Alaska. Turker, W.B., et al., [1977, p. 23-31]. MP 1162 Finite element formulation of a sea see drift model. Sodiu, D.S., et al., [1977, p. 87-76]. MP 1165 Dynamics of near-shore see. Kovics, A., et al., [1977, p. 503-510]. MP 1165 Dynamics of near-shore see. Kovics, A., et al., [1977, p. 503-510]. MP 1120 Ice arching and the drift of pack see through channels. Sodiu, D.S., et al., [1978, p. 415-443]. MP 1129 Itelation of measurements of Kovics, A., et al., [1978, p. 141-121]. MP 1205 Measurement of measurements on through channels see application of a sumple model. McFiber, McFib	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclini, adjustment of the Arctic Ocean. Hibler, W.D., III., (1990, p. 287-250). MP 2399. Drift stations. Some results from a linear-viscous model of the Arctic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salently and density, March-May 1979. McPice, M.G. (1981, 20p.). SR 81-85. Autoco-seean interaction experiments in Arctic marginal see zones (1984, 58p.). SR 84-28. Mesocale astoric-seean interaction experiments. Johannessen, O.M., ed., (1994, 170p.). Drill cove analysis. Byrd. Land. quaternary. volcanism. Le-Masuner, W.E., (1977, p. 191-141). Gas inclusions in the Antarctic see sheet. Gow., A.J., et al., (1975, p. 510-5108). Internal structure and crystal fabrics of the West Antarctic see sheet. Gow., A.J., et al., (1975, p. 510-5108). Defineation and expineering. characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1972, p. 41-440). 1977. CR 78-1-1. SGS permafrost program Beaufort Sea., Alasia, operational report. Sellmann, P.V., et al., (1977, 197). Beforeation and engineering characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1977, 197). 1977. CR 78-1-1. SGS permafrost program Beaufort Sea., Alasia, operational engineering. characteristics of permafrost.
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 30-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 167-173]. MP 2365 Dislocations (moterials). Delecting properties of dishocition-free icc., [1978, p. 207-217]. MP 2765 Dislocations (moterials). Delecting properties of charge density in icc., [1978, p. 207-217]. MP 1771 X-ray measurement of charge density in icc., [1978, p. 207-217]. Charged dislocation in icc. 2. Contribution of delecting relaxation. Itagaki, K., [1982, 15p.]. CR 79-25 Obecks. Icc. engineering. O'Steen, D.A., [1980, p. 41-47]. MP 1462. Rehulding infrastructure for pleasure boating. CA., et al., [1979, p. 188-201]. MP 2466 Dopied fee Properties of urea-doped icc in the CRREL, test basin. Hirayama, K., [1983, 44p.]. CR 83-68 Draionage. Topological properties of some trellis pattern channel networks. Mock, S.J., [1976, 54p.]. CR 77-12 Storm strange design considerations in cold repross. Lobacz, E.F., et al., [1978, p. 474-489]. MP 1068 Frost action in New Jersey highways. Reg. R.L., et al., [1978, 80p.]. Study of water drainage from columns of snow. ct al., [1979, 1991].	al. [1975, p.541-554] Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hitber, W.D. III. et al. [1976, p.595-609] Sea ice conditions in the Arctic. Weeks, W.F. [1976, p.173-205] MP 266 Sea ice conditions in apparent sea see suscessity on the geophysical scale. Hibler, W.D. III. et al. [1977, p.27-90] Seasonal variations in apparent sea see suscessity on the geophysical scale. Hibler, W.D. III. et al. [1977, p.27-90] Dynamics of near-shore see. Konzek, A. et al. [1977, p.151-163] Ice arching and the drift of pack see through restricted channels. Soddii, D.S. [1977, p.27-16] Nearshoes see tootion near Frudhoe Bay, Alaska. Turkler, W.B., et al. [1977, p.27-16] Dynamics of near-shore see. Konzek, A. et al. [1978, p.1162] Finite element formulation of a was see drift model. Sodli, D.S., et al. [1977, p.27-76]. MP 1162 Dynamics of near-shore see. Konzek, A., et al. [1977, p.503-510]. Ice arching and the drift of pack see through channels. Sodlii, D.S., et al. [1978, p.415-442]. MP 1138 Dynamics of near-shore see. Konzek, A., et al. [1972, p.11-22]. MP 200 Measurement of mesoscale deformation of Beautiest sea see (AIDJEA-1971). Hibler, W.D. III. et al. [1978, p.131-172]. MP 1139 Diffing bony measurements on Weddell Sea pack see. Acides, S.F., [1979, p.104-103]. Oceanic boundary-layer features and oscillation at drift stations. McParen, M.G. [1990, p.270-243]. MP 1139 Oceanic boundary-layer features and oscillation at drift stations. McParen, M.G. [1990, p.270-243]. MP 1139 Oceanic boundary-layer features and oscillation at drift stations. McParen, M.G. [1990, p.270-243]. MP 1399 Nonsteady see drift in the Serant of Belle Isle. Sodla, D.S. et al. [1990, p.177-184]. NET 159	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1988, p. 129-175]. MP 2347. Effect of see pressure on marginal see zone dynamics. Fato, G.M. et al., [1989, p. 514-521]. MP 2352. Models of the mechanical properties of see. Richter-Menge, J.A., et al., [1989, p. 87-99]. MP 2467. On modeling the barecium, adjustment of the Arctic Ocean. Hibler, W.D., III., [1990, p. 247-250]. MP 2739. Diffe stations. Some results from a linear-resons model of the Arctic ice cover. Hibler, W.D., III., et al., [1979, p. 293-304]. MP 1248. Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., [1981, 207]. SR 84-28. Arctic Ocean temperature, salinity and density, March-May 1979. McPhee, M.G., [1981, 207]. SR 84-28. Mreseale actic-ocean interaction experiments marginal see zones [1984, 549]. Mreseale actic-ocean interaction experiments. Johannessen, O.M., ed., [1984, 1769]. SR 84-28. Drill cove analysis. Byrd Land. quaternary. soleanism. LeMasurier, W.E., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gon, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gon, A.J., et al., [1972, p. 139-141]. MP 2467. Defineation and engineering characteristics of permafrost beneath the Resultet Sea. Sellmann, P.V., et al., [1973, p. 137-141]. Defineation and engineering characteristics of permafrost beneath the Resultet Sea. Sellmann, P.V., et al., [1977, p. 417-440]. MP 1077. SR 77-41. Defineation and engineering characteristics of permafrost beneath the Resultet Sea. Sellmann, P.V., et al., [1977, p. 417-440]. SR 77-41. Defineation and engineering characteristics of permafrost beneath the Resultet Sea.
Sediment load and channel characteristics in subarities upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-1932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., [1940, p. 157-173]. MP 2365 Dislocations (moteriels). Delective properties of dalacintion-free ice [1978, p. 207-217]. MP 2765 Dislocations (moteriels). Delective properties of delective relaxation. Itagaki, K., [1982, 15p]. CR 79-25. Charged dedecation in .ce. 2. Contribution of delective relaxation. Itagaki, K., [1982, 15p]. CR 82-07 shocks. Ite engineering. O'Steen, D.A., [1920, p.41-47]. MP 1642. Rebuilding infrastructure for pleasure boating. C.A., et al., [1989, p. 188-201]. MP 1642. Properties of urea-doped ice in the CRREL, test hasin. Hirayama, K., [1983, 44p]. CR 83-06. Prological properties of some trellis pattern channel networks. Mock, S.J., [1976, 54p]. CR 76-46. Roof loads resulting from rannon-snom. Colbect, S.C., [1977, 19p]. Storm dramage design considerations in cold reposit brooks. Meck, S.J., [1976, 54p]. MP 1008. Frost action in New Jersey highways. Berg. R.L., et al., [1978, 19p]. Study of water dramage from columns of snow. Cr 79-61. SR 78-09. SR 78-09. SR 78-09.	al, [1975, p.541-554] MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III, et al., [1976, p.115-115]. MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D. III, et al., [1976, p.595-609]. MP 846 Sea ice conditions in the Aretic. Weeks, W.F., [1976, p.173-205]. MP 910 Seasonal variations in apparent sea see suscensity on the geophysical scale. Hisber, W.D., III, et al., [1977, p. 87-90]. MP 900 Dynamics of near-shore see. Kovics, A., et al., [1977, p. 151-163]. MP 1167 Ice arching and the drift of pack see through restricted channels. Sodiu, D.S., [1977, 117]. CR 77-18 Nearshoe see assistion near Frishne Bay, Alaska. Turker, W.B., et al., [1977, p. 23-31]. MP 1162 Finite element formulation of a sea see drift model. Sodiu, D.S., et al., [1977, p. 87-76]. MP 1165 Dynamics of near-shore see. Kovics, A., et al., [1977, p. 503-510]. MP 1165 Dynamics of near-shore see. Kovics, A., et al., [1977, p. 503-510]. MP 1120 Ice arching and the drift of pack see through channels. Sodiu, D.S., et al., [1978, p. 415-443]. MP 1129 Itelation of measurements of Kovics, A., et al., [1978, p. 141-121]. MP 1205 Measurement of measurements on through channels see application of a sumple model. McFiber, McFib	Evaluation of an operational see forecasting model during summer. Tucker, W.B., et al., (1988, p. 129-175). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the baroclini, adjustment of the Arctic Ocean. Hibler, W.D., III., (1990, p. 287-250). MP 2399. Drift stations. Some results from a linear-viscous model of the Arctic see cover. Hibler, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salently and density, March-May 1979. McPice, M.G. (1981, 20p.). SR 81-85. Autoco-seean interaction experiments in Arctic marginal see zones (1984, 58p.). SR 84-28. Mesocale astoric-seean interaction experiments. Johannessen, O.M., ed., (1994, 170p.). Drill cove analysis. Byrd. Land. quaternary. volcanism. Le-Masuner, W.E., (1977, p. 191-141). Gas inclusions in the Antarctic see sheet. Gow., A.J., et al., (1975, p. 510-5108). Internal structure and crystal fabrics of the West Antarctic see sheet. Gow., A.J., et al., (1975, p. 510-5108). Defineation and expineering. characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1972, p. 41-440). 1977. CR 78-1-1. SGS permafrost program Beaufort Sea., Alasia, operational report. Sellmann, P.V., et al., (1977, 197). Beforeation and engineering characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1977, 197). 1977. CR 78-1-1. SGS permafrost program Beaufort Sea., Alasia, operational engineering. characteristics of permafrost.
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1990, p. 145-173]. MP 2365 Dislocations (moteriels). MP 2165 Dislocations (moteriels). MP 2165 Dislocations (moteriels). MP 1171 X-ray measurement of charge density in ice. [1978, p. 207-217]. MP 1171 X-ray measurement of charge density in ice. [1978, p. 207-217]. CR 79-25 Charged dislocation in .ce. 2. Contribution of dielectric relaxation. Itagaki, K., [1982, 15p.]. CR 82-07 Oockt. Ice engineering. O'Steen, D.A., [1980, p. 41-47]. MP 1462 Rebuilding infrastructure for pleasure boating. CA., et al., [1989, p. 188-201]. MP 2466 Doped Ice. Properties of urea-doped ice in the CRREL, test basin. Hirayama, K., [1983, 44p.]. CR 78-64 Roof loads resulting from rain-on-show. Calbeck, SC., [1971, 18p.]. CR 77-12 Storm oftanage design considerations in cold regions. Lobace, E.F., et al., [1974, 54p.]. CR 77-12 Storm oftanage design considerations in cold regions. Lobace, E.F., et al., [1974, p. 474-489]. MP 1008 Front action in New Jeries highways. Resp. R.L., et al., [1972, 90.]. SR 78-09 Study of water drainage from columns of snow. Denoth, A. CR 79-61 Drainage network et a subarctic watershed. Reddinater, SR, et al., [1979, 97.]. SR 78-19 Drainage network analysis of a subarctic watershed. Reddinater, SR 78-19	al. (1975, p.541-554) Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.115-115). MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.595-609). MP 266 Sea ice conditions in the Arctic. Works, W.F. (1976, p.173-205). MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hisber, W.D. III. et al. (1977, p.27-90). MP 910 Dynamics of near-shore see. Konzek, A., et al. (1977, p.151-163). MP 1673 Ice arching and the drift of pack see through restricted channels. Soddii, D.S. (1977, p.17-11). MP 1162 Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p.27-12). MP 1162 Dynamics of near-shore see. Konzek, A., et al. (1977, p.503-510). MP 1205 Dynamics of near-shore see. Konzek, A., et al. (1977, p.503-510). MP 1163 Dynamics of near-shore see. Konzek, A., et al. (1977, p.503-510). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-121). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution at drift stations. McPatre, M.G. (1990, p.270-284). MP 1149 Dording busy measurements on Weddell Sea pack see. As al. (1970, p. 177-184). MP 1144 Continuum sea see model for a global cirrate model. Lieg. C.H. et al. (1980, p.177-184). MP 1142 Continuum sea see model for a global cirrate model. Lieg. C.H. et al. (1980, p.177-184). MP 1242 Sea see studies in the Veddell Sea aboard 1.	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1983, p. 129-175]. MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2452. Models of the mechanical properties of see. Richter-Meage, J.A., et al., [1989, p. 87-99]. MP 2467. On modeling the bareclinit, adjustment of the Arctic Geen. Hibler, W.D., III., [1990, p. 247-250]. Drift stations. Some results from a linear-visious model of the Arctic See cover. Hibler, W.D., III., et al., [1979, p. 293-304]. MP 1241. Arctic Ocean temperature, salinity and density, March-May 1979. McPiter, M.G., [1981, 207]. SR 81-28. Artice-ocean interaction experiments in Arctic marginal see roses [1984, 562]. Mesoscale active-ocean interaction experiments. Johannessen, O.M., ed., [1984, 1762]. Oceanic heat flut in the Fram Strait measured by a disting busy. Perovich, D.K., et al., [1990, p. 291-296]. MP 2740. Drill core analysis. Byrd. Land. quaternary. volcanism. LeMasurer, W.E., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1975, p. 5101-5103]. MP 294. Internalistructure and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., [1974, 279]. Definication and engineering share, firmines of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1976, p. 5104. 1977 CRRP1-4 SGS permatrost program Beaufort Sea, Alaska, operational report. Sellmann, P.V., et al., [1977, p. 412-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1977, p. 412-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1977, p. 412-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1978, p. 413-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1978, p. 413-440]. Definication and engine
Sediment load and channel characteristics in subarities upland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. Runoff from a small subarctic watershed, Alaska. E.F., et al., [1983, p. 115-120]. MP 1654 Mingative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1940, p. 157-173]. MP 2365 Dislocations (moterials). Dielectric properties of dishocution-free icc. lingals, K., [1978, p. 207-217]. MP 1171 X-ray incasurement of charge density in icc. lingals, K., [1978, 120]. CR 79-25 Charged Ashocution in icc. 2. Contribution of delectric relaxation. lingals, K., [1982, 15p.]. CR 82-07 shocks. Icc engineering. O'Steen, D.A., [1980, p. 41-47]. MP 1602 Rehulding infrastructure for pleasure boating. C.A., et al., [1939, p. 188-201]. MP 2466 Doped fee. Properties of urea-doped icc in the CRREL test haun. Hirayama, K., [1989, 148-201]. MP 2464 Doped fee. Properties of urea-doped icc in the CRREL test haun. Hirayama, K., [1989, 148-201]. CR 79-12 Storm dramage design considerations in cold repositionary. J., [1971, 1891]. Storm dramage design considerations in cold repositionary. J., [1971, 1891]. Storm dramage design considerations in cold repositionary. Storm dramage design considerations and cold repositionary. Storm dr	al. (1975, p.541-554) MP 849 Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III, et al. (1976, p.115-115) MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D. III, et al. (1976, p.595-409) Sea ice conditions in the Arctic. Weeks, W.F., (1976, p.173-205) MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hisber, W.D. III, et al. (1977, p.37-90) MP 900 Dynamics of near-shore see. Konzes, A., et al. (1977, p.151-163) Ice arching and the drift of pack see through restricted channels. Sodhi, D.S., (1977, p.37-16) Nearshore see isostion near Prodhoc Bay, Alaska. Turker, W.B., et al. (1977, p.37-16) Dynamics of near-shore see. Konzes, A., et al. (1977, p.39-11) Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p.37-16) Dynamics of near-shore see. Konzes, A., et al. (1977, p.503-510) Ice arching and the drift of pack see through channels. Sodhi, D.S., et al. (1973, p.415-441) Dynamics of near-shore see. Konzes, A., et al. (1973, p.111-22) Measurement of mesoscale deformation of Beaution sea see (AIDJEX-1971). Hisber, W.D., III, et al. (1973, p.141-171) Effect of the oceanic boundary layer on the mean drift of pack see application of a sample model. Methods sea see (AIDJEX-1971). Hisber, W.D., III, et al. (1973, p.141-172) Drifting busy measurements on Weddell Sea pack see. Acid (1978, p.194-100) Drifting busy measurements on Weddell Sea pack see. Acid (1978, p.196-103) Oceanic boundary-layer features and oscillation at drift stations. MicPiter, M.G., (1980, p.270-844). MP 1349 Sea see growth, drift, and decay. Hisber W.D. IIII, (1990, p.141-109) Nonsteady see drift in the Strait of Belle liste. Sodh, D.S., et al. (1980, p.17-184). MP 1432 Sea see studies in the Weddell Sea absard U.S.C.C. Polas Sea. Acidey, S.F., et al. (1980, p.18-9).	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., (1988, p. 129-173). MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., (1989, p. 514-521). MP 2522. Models of the mechanical properties of see. Richter-Meage, J.A., et al., (1989, p. 87-99). On modeling the barochim, adjustment of the Arctic Gean. Hibler, W.D., III., (1990, p. 247-250). MP 2347. On modeling the barochim, adjustment of the Arctic See cover. Hibler, W.D., III., (1990, p. 247-250). MP 1241. Arctic Ocean temperature, salinity and density, March-May 1979. McPiter, W.D., III., et al., (1979, p. 293-304). MP 1241. Arctic Ocean temperature, salinity and density, March-May 1979. McPiter, W.G., (1981, 20p.). SR 81-85. Artice-ocean interaction experiments in Arctic marginal researce, (1914, 56p.). SR 84-28. Mesocale astistis-ocean interaction experiments. Johannessen, O.M., ed., (1994, 1769.). SR 84-29. Oceanic heat finis in the Fram Strait measured by a dinfung busy. Perovich, D.K., et al., (1990, p. 291-294). MP 2740. Drill core analysis. Byrd Land. quaternary. volcanism. LeMasurer, W.E., (1977., p. 191-151). Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., (1975, p. 5101-5104). Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., (1975, p. 5101-5104). MP 2447. Delineation and engineering characteristics of permatric see sheet. Gow, A.J., et al., (1974, p. 51-60). MP 1970. Philocation and engineering characteristics of permatric beneath the Resident Sea. Sellmann, P.V., et al., (1977, p. 412-440). Delineation and engineering characteristics of permatric beneath the Resident Sea. Sellmann, P.V., et al., (1977, p. 412-440). Delineation and engineering characteristics of permatric beneath the Resident Sea. Sellmann, P.V., et al., (1977, p. 412-440). Delineation and engineering characteristics of permatric beneath the Resident Sea. Sellmann, P.V., et al., (1977, p. 412-440). Delineation and engineering characteristics of permatric beneat
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 19-48]. Runoff from a small subarctic watershed, Alaska. Chacho, E.F., et al., [1983, p. 115-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-42]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney. A.J., et al., [1988, p. 927-932]. MP 2365 Water and suspended solids discharge during snowmelt. Chacho, E.F., Jr., [1990, p. 167-173]. MP 2365 Dislocations (moteriels). MP 2765 Dislocations (moteriels). MP 2765 Dislocations (moteriels). MP 1771 X-ray measurement of charge density in see [1938, 1.20]. CR 79-25 Charged d-shocation in .ce. 2. Contribution of delection relaxation. Itagaki, K., [1982, 15p.]. CR 82-97 Oucks. Ice engineering. O'Steen, D.A., [1920, p. 41-47]. MP 1642. Rebuilding infrastructure for pleasure boating. CA., et al., [1939, p. 188-201]. MP 2466. Doped fee. Properties of urea-doped ice in the CRREL. test hasin Hirayama, K., [1983, 44p.]. CR 82-68 Draionge. Topological properties of some trellis pattern channel networks. Mock, S.J., [1976, 54p.]. CR 76-46 Roof loads resulting from rain-on-show. CR 82-68 Draionge. Topological properties of some trellis pattern channel networks. Mock, S.J., [1978, 54p.]. CR 76-46 Roof loads resulting from rain-on-show. CR 78-68 Front action in New Jersey highways. Berg. R.L., et al., [1972, 1991]. SR 78-69 Study of water drainage from columns of snow. Denoth, A., (1972, 209.) Drainage network of a subarctic watershed. Red thauer, S.R., et al., [1979, p. 349-159]. MP 1274 Hydrautic obaracteristics of the Deer Creek Lake land treat ment site during watewater application. Abele, G., et al.,	al. (1975, p.541-554) Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.115-115). MP 1059 Techniques for studying sea see drift and deformation at sites far from land using LANDSAT imagery. Hisber, W.D. III. et al. (1976, p.595-609). MP 266 Sea ice conditions in the Arctic. Works, W.F. (1976, p.173-205). MP 910 Seasonal variations in apparent sea see viscosity on the geophysical scale. Hisber, W.D. III. et al. (1977, p.27-90). MP 910 Dynamics of near-shore see. Konzek, A., et al. (1977, p.151-163). MP 1673 Ice arching and the drift of pack see through restricted channels. Soddii, D.S. (1977, p.17-11). MP 1162 Finite element formulation of a sea see drift model. Sodhi, D.S., et al. (1977, p.27-12). MP 1162 Dynamics of near-shore see. Konzek, A., et al. (1977, p.503-510). MP 1205 Dynamics of near-shore see. Konzek, A., et al. (1977, p.503-510). MP 1163 Dynamics of near-shore see. Konzek, A., et al. (1977, p.503-510). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-121). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution sea see (AIDJEA-1971). Hisber, W.D. III. et al. (1978, p.141-171). MP 1109 Measurement of mesoscale deformation of Beaution at drift stations. McPatre, M.G. (1990, p.270-284). MP 1149 Dording busy measurements on Weddell Sea pack see. As al. (1970, p. 177-184). MP 1144 Continuum sea see model for a global cirrate model. Lieg. C.H. et al. (1980, p.177-184). MP 1142 Continuum sea see model for a global cirrate model. Lieg. C.H. et al. (1980, p.177-184). MP 1242 Sea see studies in the Veddell Sea aboard 1.	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1983, p. 129-175]. MP 2347. Effect of see pressure on marginal see zone dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2452. Models of the mechanical properties of see. Richter-Meage, J.A., et al., [1989, p. 87-99]. MP 2467. On modeling the bareclinit, adjustment of the Arctic Geen. Hibler, W.D., III., [1990, p. 247-250]. Drift stations. Some results from a linear-visious model of the Arctic See cover. Hibler, W.D., III., et al., [1979, p. 293-304]. MP 1241. Arctic Ocean temperature, salinity and density, March-May 1979. McPiter, M.G., [1981, 207]. SR 81-28. Artice-ocean interaction experiments in Arctic marginal see roses [1984, 562]. Mesoscale active-ocean interaction experiments. Johannessen, O.M., ed., [1984, 1762]. Oceanic heat flut in the Fram Strait measured by a disting busy. Perovich, D.K., et al., [1990, p. 291-296]. MP 2740. Drill core analysis. Byrd. Land. quaternary. volcanism. LeMasurer, W.E., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gow, A.J., et al., [1975, p. 5101-5103]. MP 294. Internalistructure and crystal fabrics of the West Antarctic see sheet. Gow, A.J., et al., [1974, 279]. Definication and engineering share, firmines of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1976, p. 5104. 1977 CRRP1-4 SGS permatrost program Beaufort Sea, Alaska, operational report. Sellmann, P.V., et al., [1977, p. 412-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1977, p. 412-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1977, p. 412-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1978, p. 413-440]. Definication and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al., [1978, p. 413-440]. Definication and engine
Sediment load and channel characteristics in subarities unland catchments. Slaughter, C.W., et al., [1981, p. 39-48]. MP 1518 Runoff from a small subarctic watershed, Alaska Chicho, E.F., et al., [1983, p. 215-120]. MP 1654 Mitigative and remedial measures for chilled pipelines in discontinuous permafrost. Sayles, F.H., [1984, p. 61-62]. MP 1974 Seasonal variations in resistivity and temperature in discontinuous permafrost. Delaney, A.J., et al., [1988, p. 927-17932]. MP 2365 Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1940, p. 157-173]. MP 2365 Dislocations (moteriels). Delective properties of dalacintion-free see [1978, p. 207-217]. X-ray measurement of charge density in see [1978, p. 207-217]. Charged d-docation in .ce. 2. Contribution of delective relaxation. Itagiki, K., [1982, 15p.]. CR 79-25 Docks. Ice engineering. O'Steen, D.A., [1920, p. 41-47]. MP 1642 Rebuilding infrastructure for pleasure boating. C.A., et al., [1989, p. 188-201]. MP 2466 Doped fee. Properties of urea-doped see in the CRREL test hasin. Hirayama, K., [1983, 44p.]. CR 83-66 Doshooge. Topological properties of some trellis pattern channel networks. Mock, S.J., [1976, 54p.]. CR 70-46 Roof loads resulting from rain-on-show. Coheck, S.C., [1977, 15p.]. Storm. Harange design considerations in cold regions. Lohace, E.F., et al., [1978, p. 474-489]. MP 1068 Frost action in New Jersey highways. Berg. R.L., et al., [1978, 30p.]. St. 73-69 Drainage network analysis of a subarctic watershed. Reditaioer, S.R., et al., [1979, 7p.]. Drainage network analysis of a subarctic watershed. Reditaioer, S.R., et al., [1979, p. 349-359]. S.R. 79-19 Drainage network analysis of a subarctic watershed. Reditaioer, S.R., et al., [1979, p. 349-359]. S.R. 79-19 Drainage network analysis of a subarctic watershed. Reditaioer, S.R., et al., [1979, p. 349-359]. S.R. 79-19 Drainage network analysis of a subarctic watershed. Reditaioer, S.R., et al., [1979, p. 349-359]. S.R. 79-19 Drainage network analysis of a subarctic wat	al. [1975, p.541-554] Sea see drift and deformation from LANDSAT imagery. Hisber, W.D. III. et al. [1976, p.115-115] MP 1059 Techniques for studying sea see drift and deformation at site far from land using LANDSAT imagery. Hisber, W.D. III. et al. [1976, p.595-609] Sea ice conditions in the Arctic. Weeks, W.F. [1976, p.173-205] Seasonal sanations in apparent sea see suscensis on the geophysical scale. Hisber, W.D. III. et al. [1977, p. 87-90] Dynamics of near-shore see. Konzek, A. et al. [1977, p. 87-90] Dynamics of near-shore see. Konzek, A. et al. [1977, p. 151-163] Ice arching and the drift of pack see through restricted channels. Sodhi, D.S. [1977, p. 17-16] Near-shoe see association near Fradhoe Bay, Alaska. Tucker, W.B., et al. [1977, p. 9-7-16]. MP 1162 Finite element formulation of a sea see drift model. Sodhi, D.S., et al. [1977, p. 87-76]. MP 1165 Dynamics of near-shore see. Konzek, A., et al. [1977, p. 803-510]. Ice arching and the drift of pack see through channels. Sodhi, D.S., et al. [1978, p. 415-442]. MP 1138 Dynamics of near-shore see. Konzek, A., et al. [1978, p. 113-122]. MP 1105 Measurement of mesoscale deformation of Beautiest sea see (AIDHEX-1971). Hisber, W.D., III. et al. [1978, p. 113-122]. MP 1109 Drifting bussy measurements on Weddell Sea pack see. Acid see, S.F., [1979, p. 104-104]. MP 1139 Oceanic boundary-layer features and oscillation at drift stations. McPiters, M.G., [1980, p. 87-944]. MP 139 Oceanic boundary-layer features and oscillation at drift stations. McPiters, M.G., [1980, p. 87-944]. MP 139 Oceanic boundary-layer features and oscillation at drift stations. McPiters, M.G., [1980, p. 87-944]. MP 1394 Sea see growth, drift, and decay. Hisber, W.D., III. [1940, p. 141-204]. MP 1394 Continuum sea see model for a global circuit model. Ling, C.H., et al. [1980, p. 18-94]. MP 1394 Continuum sea see model for a global circuit model. Ling, C.H., et al. [1980, p. 18-94]. MP 1394 Continuum sea see model for a global circuit model. Ling, C.H., et al. [1980, p.	Evaluation of an operational see forecasting model during summer. Tocker, W.B., et al., [1988, p. 129-173]. MP 2347. Effect of see pressure on marginal see aron dynamics. Flato, G.M., et al., [1989, p. 514-521]. MP 2522. Models of the mechanical properties of see. Richter-Menge, J.A., et al., [1989, p. 87-99]. MP 2687. On modeling the barocium, adjustment of the Arctic Ocean. Hilber, W.D., III., [1990, p. 247-250]. MP 2739. Diffs stations. Some results from a linear-tyricous model of the Arctic (see cover. Hilber, W.D., III., et al., [1979, p. 293-304]. MP 1248. Arctic Ocean temperature, salinity and density. March-May 1979. McPhee, M.G., [1981, 207]. SR 81-82. Air-teo-ocean interaction experiments in Arctic marginal see rones. [1984, 549]. Mesocale actore-ocean interaction experiments. Johannessee, 1984, 549]. Drill cover analysis. Byrd Land. quaternary. solicanism. Le-Masuner. M.E., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gown, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gown, A.J., et al., [1972, p. 139-141]. Gas inclusions in the Antarctic see sheet. Gown, A.J., et al., [1972, p. 139-141]. Gas inclusions and expineering characteristics of permafront beneath the Beaufort Sea. Sellmann, P.V., et al., [1972, p. 13-140]. Delineation and expineering characteristics of permafront beneath the Beaufort Sea. Sellmann, P.V., et al., [1972, p. 13-140]. Delineation and engineering characteristics of permafront beneath the Beaufort Sea. Sellmann, P.V., et al., [1972, p. 13-140]. Delineation and engineering characteristics of permafront beneath the Beaufort Sea. Sellmann, P.V., et al., [1972, p. 13-140]. Delineation and engineering characteristics of permafront beneath the Beaufort Sea. Sellmann, P.V., et al., [1972, p. 13-141]. Delineation and engineering characteristics of permafront beneath the Beaufort Sea. Sellmann, P.V., et al., [1972, p. 13-141]. Delineation and engineering characteristics of permafront beneath the Beaufort Sea. Sell

Drill core analysis (cont.) Stratified debris in Antarctic ice cores. Gow, A.J., et al.	Chemical composition of haul road dust and vegetation. Is- kandar, I.K., et al, (1978, p.110-111) MP 1116	Construction of an embankment with frozen soil. Botz, J.J., et al, [1980, 105p.] SR 80-21
(1979, p.185-192) MP 1272	Road dust along the Haul Road, Alaska. Everett, K.R.,	Excavation of frozen materials. Moore, H.E., et al, 1980.
20-yr cycle in Greenland ice core records. Hibler, W.D., Ill, et al, (1979, p.481-483) MP 1245	[1980, p.101-128] MP 1352 Vibrating wire technology for settled dust monitoring. Dut-	p 323-345 ₁ MP 1360 Echo sounding
Antifreeze-thermodrilling, central Ross Ice Shelf. Zotikov,	ta, P.K, et al, [1988, p.71-82] MP 2516 Dust control	Variability of Arctic sea ice drafts. Tucker, W.B., et al.
I.A., [1979, 12p] CR 79-24 Ultrasonic tests of Byrd Station ice cores. Gow, A J., et al,	Sublimation and its control in the CRREL permafrost tunnel.	High frequency acoustical properties of saline ice. Jezek,
[1979, p.147-153] MP 1282	Johansen, N.I., (1981, 12p.) SR 81-08 Dasting	K.C, et al, (1989, p.9-23) MP 2686 Ecology
Margin of the Greenland ice sheet at Isua. Colbeck, S.C., et al, [1979, p.155-165] MP 1281	Snowmelt incr. see through albedo reduction. Colbeck, S.C.,	Ecological baseline on the Alaskan haul road. Brown, J, ed,
Features of permafrost beneath the Beaufort Sea. Sellmann,	[1988, 11p.] SR 88-26	(1978, 131p) SR 78-13
P.V., et al., [1980, p 103-110] MP 1344 Time-priority studies of deep ice cores. Gow, A J., [1980,	DYNAMIC LOADS Ice pressure on engineering structures. Michel, B, £1970,	Internation: Workshop on the Seasonal Sea Ice Zone, Monterey, Calumia, Feb. 26-Mar 1, 1979. Andersen, B.G.
p.91-102 ₁ MP 1308 Characteristics of permafrost beneath the Beaufort Sea. Sell-	71p ₁ M III-B1b Dynamic loads	ed, [1980, 357p.] MP 1292 Winter habitats of salmon and trout. Calkins, D.J., [1989,
mann, P.V., et al. [1981, p.125-157] MP 1428	Repetitive loading tests on membrane enveloped road sec-	9p. ₃ SR 89-34
US global ice core research program West Antarctica and beyond. Grootes, P.M., et al, [1989, 32p] MP 2709	tions during freeze thaw. Smith, N., et al, (1977, p.171- 197) MP 962	Sea ice a habitat for the foraminifer Neogloboquadrina pa- chyderma?. Dieckmann, G, et al. [1990, p 86-92]
Dominion Range ice core characteristics, Antarctica.	Technique for measuring radial deformation during repeated	MP 2732
Mayewski, P.A., et al, (1990, p 11-16) MP 2707 Drilling	load triaxial testing. Cole, D.M., (1978, p 426-429) MP 1157	Arctic research of the United States, Vol-4. [1990, 120p.] MP 2765
Subsurface explorations in permafrost areas. Cass, J.R., Jr.,	Freeze thaw loading tests on membrane enveloped road sec-	Economic analysis
(1959, p.31-41) MP 885 General considerations for drill system design Mellor, M,	tions. Smith, N., et al, (1978, p.1277-1288) MP 1158	Regionalized feasibility study of cold weather earthwork. Roberts, W.S., [1976, 190p.] SR 76-02
et al, (1976, p.77-111) MP 856	Critical velocities of a floating ace plate subjected to in-plane forces and a moving load Kerr, A.D., (1979, 12p.)	Economic development
USA CRREL shallow drill. Rand, J.H., [1976, p 133-137] MP 873	CR 79-19	International arctic research programs. Chung, J.S., comp, (1989, 74p) SR 39-21
Dynamics and energetics of parallel motion tools for cutting	Volumetric constitutive law for snow under strain. Brown, R L., (1979, 13p.) CR 79-20	U.S. Federal arctic research Devine, J.S., et al, 1989, p 65-74, MP 2671
and boring. Mellor, M., (1977, 85p ₁ CR 77-07 Ross Ice Shelf Project drilling, October-December 1976.	Cyclic loading and fatigue in ice. Mellor, M., et al, [1981,	Economics
Rand, J.H., (1977, p.150-152) MP 1061	p 41-53; MP 1371 On the buckling force of floating ice plates. Kerr, A D,	Towing icebergs. Lonsdale, H.K., et al. (1974, p.2) MP 1020
Large mobile drilling rigs used along the Alaska pipeline. Sellmann, P.V., et al, (1978, 23p) SR 78-04	[1981, 7p] CR 81-09	Some economic benefits of ice booms. Perham, R.E.,
Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B C., et al, [1978, p 7-36] MP 1075	Dynamic ice-structure interaction analysis for narrow vertical structures. Eranti, E., et al., [1981, p 472-479]	[1977, p.570-591] MP 959 Ecosystems
Engineering properties of submarine permafrost near Prudhoe	MP 1456	Tundra biome program. Brown, J., (1970, p.1278) MP 881
Bay. Chamberlain, E.J., et al, [1978, p 629-635] MP 1104	Acoustic emissions from polycrystalline ice St. Lawrence, WF, et al. (1982, p.183-199) MP 1524	Tundra biome applies new look to ecological problems in
Core drilling through Ross Ice Shelf. Zotikov, I.A., et al.	Dynamic ice-structure interaction during continuous crushing. Maattanen, M., [1983, 48p] CR 83-05	Alaska. Brown, J., (1970, p.9) MP 880
(1979, p 63-64) MP 1337 Danish deep drill; progress report: February-March 1979.	Dynamic buckling of floating ice sheets Sodhi, D.S.	Word model of the Barrow ecosystem. Brown, J., et al, [1970, p.41-43] MP 943
Rand, J.H., (1980, 37p.) SR 80-03	(1983, p. 822-833) MP 1607 Thermal patterns in ice under dynamic loading Fish, A.M.,	Synthesis and modeling of the Barrow, Alaska, ecosystem.
Drilling and coring of frozen ground in northern Alaska, Spring 1979. Lawson, D.E., et al. [1980, 14p.]	et al, (1983, p.240-243) MP 1742	Coulombe, H N., et al. (1970, p 44-49) MP 944 Bibliography of the Barrow, Alaska, IBP ecosystem model.
SR 80-12 Mechanics of cutting and boring in permafrost Mellor, M.	Dependence of crushing specific energy on the aspect ratio and the structure velocity. Sodhi, D.S., et al, [1984,	Brown, J., (1970, p 65-71) MP 946
(1980, 82p) CR 80-21	p.363-374 ₃ MP 1708	Influence of grazing on Arctic tundra ecosystems. Batzli, G O., et al. (1976, p.153-160) MP 970
South Pole ice core drilling, 1981-1982 Kuivinen, K C, et al, [1982, p 89-91] MP 1621	Determining the characteristic length of floating ice sheets by moving loads. Sodhi, D.S., et al., (1985, p.155-159)	Geobotanical atlas of the Prudhoc Bay region, Alaska. Walker, D A, et al, (1980, 69p.) CR 80-14
Calculating borehole geometry Jezek, K.C., et al. (1984,	MP 1855 Ice beam moving against a sloping structure. Sodhi, DS,	Arctic ecosystem the coastal tundra at Barrow, Alaska.
18p ₃ SR 84-15 Arctic ice and drilling structures Sodhi, D.S., £1985, p 63-	(1987, p 281-284) MP 2194	Brown, J., ed, (1980, 571p.) MP 1355 Coastal tundra at Barrow. Brown, J., et al. (1980, p.1-29)
69 ₁ MP 2119	Dynamic properties Dynamic aerosol flow chamber. Hewitt, A.D., (1988).	MP 1356
Response of permafrost to disturbance. Lawson, D.E., [1986, p.1-7] MP 2165	13p ₁ SR 88-21	Tundra and analogous soils Everett, K.R., et al, [1981, p. 139-179] MP 1405
Drilling in frozen ground, bitumens and concretes. Sell-	Dynamic analysis of a floating ice sheet undergoing vertical indentation. McGilvary, W.R., et al, (1990, p 195-203)	Introduction to abiotic components in tundra. Brown, J.,
mann, P.V., et al. (1988, 10p) SR 88-08 Engineering geology studies on the National Petroleum Re-	MP 2579	[1981, p.79] MP 1432 Point Barrow, Alaska, USA. Brown, J., [1981, p.775-776]
serve in Alaska. Kachadoonan, R, et al, (1988, p.899- 922) MP 2519	Earth dams Construction and performance of the Hess creek earth fill	WP 1434 U.S. tundra biome publication list. Brown, J, et al., [1983,
Introduction to drilling technology. Mellor, M., 1989,	dam, Livengood, Alaska. Simoni, O.W., (1973, p. 23-34) MP 859	29p j SR 83-29
p.95-114; MP 2591 Undersaturation in thawed permafrost at the beginning of	Slum, ing failure of an Alaskan earth dam. Collins, C.M., et	Education Technology transfer. Eaton, R, (1990, p 25)
freezeback. Ayorinde, O.A., [1990, p 317-321] MP 2582	a), (1977, 21p) SR 77-21 Remore sensing for earth dam site selection and construction	MP 2721
Drilling fluids	materials. Merry, C.J., et al, (1980, p.158-170) MP 1316	Elastic properties Flexible pavement resilient surface deformations. Smith, N.,
Sorption of military explosive contaminants on bentonite drilling muds Leggett, D.C., [1985, 33p] CR 85-18	Embankment dams on permafrost in the USSR. Johnson,	ct al, (1975, 13 leaves) MP 1264
Drills	T.C, et al, [1930, 59p.] SR 80-41 Earth fills	Resiliency of subgrade soils during freezing and thawing. Johnson, T.C., et al. [1978, 59p.] CR 78-23
Stake driving tools: a preliminary survey Kovacs, A, et al. [1977, 43p] SR 77-13	Construction and performance of the Hess creek earth fill	Photoelastic instrumentation—principles and techniques. Roberts, A, et al., (1979, 153p.) SR 79-13
Transverse rotation machines for cutting and boring in perma-	dam, Livengood, Alaska Simoni, O.W., (1973, p.23-34) MP 859	Bending and buckling of a wedge on an elastic foundation.
frost Mellor, M., (1977, 36p) CR 77-19 Mechanics of cutting and boring in permafrost Mellor, M.	Earth movement	Nevel, D. E., (1980, p.278-288) MP 1303 Effect of freezing and thawing on resilient modulus of granu-
[1981, 38p.] CR 81-26	Analysis of explosively generated ground motions using Fourier techniques Blouin, S.E., et al. (1976, 86p.)	lar soils. Cole, D.M., et al. [1981, p 19-26]
Prototype drill for core sampling fine-grained perennially frozen ground. Brockett, B E, et al. (1985, 29p.)	CR 76-28	MP 1484 Resistance of elastic rock to the propagation of tensile cracks
Drill bits for frozen fine-grained soils. Sellmann, PV, et al.	Earthquakes Environmental consequences of 1964 Alaska earthquake in	Peck, L., et al, [1985, p 7827-7836] MP 2052
[1986, 33p.) SR 86-27	Portage, Alaska Ovenshine, A.T., et al, [1974, p.3-9] MP 2409	Fiber composite materials in an arctic environment. Dutta, P.K., [1989, p.216-225] MP 2559
Auger bit for frozen fine-grained soil Scilmann, P.V., et al., [1986, 13p] SR 86-36	Placer River Silt-an intertidal deposit caused by the 1964	Elastic waves Observations of volcanic tremor at Mount St. Helens volcano.
Drops (liquids)	Alaska carthquake Ovenshine, A.T., et al., (1976, p. 151- 162) MP 2410	Fehler, M. (1984, p 3476-3484) MP 1770
Numerical simulation of atmospheric ice accretion Ackley, S.F., et al, [1979, p 44-52] MP 1235	Hydraulic transients: a seismic source in volcanoes and gla- ciers. St. Lawrence, W.F., et al. (1979, p 654-656)	Electric charge X-ray measurement of charge density in ice. Itagaki, K.,
Heat and mass transfer from freely falling drops at low tem-	MP 1181	(1978, 12p) CR 79-25
peratures Zarling, J.P., (1980, 14p.) CR 80-18 Condensate profiles over Arctic leads. Andreas, E.L., et al,	Alaska Good Friday carthquake of 1964. Swinzow, G K., (1982, 26p.) CR 82-01	Possibility of anomalous relaxation due to the charged dislo- cation process Itagaki, K., [1983, p.4261-4264]
(1981, p 437-460) MP 1479	Fluid dynamic analysis of volcanic tremor. Ferrick, M.G., et	MP 1669
Persistence of chemical agents on the winter battlefield Leggett, D.C., [1987, 20p] CR 87-12	al, [1982, 12p] CR 82-32 Source mechanism of volcanic tremor. Ferrick, M.G., et al,	Electric equipment S.mplified method for monitoring soil moisture. Walsh, J.E.,
Thermal and size evolution of sea spray droplets E.L., {1989, 37p.} Andreas, CR 89-11	(1982, p.8675-8683) MP 1576 Earthwork	et al. (1978, p 40-44) MP 1194 Mapping resistive scabed features using DC methods Sell-
Drying	Regionalized feasibility study of cold weather earthwork	mann, P.V., et al. (1985, p 136-147) MP 1918
Can wet roof insulation be dried out. Tobiasson, W, et al. [1983, p.626-639] MP 1509	Roberts, W.S., 1976, 190p; SR 76-02 Winter earthwork construction in Upper Michigan Haas,	Phase change heat transfer program for microcomputers. Buzzell, G M, et al. (1988, p.645-650) MP 2383
Dust	W.M., et al. (1977, 59p.) SR 77-40	Electric fields
Changes in the composition of atmospheric precipitation Cragin, J.H., et al. (1977, p.617-631) MP 1079	Some aspects of Soviet trenching machines Mellor, M., [1980, 13p] SR 80-07	Interaction of a surface wave with a dielectric slab discon- tinuity. Arcone, S.A., et al. [1978, 10p] CR 78-08
with the experience of the same	53.000	. ,

VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417) MP 1166	Seasonal variations in resistivity and temperature in discon- tinuous permafrost Delaney, A.J., et al. (1988, p.927-	Airborne measurement of sea ice thickness and subice bath- ymetry. Kovacs, A., et al. [1988, p.111-120]
Distortion of model subsurface radar pulses in complex die- lectrics. Arcone, S.A., [1981, p 855-864] MP 1472	932 ₁ MP 2365 Coastal subsea permafrost and bedrock observations using de	MP 2345 Electromagnetic measurements of a second-year sea ice floe
Electric heating	resistivity. Sellmann, P.V., et al, [1989, 13p] CR 89-13	Kovacs, A, et al, [1988, p.121-136] MP 2346
Methods to reduce see accumulation on miter gate recess walls. Rand, J.H., et al, [1989, 5p.] MP 2723	Determination of frost penetration by soil resistivity measure-	Airborne sea ice thickness sounding Kovacs, A., et al. (1989, p 1042-1052) MP 2623
Reduced winter leakage in gates with J-scals Rand, J.H., et al., [1989, 3p.] MP 2724	ments. Atkins, R.T., [1989, p 87-100] MP 2565 Electricity	Sea ice thickness measurement Kovacs, A., et al, [1989, p 394-424] MP 2693
Electric power	Utility distribution systems in Sweden, Finland, Norway and	Measurement of sea ice thickness using electromagnetic in-
Losses from the Fort Wainwright heat distribution system. Phetteplace, G., et al., [1981, 29p.] SR 81-14	England Aamot, H.W.C., et al, [1976, 121p] SR 76-16	duction Holladay, J.S., et al. (1990, p. 309-315) MP 2590
Ice growth and circulation in Kachemak Bay, Alaska. Daly,	Electromagnetic properties Excavating rock, ice, and frozen ground by electromagnetic	Airborne sea ice thickness sounding Kovacs, A., et al. [1990, p 225-229] MP 2737
Unconventional power sources for ice control at locks and	radiation. Hockstra, P. (1976, 17p) CR 76-36	Electron microscopy
dams. Nakato, T., et al, (1989, p 107-126) MP 2572	Radar anisotropy of sea ice. Kovacs, A, et al. (1978, p 6037-6046) MP 1139	Aerosols in Greenland snow and ice Kumai, M., (1977, p 341-350) MP 1725
Electrical grounding	Anisotropic properties of sea ice in the 50-150 MHz range. Kovacs, A, et al. (1979, p 324-353) MP 1620	Elemental analyses of ice crystal nuclei and aerosols. Kumai, M., (1977, 5p.) MP 1191
Improving electric grounding in frozen materials. Delaney, A.J., et al, [1982, 12p.] SR 82-13	Physical properties of sea ice and under-ice current orienta-	Antarctic soil studies using a scanning electron microscope.
Observations during BRIMFROST'83 Bouzoun, J.R., et al, (1984, 36p) SR 84-10	tion Kovacs, A., et al. [1980, p 109-153] MP 1323 Modeling of anisotropic electromagnetic reflection from sea	Kumai, M., et al. (1978, p 106-112) MP 1386 Measurement and identification of aerosols collected near
Conductive backfill for improving electrical grounding in frozen soils. Sellmann, P.V., et al, [1984, 199.]	ice. Golden, K.M., et al, (1980, p 247-294) MP 1325	Barrow, Alaska. Kumai, M., [1978, 6p.] CR 78-20 Electron microscope investigations of frozen and unfrozen
SR 84-17	Review of techniques for measuring soil moisture in situ.	bentonite. Kumai, M., [1979, 14p] CR 79-28
Electrical measurement Technique for measuring radial deformation during repeated	McKim, H L., et al, (1980, 17p) SR 80-31 Sea ice anisotropy, electromagnetic properties and strength	Ice crystal formation and supercooled fog dissipation. Kumai, M, [1982, p 579-587] MP 1539
load triaxial testing Cole, D.M., (1978, p 426-429) MP 1157	Kovacs, A, et al. (1980, 18p.) CR 80-20 Modeling of anisotropic electromagnetic reflection from sea	Electronic equipment Effects of conductivity on high-resolution impulse radar
Catalog of smoke/obscurant characterization instruments.	ice. Golden, K.M., et al. (1980, 15p) CR 80-23	sounding. Morey, R.M., et al., (1982, 12p.)
O'Brien, H.W., et al. (1984, p.77-82) MP 1865 ELECTRICAL PROPERTIES	Modeling of anisotropic electromagnetic reflections from sea- ice Golden, K.M., et al, [1981, p.8107-8116]	Meteorological and snow cover measurements at Grayling,
Snow as a material Bader, H., et al, [1962, 79p] M II-B	MP 1469 SNOW-ONE-A; Data report. Aitken, G.W., ed, (1982,	Michigan. Bates, R.E., et al. [1985, p 212-229] MP 2176
Electrical properties	641p ₁ SR 82-08	Embankments
Shallow electromagnetic geophysical investigations of perma- frost. Arcone, S.A., et al., [1978, p.501-507]	Geometry and permittivity of snow Colbeck, S.C., [1982, p.113-131] MP 1985	Thermoinsulating media within embankments on perennially frozen soil Berg, R.L., {1976, 161p} SR 76-03
MP 1101 Electrical properties of frozen ground, Point Barrow, Alaska	Performance and optical signature of an AN/VVS-1 laser rangelinder in falling snow: Preliminary test results La-	Light-colored surfaces reduce thaw penetration in permafrost. Berg, R L., et al, (1977, p 86-99) MP 954
Arcone, S.A., et al. [1982, p 485-492] MP 1572	combe, J., (1983, p 253-266) MP 1759	Construction of an embankment with frozen soil. Botz, J.J.,
Natural electrical potentials that arise when soils freeze. Yarkin, I.G., {1986, 24p. ₁ SR \$6-12	Characterization of snow for evaluation of its effect on elec- tromagnetic wave propagation. Berger, R.H., 1983,	et al. (1980, 105p) SR 80-21 Embankment dams on permafrost in the USSR. Johnson,
Borehole investigations of the electrical properties of frozen silt Arcone, S.A., et al., (1988, p. 910-915) MP 2364	p 35-42; MP 1648 Progress in methods of measuring the free water content of	T.C., et al, (1980, 59p) SR 80-41 Comparison of two-dimensional domain and boundary inte-
Electrical prospecting	snow. Fisk, D.J., (1983, p 48-51) MP 1649	gral geothermal models with embankment freeze-thaw field
Shallow electromagnetic geophysical investigations of perma- frost. Arcone, S.A., et al., [1978, p.501-507]	Electromagnetic properties of sea ice. Morey, R M, et al. (1984, 32p) CR 84-02	data Hromadka, TV, II, et al. (1983, p 509-513) MP 1659
MP 1101 Electrical resistivity	Electromagnetic properties of sea ice Morey, R.M., et al. [1984, p.53-75] MP 1776	Interaction of gravel, surface drainage and culverts with per- mafrost. Brown, J., et al. [1984, 35p] MP 2215
Conductivity and surface impedance of sea ice McNeill, D,	Electromagnetic pulse propagation in dielectric slabs. Ar-	Design and performance of water-retaining embankments in
Electrical resistivity profile of permafrost Hoekstra, P.	cone, S.A., [1984, p.1763-1773] MP 1991 Discussion Electromagnetic properties of sea ice by R.M.	Embankment dams on permafrost Sayles, FH. 1987,
(1974, p 28-34) MP 1045 Airborne E-phase resistivity surveys of permafrost. Sell-	Morey, A. Kovacs and G F N. Cox Arcone, S A., (1984, p.93-94) MP 1821	109p ₁ SR 87-11 Engine starters
mann, P.V., et al. (1974, p.67-71) MP 1046 Electrical ground impedance measurements in Alaskan per-	Authors' response to discussion on Electromagnetic proper-	Engine starters in winter Coutts, H.J., [1981, 37p]
mafrost regions. Hockstra, P., [1975, 60p] MP 1049	ties of sea ice Morey, R.M., et al. (1984, p.95-97) MP 1822	Engineering
Bedrock geology survey in northern Maine. Sellmann, P.V.,	Performance of microprocessor-controlled snow crystal repli- cator. Koh. G. (1984, p 107-111) MP 1866	Icings developed from surface water and ground water Carey, K L., (1973, 71p) M III-D3
et al, (1976, 19p) CR 76-37 Structural growth of lake ice. Gow, A.J., et al, (1977, 24p)	Electromagnetic properties of multi-year sea ice Morey, R.M., et al. [1985, p.151-167] MP 1902	Sea ice engineering Assur, A , [1976, p.231-234] MP 986
CR 77-01	Electromagnetic measurements of multi-year sea ice using	Delineation and engineering characteristics of permafrost
Computer program for determining electrical resistance in nonhomogeneous ground Arcone, SA, [1977, 169.]	impulse radar Kovacs, A., et al. (1985, 26p.) CR 85-13	beneath the Beaufort Sea. Sellmann, P.V., et al. (1977, p.385-395) MP 1074
CR 77-02 Selected examples of radiohm resistivity surveys for geotech-	Electromagnetic measurements of sea ice Kovacs, A, et al. [1986, p 67-93] MP 2020	Proceedings of the Second International Symposium on Cold Regions Engineering Burdick, J. ed. (1977, 597p.)
nical exploration. Hockstra, P., et al, [1977, 16p]	Electromagnetic properties of sea ice. Kovacs. A, et al.	MP 952
Numerical studies for an airborne VLF resistivity survey		
	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs,	Engineering properties of snow. Mellor, M. (1977, p.15-66) MP 1015
Arcone, S A, (1977, 10p) CR 77-05 Evaluation of electrical equipment for measuring permafrost	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A, et al. (1987, 45p) CR 87-06	Engineering properties of snow. Mellor, M. (1977, p. 15-66) MP 1015 Engineering properties of sea icc Schwarz, J. et al. (1977.
	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R. (1987, p 527-539) MP 2286	Engineering properties of snow. Mellor, M. (1977, p. 15-66) MP 1015 Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) MP 1065 Undersea pipelines and cables in pola: waters Mellor, M.
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42) MP 925 Investigation of an airborn- resistivity survey conducted at	(1986, p. 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles	Engineering properties of snow. Mellor, M. (1977, p. 15-66) MP 1015 Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) MP 1065 Undersea pipelines and cables in pola: waters Mellor, M. (1978, 34p) CR 78-22 Icc engineering O'Steen, D.A., (1980, p. 41-47)
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42) MP 925 Investigation of an airborn- resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p) CR 77-20	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R. (1987, p 527-539) MP 2286 Modeling the electromagnetic property, trends in sea ice; Part 1 Kovacs, A., et al. (1987, p 207-235) MP 2330 Two-stream multilayer, spectral radiative transfer model for	Engineering properties of snow. Mellor, M. (1977, p. 15-66) MP 1015 Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) MP 1065 Undersea pipelines and cables in pola: waters (1978, 34p) CR 78-22 Icc engineering O'Steen, D.A., (1980, p. 41-47) MP 1602
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42) MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p) CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417) MP 1166	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., [1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., (1987, p 527-539) MP 2386 Modeling the electromagnetic property trends in sea ice: Part 1 Kovacs, A., et al., [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D K., (1989, 17p) CR 89-15 Electromagnetic prospecting	Engineering properties of snow. Mellor, M. (1977, p. 15-66) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters Mellor, M. (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea ice zone Weeks, W. F., (1980, p. 1-35) MP 1293
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42). MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p.). CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A.	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R. (1987, p 527-539) MP 2286 Modeling the electromagnetic property trends in sea ice: Part 1 Kovacs, A., et al. (1987, p 207-235) MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, DK. (1989, 17p) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., (1976, p.75-90)	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters Mellor, M. (1978, 34p) Icc engineering O'Steen, D.A., (1980, p.41-47) Problems of the seasonal sea icc zone Wecks, W.F., (1980, p.1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed., (1980, 492p)
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42) MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p.) CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417) MP 1166 Electrical ground impedance Arcone, S.A., et al., (1978, 92p.) MP 1221 Geophysics in the study of permafrost Scott, W.J., et al.	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. [1987, 45p] CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., [1987, p 527-539] MP 2386 Modeling the electromagnetic property trends in sea ice; Part 1 Kovacs, A., et al. [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D.K., [1989, 17p) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., [1976, p.75-90] MP 932	Engineering properties of snow. Mellor, M. (1977, p. 15-66) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters Mellor, M. (1978, 34p.) Lee engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea icc zone Weeks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed. (1980, 492p.) MP 1321
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42) MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p.) CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p. 1399-1417) Electrical ground impedance Arcone, S.A., et al., (1978, 92p.) MP 1221 Geophysics in the study of permafrost Scott, W.J., et al., (1979, p. 93-115) MP 1266 Electrical resistivity of frozen ground Arcone, S.A., (1979.)	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R. (1987, p 527-539) MP 2286 Modeling the electromagnetic property trends in sea ice: Part 1 Kovacs, A., et al. (1987, p 207-235) MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D K. (1989, 17p) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., (1976, p.75-90) MP 932 Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al. (1977, p 39-42)	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters Mellor, M. (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea icc zone Wecks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed. (1980, 492p) MP 1321 Haul Road performance and associated investigations in Alaska Berg, R. L., (1980, p. 53-100) MP 1351
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42). MP 925 Investigation of an airborn- resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p.) CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417). MP 1166 Electrical ground impedance Arcone, S.A., et al., (1978, 92p.) Geophysics in the study of permafrost Scott, W.J., et al., (1979, p.93-115). MP 1266 Electrical resistivity of frozen ground Arcone, S.A., (1979, p. 32-37). MP 1623 Bibliography on techniques of water detection in cold regions.	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., [1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., [1987, p 527-539] MP 2286 Modeling the electromagnetic property trends in sea ice: Part 1 Kovacs, A., et al., [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D K., [1989, 17p.) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., [1977, p 39-42] MP 925 Geophysics in the study of permafrost Scott, W J., et al.	Engineering properties of snow. Mellor, M., (1977, p. 15-65) Engineering properties of sea ice Schwarz, J. et al., (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Ice engineering O'Steen, D.A., (1980, p. 41-47) Problems of the seasonal sea ice zone Wecks, W. F., (1980, p.1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed., (1980, 492p) Haul Road performance and associated investigations in Alaska Berg, R. L., (1980, p. 53-100) MP 1321 Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1981, p. 125-157) MP 1428
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42). MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p). CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417). MP 1166 Electrical ground impedance. Arcone, S.A., et al., (1978, 92p). MP 1221 Geophysica in the study of permafrost. Scott, W.J., et al., (1979, p. 93-115). Electrical resistivity of frozen ground. Arcone, S.A., (1979, p. 32-37). Bibliography on techniques of water detection in cold regions. Smith, D.W., comp., (1979, 75p). SR 79-10	t1986. p 57-133 MP 2197 blectromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. [1987, 45p] CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., [1987, p 527-539] MP 2386 Modeling the electromagnetic property trends in sea ice; Part 1 Kovacs, A., et al. [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D.K. [1989, 17p) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al. [1977, p 39-42] MP 925	Engineering properties of snow. Mellor, M. (1977, p. 15-66) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters Mellor, M. (1978, 34p) Icc engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea icc zone Wecks. W. F. (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed. (1980, 492p) MP 1321 Haul Road performance and associated investigations in Alaska Berg, R. L. (1980, p. 53-100) MP 1351 Characteristics of permafrost beneath the Beaufort Sea. Sell-
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., [1977, p. 39-42]. MP 925 Investigation of an airborn- resistivity survey conducted at very low frequency. Arcone, S.A., [1977, 48p.] CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., [1978, p. 1399-1417]. MP 1166 Electrical ground impedance Arcone, S.A., et al., [1978, 92p.] Geophysics in the study of permafrost Scott, W.J., et al., [1979, p. 39-3115]. MP 1266 Electrical resistivity of frozen ground Arcone, S.A., [1979, p. 32-37]. MP 1623 Bibliography on techniques of water detection in cold regions, Smith, D.W., comp., [1979, 75p.] Determination of frost penetration by soil resistivity ments. Atkins, R.T., [1979, 24p.] SR 79-22	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., (1987, p 527-539) MP 2286 Modeling the electromagnetic property trends in sea ice; Part 1 Kovacs, A., et al., (1987, p 207-235) MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D K., (1989, 17p) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., (1976, p.75-90) MP 932 Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42) MP 925 Geophysics in the study of permafrost Scott, W J., et al., (1979, p 93-115) Electromagnetic survey in permafrost Sellmann, P.V., et al., (1979, 7p) SR 79-14	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea ice Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) Problems of the seasonal sea ice zone Wecks, W. F. (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed. (1980, 492p, MP 1321) Haul Road performance and associated investigations in Alaska Berg, R. L. (1980, p. 53-100) MP 1351 Characteristics of permafrost beneath the Beaufort sea. Sellmann, P.V. et al. (1981, p. 125-157) MP 1428 Lee engineering for civil work baseline study. Carcy, K.L., et al. (1983, 91p) Computational mechanics in arctic engineering Sodhi, D.S.
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42). MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p). CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417). MP 1166 Electrical ground impedance. Arcone, S.A., et al., (1978, 92p). Geophysics in the study of permafrost. Scott, W.J., et al., (1979, p.93-115). MP 1266 Electrical resistivity of frozen ground. Arcone, S.A., (1979, p. 32-37). MP 1623 Bibliography on techniques of water detection in cold regions. Smith, D.W., comp., (1979, 75p). Determination of frost penetration by soil resistivity measurements. Atkins, R.T., (1979, 24p). Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p). MP 1315	## 2193. ## 219	Engineering properties of snow. Mellor, M., (1977, p. 15-65) Engineering properties of sea ice Schwarz, J. et al., (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Ice engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea ice zone Wecks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D., ed., (1980, 492p) MP 1321 Haul Road performance and associated investigations in Alaska Berg, R. L., (1980, p. 53-100) MP 1351 Characteristics of permafrost beneath the Beaufort Sea, Sellmann, P.V., et al., (1981, p. 125-157) MP 1428 Ice engineering for civil work baseline study. et al., (1983, 91p) Computational mechanics in arctic engineering Sodhi, D.S., MP 2472 Permafrost Benson, C., et al., (1986, p. 99-106)
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., [1977, p. 39-42]. MP 925 Investigation of an airborner resistivity survey conducted at very low frequency. Arcone, S.A., [1977, 48p]. CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., [1978, p. 1399-1417]. MP 1166 Electrical ground impedance Arcone, S.A., et al., [1978, 92p]. Geophysics in the study of permafrost Scott, W.J., et al., [1979, p. 93-115]. MP 1221 Geophysics in the study of permafrost Scott, W.J., et al., [1979, p. 32-37]. MP 1236 Electrical resistivity of frozen ground Arcone, S.A., [1979, p. 32-37]. MP 1623 Bibliography on techniques of water detection in cold regions, Smith, D.W., comp., [1979, 75p]. Determination of frost penetration by soil resistivity measurements. Atkins, R.T., [1979, 24p]. SR 79-22 Break-up of the Yukon River at the Haul Road Bridge, 1979, Stephens, C.A., et al., [1979, 22p]. MP 1315 Measurements of ground resistivity. Arcone, S.A., [1982].	t1986, p 57-133 MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. [1987, 45p] CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R. [1987, p 527-539] MP 2286 Modeling the electromagnetic property trends in sea ice: Part 1 Kovacs, A., et al. [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D.K. [1989, 17p] CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hocksitra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for incasuring permafrost distribution Sellmann, P.V., et al. [1977, p 39-42] MP 925 Geophysics in the study of permafrost (1979, p 93-115) Scott, W.J., et al. (1979, p 93-115) Scott, W.J., et al. (1979, p 91-115) Scott, W.J., et al. (1979, p 91-1	Engineering properties of snow. Mellor, M., (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al., (1977, p. 499-531) Undersea pipelines and cables in pola: waters Mellor, M., (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea ice zone Wecks, W.F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed., (1980, 492p) MP 1321 Haul Road performance and associated investigations in Alaska Berg, R.L., (1980, p. 53-100) MP 1351 Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1981, p. 125-157) Ice engineering for civil work baseline study. et al., (1983, 91p) Computational mechanics in arctic engineering Sodth, D.S. MP 2441 Sodth, D.S. MP 2072
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42). MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p). CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417). MP 1166 Electrical ground impedance. Arcone, S.A., et al., (1978, 92p). Geophysics in the study of permafrost. Scott, W.J. et al., (1979, p. 93-115). Electrical resistivity of frozen ground. Arcone, S.A., (1979, p. 32-37). MP 1266 Electrical resistivity of frozen ground. Arcone, S.A., (1979, p. 32-37). MP 1623 Bibliography on techniques of water detection in cold regions. Smith, D.W., comp., (1979, 75p). SR 79-10 Determination of frost penetration by soil resistivity measurements. Atkins, R.T., (1979, 24p). SR 79-22 Break-up of the Yukon River at the Haul Road Bridge. 1979. Stephens, C.A., et al., (1979, 22p). Figs. J. MP 1315 Measurements of ground resistivity. Arcone, S.A., (1982, p. 92-110). Improving electric grounding in frozen materials.	t1986, p 57-133 MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., [1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., [1987, p 527-539) MP 2286 Modeling the electromagnetic property, trends in sea ice; Part 1. Kovacs, A., et al., [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice. Perovich, D.K., [1989, 17p.) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hoekstra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for measuring permafrost distribution. Sellmann, P.V., et al., [1977, p 39-42] MP 925 Geophysics in the study of permafrost Scott, W.J., et al., [1979, p 93-115] Sm P 1266 Electromagnetic survey in permafrost Scott, W.J., et al., (1979, 7p) Electrical resistivity of frozen ground Acconc, S.A., (1979, p 32-37) Electromagnetic surveys of permafrost Accone, S.A., (1979, p 32-37) Electromagnetic surveys of permafrost CR 79-23 Electromagnetic subsurface measurements. Dean, A.M. Jr.,	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Icc engineering O'Steen, D.A., (1980, p. 41-47) Problems of the seasonal sea icc zone Weeks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed. (1980, 492p) Haul Road performance and associated investigations in Alaska Berg, R. L., (1980, p. 53-100) Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al., (1980, p. 13-117) Icc engineering for civil work baseline study. et al., (1983, 91p) Icc engineering for civil work baseline study. et al., (1983, 91p) Computational mechanics in arctic engineering (1984, p. 351-374) Permafrost Benson, C., et al., (1986, p. 99-106) Cold climate utilities manual Smith, D.W., ed., (1986, var p.; MP. 2135
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42). MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p). CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417). MP 1166 Electrical ground impedance. Arcone, S.A., et al., (1978, 92p). Geophysics in the study of permafrost. Scott, W.J., et al., (1979, p.93-115). Electrical resistivity of frozen ground. Arcone, S.A., (1979, p.32-237). MP 1266 Electrical resistivity of frozen ground. Arcone, S.A., (1979, p.32-237). MP 1627 Bibliography on techniques of water detection in cold regions. Smith. D.W., comp., (1979, 75p). SR 79-10 Determination of frost penetration by soil resistivity measurements. Atkins, R.T., (1979, 24p). Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p). Freak-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p). MP 1313 Measurements of ground resistivity. Arcone, S.A., (1982, 192-110). MP 1513 Improving electric grounding in frozen materials. Al., et al., (1982, 12p). SR 82-13 Radar wave speeds in polar glaciers. Jezek, K.C., et al.,	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al. (1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R. (1987, p 527-539) MP 2286 Modeling the electromagnetic property, trends in sea ice; Part 1 Kovacs, A., et al. (1987, p 207-255) MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D.K. (1989, 17p) Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., (1976, p.75-90) MP 932 Evaluation of electrical equipment for ineasuring permafrost distribution Sellmann, P.V., et al. (1977, p 39-42) Geophysics in the study of permafrost (1979, p 93-115) Electromagnetic survey in permafrost (1979, p 7p) Electromagnetic survey of permafrost (1979, 7p) Electromagnetic surveys of permafrost (1979, 74p) Electromagnetic surveys of permafrost (1979, 74p) Electromagnetic surveys of permafrost (1981, 19p) Measurements of ground resistivity Arcone, S.A., (1982, SR 81-23) Measurements of ground resistivity Arcone, S.A., (1982, SR 81-23)	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola; waters Mellor, M. (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea ice zone Wecks, W. F. (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed. (1980, 492p) MP 1321 Haul Road performance and associated investigations in Alaska Berg, R. L. (1980, p. 53-100) MP 1351 Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P. V. et al. (1981, p. 125-157) MP 1428 Lee engineering for evid work baseline study. et al. (1983, 91p) Computational mechanics in arctic engineering Sodh, D. S. (1984, p. 351-374) Permafrost Benson, C. et al. (1986, p. 99-106) MP 2156 Cold climate utilities manual Smith, D. W. ed. (1986, var p.) NP 2144 MP 2144 MP 2144
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p. 39-42) Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p) CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417) MP 1166 Electrical ground impedance Arcone, S.A., et al., (1978, MP 1221) Geophysics in the study of permafrost Scott, W.J. et al., (1979, p. 93-115) Electrical resistivity of frozen ground Arcone, S.A., (1979, p. 32-37) MP 1266 Electrical resistivity of frozen ground Arcone, S.A., (1979, p. 32-37) MP 1623 Bibliography on techniques of water detection in cold regions, Smith, D.W., comp., (1979, 75p) Determination of frost penetration by soil resistivity measurements Atkins, R.T., (1979, 24p) Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p + Figs.) MP 1315 Measurements of ground resistivity, Arcone, S.A., (1982, p. 92-110) Improving electric grounding in frozen materials Delaney, A.J., et al., (1982, 12p) SR 82-13 Radar wave speeds in polar glaciers. Jezek, K.C., et al., (1983, p. 199-208)	t 1986, p 57-133 MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., [1987, 45p] CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., [1987, p 527-539] MP 2186 Modeling the electromagnetic property, trends in sea ice; Part 1. Kovacs, A., et al., [1987, p 207-235] MP 2330 Two-stream multilayer, apectral radiative transfer model for sea ice. Perovich, D.K., [1989, 17p.] CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for measuring permafrost distribution. Sellmann, P.V., et al., [1977, p 39-42] MP 925 Geophysics in the study of permafrost (1979, p.93-115) Scott, W.J., et al., (1979, p.91-115) SR 79-14 Electromagnetic survey in permafrost (1979, 7p.) Electromagnetic surveys of permafrost Arcone, S.A., (1979, p.32-37) Electromagnetic surveys of permafrost Arcone, S.A., (1979, p.32-37) Electromagnetic surveys of permafrost (1981, 199) SR 81-23 Measurements of ground resistivity Arcone, S.A., (1982, p.92-110) MP 1513	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) Problems of the seasonal sea icc zone Wecks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed., (1980, 492p) Haul Road performance and associated investigations in Alaska Berg, R. L., (1980, p. 53-100) Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V. et al., (1981, p. 125-157) MP 1428 Lee engineering for civil work baseline study. Carey, K.L., (1983, p. 351-374) Computational mechanics in arctic engineering Sodh, D.S., (1984, p. 351-374) Permafrost Benson, C., et al., (1986, p. 99-106) MP 2156 Cold climate utilities manual Smith, D.W., ed., (1986, var p.) River and lake icc engineering Ashton, G.D. ed., (1986, p. 1956)
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42), MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p), CR 77-20 VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417), MP 1166 Electrical ground impedance. Arcone, S.A., et al., (1978, p.3199-1417), MP 1221 Geophysics in the study of permafrost. Scott, W.J., et al., (1979, p.93-115), MP 1266 Electrical resistivity of frozen ground. Arcone, S.A., (1979, p.32-37), MP 1623 Bibliography on techniques of water detection in cold regions. Smith, D.W., comp., (1979, 75p), SR 79-10 Determination of frost penetration by soil resistivity measurements. Atkins, R.T., (1979, 24p), SR 79-22 Break-up of the Yukon River at the Haul Road Bridge, 1979, 92-110), MP 1513 Improving electric grounding in frozen materials. Delaney. A.J., et al., (1982, 12p), MP 257 Conductive backfill for improving electrical grounding in frozen soils. Selfmann, P.V., et al., (1984, 19p.)	(1986, p 57-133) MP 2197 Electromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., [1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., (1987, p 527-539) MP 2286 Modeling the electromagnetic property, trends in sea ice: Part i Kovacs, A., et al., [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D.K., [1989, 17p.) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for incasuring permafrost distribution Sellmann, P.V., et al., [1977, p 39-42] MP 925 Geophysics in the study of permafrost Scott, W.J., et al., (1979, p) 39-115] Electromagnetic survey in permafrost Sellmann, P.V. et al., (1979, p 32-37) Electromagnetic surveys of permafrost Arcone, S.A., (1982, p.92-110) Snow and fog particle size measurements Bean, A.M. Jr., S.R. 81-23 Snow and fog particle size measurements Bean, A.M. P1982 MP 1982	Engineering properties of snow. Mellor, M., (1977, p. 15-65) Engineering properties of sea ice Schwarz, J. et al., (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Ice engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea ice zone Wecks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed., (1980, 492p) MP 1321 Haul Road performance and associated investigations in Alaska Berg, R. L., (1980, p. 53-100) MP 1351 Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V. et al., (1981, p. 125-157) MP 1428 Ice engineering for civil work baseline study. Care, K.L., et al., (1983, 91p) Computational mechanics in arctic engineering Sodh, D.S., MP 2479 Permafrost Benson, C., et al., (1986, p. 99-106) Cold climate utilities manual Smith, D.W., ed., (1986, var.p.; MP 2135 River and lake ice engineering Ashton, G.D., (1986, 485p.; MP 2144 Perspectives in ice technology Ashton, G.D., (1986, 487) MP 2288 International Conference on Snow Engineering, 1st, July
Evaluation of electrical equipment for measuring permafrost distribution Sellmann, P.V., et al., (1977, p 39-42). MP 925 Investigation of an airborne resistivity survey conducted at very low frequency. Arcone, S.A., (1977, 48p). VLF airborne resistivity survey in Maine. Arcone, S.A., (1978, p.1399-1417). MP 1166 Electrical ground impedance. Arcone, S.A., et al., (1978, 92p). MP 1221 Geophysics in the study of permafrost. Scott, W.J., et al., (1979, p.93-115). Electrical resistivity of frozen ground. Arcone, S.A., (1979, p. 32-37). MP 1623 Bibliography on techniques of water detection in cold regions. Smith. D.W., comp., (1979, 24p). Determination of frost penetration by soil resistivity measurements. Atkins, R.T., (1979, 24p). Break-up of the Yukon River at the Haul Road Bridge. 1979. Stephens, C.A., et al., (1982, 12p). MP 1513 Improving electric grounding in frozen materials. Delancy, A.J., et al., (1982, 12p). Radar wave speeds in polar glaciers. Jezek, K.C., et al., (1983, p.199-208). Conductive backfill for improving electrical grounding in	telectromagnetic property trends in sea ice, Part 1. Kovacs, A. et al., [1987, 45p) CR 87-06 Extinction coefficient for a distribution of ice fog particles Jordan, R., [1987, p 527-539] MP 2286 Modeling the electromagnetic property trends in sea ice: Part 1. Kovacs, A., et al., [1987, p 207-235] MP 2330 Two-stream multilayer, spectral radiative transfer model for sea ice. Perovich, D.K., [1989, 17p.) CR 89-15 Electromagnetic prospecting Geophysical methods for hydrological investigations in permafrost regions. Hockstra, P., [1976, p.75-90] MP 932 Evaluation of electrical equipment for measuring permafrost distribution. Sellmann, P.V., et al., [1977, p 39-42], MP 925 Geophysics in the study of permafrost. Scott, W.J., et al., (1979, p 93-115) MP 1266 Electromagnetic survey in permafrost. Sellmann, P.V., et al., (1979, Pp) Electromagnetic survey in permafrost. Sellmann, P.V., et al., (1979, Pp) Electromagnetic surveys of permafrost. Arcone, S.A., (1979, p 32-37), MP 1623 Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p) Measurements of ground resistivity. Arcone, S.A., (1982, p 92-110), MP 1513 Snow and fog particle size measurements. Berger, R.H.,	Engineering properties of snow. Mellor, M. (1977, p. 15-65) Engineering properties of sea icc Schwarz, J. et al. (1977, p. 499-531) Undersea pipelines and cables in pola: waters (1978, 34p) Lee engineering O'Steen, D.A., (1980, p. 41-47) MP 1602 Problems of the seasonal sea icc zone Wecks, W. F., (1980, p. 1-35) Conference on Computer and Physical Modeling in Hydraulic Engineering, 1980 Ashton, G.D. ed., (1980, 492p) Haul Road performance and associated investigations in Alaxka Berg, R. L., (1980, p. 53-100) Characteristics of permafrost beneath the Beaufort Sea. Sellmann, P. V., et al., (1981, p. 125-157) MP 1248 Lee engineering for civil work baseline study. et al., (1983, 91p) Computational mechanics in arctic engineering MP 1445 Computational mechanics in arctic engineering Sodih, D. (1984, p. 351-374) Permafrost Benson, C., et al., (1986, p. 99-106) MP 2156 Cold climate utilities manual varp; River and lake icc engineering Ashton, G.D., (1986, 485p; MP 2288 MP 2288

Engineering (cont.)	Effects of all terrain vehicles on tundra. Racine, C., et al., 1988, 12p.; SR 88-17	Mechanics of cutting and boring in permafrost. Mellor, M., (1980, 820) CR 80-21
Cold regions engineering research—strategic plan. Carlson, R.F., et al, £1989, p 172-190; MP 2571	(1988, 12p) SR 88-17 Waste management practices in Antarctica Sletten, R.S., et	[1980, 82p] CR 80-21 Snow removal equipment Minsk, L.D., [1981, p 648-670]
Engineering geology	al, (1989, p 122-130) MP 2:64	MP 1446
Delineation and engineering characteristics of permafrost beneath the Beaufort Sea. Sellmann, P.V., et al, (1976,	Influence of well casing composition on trace metals in ground water Hewitt, A.D., [1989, 18p] SR 89-09	Snow and ice control on failroads, highways and airports Minsk, L.D., et al. (1981, p 671-706) MP 1447
p 53-60 ₁ MP 919	Comments on "Modeling adsorption/desorption kinetics of	Mechanics of cutting and boring in permafrost. Mellor, M.,
Distribution and properties of subsea permafrost of the Beau- fort Sea. Sellmann, P.V., et al. (1979, p 93-115)	pesticides in a soil suspension". Leggett, D C., [1989, p.231] MP 2532	(1981, 38p) CR 81-26 Ice engineering facility. Zabilansky, L.J., et al. (1983, 12p.
MP 1287	Use of off-road vehicles and mitigation of effects in Alaska	+ fig) MP 2088
Cold Regions Science and Technology Bibliography. Cummings, N H., [1981, p.73-75] MP 1372	permafrost environments a review Slaughter, CW, et al. [1990, p 63-72] MP 2682	Performance of a thermosyphon with an inclined evaporator and vertical condenser. Zarling, J.P., et al., (1984, p 64-
mings, N H., (1981, p.73-75) MP 1372 Engines	Environmental protection	68 ₁ MP 1677
Construction equipment problems and procedures Alaska	Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p.9] MP 880	System for mounting end caps on ice specimens Cole, D.M., et al. (1985, p.362-365) MP 2016
pipeline project. Hanamoto, B., [1978, 14p] SR 78-11	Land disposal, state of the art Reed, S.C., [1973, p.229-	D.M., et al. (1985, p.362-365) MP 2016 Pneumatically de-iced ice detector—final report, phase 2, part
Low temperature automotive emissions Coutts, HJ,	261 ₁ MP 1392	I. Franklin, C.H., et al. (1986, 9p. + appends.) MP 2249
(1983, 2 vols) MP 1703 Enthalpy	Symposium: geography of polar countries, selected papers and summaries Brown, J., ed. (1977, 61p.)	Unique new cold weather testing facility. Eaton, R.A.,
Introduction to the basic thermodynamics of cold capillary	SR 77-06	(1989, p 335-342) MP 2468
systems. Colbeck, S.C., (1981, 9p) SR 81-06	Municipal sludge management environmental factors Reed, S.C., ed, [1977, Var. p.] MP 1406	Preliminary design guide for arctic equipment et al. [1989, 35p] Walsh, M.R. SR 89-13
Solution of phase change problems O'Neill, K. [1983, p.134-146] MP 1894	Role of research in developing surface protection measures	Erosion
Environment simulation	for the Arctic Slope of Alaska Johnson, P.R., [1978, p 202-205] MP 1068	Some effects of air cushion vehicle operations on deep snow. Abele, G., et al. [1972, p.214-241] MP 887
Numerical simulation of atmospheric ice accretion Ackley, S.F., et al. (1979, p.44-52) MP 1235	Surface protection measures for the Arctic Slope, Alaska.	Road construction and maintenance problems in central Alas-
Computer simulation of urban snow removal Tucker, W B,	Johnson, P.R., (1978, p. 202-205) MP 1519 Ground pressures exerted by underground explosions John-	ka. Clark, E.F., et al., [1976, 36p] SR 76-08
et al. (1979, p 293-302) MP 1238	son, P.R., (1978, p 284-290) MP 1520	Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p) CR 82-11
Ocean circulation its effect on seasonal sea-ice simulations. Hibler, W.D., III, et al. [1984, p 489-492] MP 1700	Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., 1978,	Erosion control
Numerical simulation of Northern Hemisphere sea ice varia-	p 460-466) MP 1100	Revegetation and erosion control of the Trans-Alaska Pipe- line. Johnson, L.A., et al. (1977, 36p.) SR 77-08
bility, 1951-1980. Walsh, J.E., et al. (1985, p.4847-4865) MP 1882	Workshop on Environmental Protection of Permafrost Terrain Brown, J. et al. (1980, p. 30-36) MP 1314	Utilization of sewage sludge for terrain stabilization in cold
ENVIRONMENTAL IMPACT	rain Brown, J., et al. (1980, p 30-36) MP 1314 Building materials and acid precipitation. Merry, C.J., et al.	regions. Gaskin, D.A., et al. (1977, 45p.) SR 77-37 ERTS imagery
Symposium on fire in the northern environment. Slaughter, C.W., ed, [1971, 275p] MP 878	(1985, 40p) SR 85-01	Arctic and subarctic environmental analysis through ERTS-
Environmental impact	Vegetation recovery in the Cape Thompson region, Alaska Everett, KR, et al. (1985, 75p) CR 85-11	1 imagery. Anderson, D M, et al, (1972, p 28-30) MP 1119
Ecological effects of oil spills and seepages in cold-dominated environments McCown, B H., et al. [1971, p 61-65]	Description of the building materials data base for Cincinnati,	Arctic and subarctic environmental analyses utilizing ERTS-
MP 905	Ohio. Merry, C.J., et al, [1986, 85p] SR 86-31 Inventorying building materials. Merry, C.J., [1986, 25p.]	1 imagery. Anderson, D.M., et al. (1973, 5p.) MP 1611
Thermal energy and the environment. Crosby, R L., et al., 1975, 3p + 2p, figs 1 MP 1480	SR 86-33	Mesoscale deformation of sea ice from satellite imagery.
[1975, 3p + 2p. figs] MP 1480 Evaluation of an air cushion vehicle in Northern Alaska	Comparison of EPA and USATHAMA detection capability estimators Grant, C.L., et al. (1988, p. 405-418)	Anderson, D.M., et al. (1973, 2p) MP 1120
Abele, G., et al. [1976, 7p] MP 894	MP 2455	Arctic and subarctic environmental analyses Anderson, D.M., et al. (1973, 3p.) MP 1030
Ecological and environmental consequences of off-road traf- fic in northern regions. Brown, J., (1976, p 40-53)	Arctic research of the United States, Vol 4 (1990, 120p) MP 2765	Arctic and subarctic environmental analyses from ERTS im-
MP 1383	Environmental tests	agery Anderson, D.M., et al, [1973, 6p.] MP 1031 ERTS mapping of Arctic and subarctic environments. And-
Air-cushion vehicle effects on surfaces of Alaska's Arctic Slopes. Slaughter, C.W., [1976, p 272-279]	Guidelines for architectural programming of office settings	erson, D.M., et al. (1974, 128p) MP 1047
MP 1384	Ledbetter, CB, (1977, 14p) SR 77-05	Islands of grounded ice. Kovacs, A., et al. (1975, p 213-
	Analytical methods for detecting multary-unique compounds	216 ₁ MP 852
Hovercraft ground contact directional control devices. Abele, G., 1976, p.51-59; MP 875	Analytical methods for detecting military-unique compounds Jenkins, TF, et al. [1989, p 13-14] MP 2713	216) MP 852 Estuaries
Abele, G., [1976, p.51-59] MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy,	Jenkins, T.F., et al. (1989, p. 13-14) MP 2713 Influence of well casings on well water Hewitt, A.D., et al.	Estuaries Estuarine processes and intertidal habitats in Grays Harbor,
Abele, G., [1976, p.51-59] MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.]	Jenkins, TF, et al. (1989, p. 13-14) Influence of well casings on well water (1989, 9p.) Environments MP 2717	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] CR 78-18
Abele, G. (1976, p.51-59) MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al. (1977, 34p) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at	Jenkins, T.F., et al. (1989, p. 13-14) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Sat-	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay, New Hamp-
MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p)	Jenkins, T.F., et al. [1989, p.] 3-14] MP 2713 Influence of well casings on well water (1989, 9p.) MP 2717 Environments Arctic environmental factors affecting army operations Cr. J.E., ed. [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278]	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] CR 78-18 Physical properties of estuarine ice in Great Bay, New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251
MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost McFad-	Jenkins, T.F., et al. (1989, p. 13-14) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed. (1962, 11p.) Tundra biome program. Brown, J. (1970, p. 1278) MP 881	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., (1978, 79p.) CR 78-18 Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al. (1987, p. 833-840) MP 2251 Evaporation
MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost den. T., et al., (1977, 46p.) MP 875 MP 875 ER 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden. T., et al., (1977, 46p.)	Jenkins, T.F., et al. [1989, p.] 3-14] MP 2713 Influence of well casings on well water (1989, 9p.) MP 2717 Environments Arctic environmental factors affecting army operations Cr. J.E., ed. [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278]	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] CR 78-18 Physical properties of estuarine ice in Great Bay, New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251
MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost McFad-	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 1970, p. 1970]	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] CR 78-18 Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. MFFadden, T., [1975, p.18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C.
MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Arctic ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9) MP 880	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] Physical properties of estuarine ice in Great Bay, New Hampshire. Meese, D.A., et al., [1987, p. 833-840] Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined
Abele, G., [1976, p.51-59] MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.] CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p.] Second progress report on oil spilled on permafrost den, T., et al., [1977, 46p.] Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., [1978, p.7-36) MP 1075	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.] MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] Distriction of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181]	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions, McFadden, T., [1975, p.18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections. Zarling, J.P., et al., [1985, p.31-37]
Abele, G., 71976, p.51-59) MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross Ice Shelf Project environmental impact statement Jul., 1974. Parker, B.C., et al., (1978, p.7-36). MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Plant recovery from Arctic oil spills. Walker, D.A., et al., (1978, p.242-259). MP 1184	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278, MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p.9] Environmental setting, Barrow, Alaska Brown, J., [1970, p.96-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181], MP 964	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] Physical properties of estuarine ice in Great Bay, New Hampshire. Meese, D.A., et al., [1987, p. 833-840] Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37, MP 1853 Heat transfer characteristics of thermosyphons with inclined
Abele, G., [1976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p) Second progress report on oil spilled on permafrost McFadden, T., et al., [1977, 46p) Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., [1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., [1978, 34p) Plant recovery from Arctic oil spills Walker, D.A., et al.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Satcr, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278, MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p.9] MP 880 Environmental setting, Barrow, Alaska Brown, J., [1970, p.9] Case for comparison and standardization of carbon dioxide reference gases: Kelley, J.J., et al., [1973, p. 163-181], MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.)	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p. 285-
Abele, G., 71976, p.51-59) MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Flant recovery from Arctic oil spills Walker, D.A., et al., (1978, p.242-259) MP 1184 Crude oil spills on black spruce forest Jenkins, T.F., et al., (1978, p. 305-323) Bibliography of perma*rost soils and vegetation in the USSR	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Cr. J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] MP 945 Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181) MP 964 Arctic and subarctic environmental analyses utilizing ERTS-	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Exaporation Radiation and evaporation heat loss during ice fog conditions, McFadden. T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1985, p. 285-291] Les surface hydrolysis of disopropylifluorophosphate (DFP)
Abele, G., 71976, p.51-59, MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p) Ross lee Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p) Plant recovery from Arctic oil spills (1978, p.242-259) Crude oil spills on black spruce forest (1978, p. 305-323) MP 1184	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Satcr, J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] Case for comparison and standardization of carbon dioxide reference gases (Kelley, J.J., et al., [1973, p. 163-181], MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.) MP 1031	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C. et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p. 285-292] Leggett, D.C., (1987, p.809-815) MP 2437
Abele, G., 71976, p.51-59) MP 875 Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B. C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Flant recovery from Arctic oil spills Walker, D.A., et al., (1978, p.242-259) MP 1184 Crude oil spills on black spruce forest Jenkins, T.F., et al., (1978, p.305-323) MP 1185 Bibliography of perma*rost soils and vegetation in the USSR Andrews, M., (1978, 175p.) Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 81p.) CR 78-28	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS im-	Estuaries Estuaries processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay, New Hampshire, Meese, D.A., et al., [1987, p.833-840] MP 2251 Eraporation Radiation and evaporation heat loss during ice fog conditions, McFadden, T., [1975, p.18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zatling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p.285-292] Leggett, D.C., [1987, p.809-815] Evaporation of chemical agents from ice and snow. Leggett, D.C., [1988, 10p.] CR 88-03
Abele, G., 71976, p.51-59) Land treatment of wastewater at Manieca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p) Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p) Plant recovery from Arctic oil spills Abele, G., et al., (1978, 34p) Rorde oil spills on black spruce forest Land (1978, p.242-259) Crude oil spills on black spruce forest Land (1978, p.305-323) Bibliography of perma*rost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D. E., et al., (1978, 81p) Noncorrosive methods of ice control. Minsk, L. D., (1979, 1979)	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satcr., J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278] Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p.9] MP 880 Environmental setting, Barrow, Alaska. Brown, J., [1970, p.9] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181]. MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1611 Arctic and subarctic environmental analyses from ERTs imagery. Anderson, D.M., et al., [1973, 5p.) MP 1031 High-latitude basins as settings for circumpolar environmental at studies. Slaughter, C.W., et al., [1975, p. 1975.] MP 917	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C. et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p. 285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions.
Abele, G., [1976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.] Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p.] Second progress report on oil spilled on permafrost McFadden, T., et al., [1977, 46p.] Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B. C., et al., [1978, p.7-36]. MP 1075. Effects of winter military operations on cold regions terrain Abele, G., et al., [1978, 34p.] Plant recovery from Arctic oil spills. Walker, D.A., et al., [1978, p.242-259]. MP 1184. Crude oil spills on black spruce forest Jenkins, T.F., et al., [1978, p.305-323]. MP 1185. Bibliography of perma*rost soils and vegetation in the USSR Andrews, M., [1978, 175p.]. SR 78-19. Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., [1978, 81p.]. CR 78-28. Noncorrosive methods of ice control. Minsk, L.D., [1979, p.133-162]. MP 1265. Crude oil spills on subarctic permafrost in interior Alaska.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water [1989, 9p.] Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.] MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] MP 985 Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] MP 964 Arctic and subarctic environmental analyses from ERTS. Imagery. Anderson, D.M., et al., [1973, 6p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. 11975,	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay, New Hampshire, Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions, McFadden, T., [1975, p.18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Tarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p.285-292] Evaporation of chemical agents from ice and snow Leggett, D.C., [1987, p.809-815] Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] MP 2443 MP 2457 Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p] Thermosyphons for horizontal applications Den Hattog, Den
Abele, G., [1976, p.51-59) Land treatment of wastewater at Manieca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.] Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p.] Second progress report on oil spilled on permafrost McFadden, T., et al., [1977, 46p.] Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., [1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., [1978, 34p.) Final recovery from Arctic oil spills Walker, D.A., et al., [1978, p.242-259) Crude oil spills on black spruce forest Jenkins, T.F., et al., (1978, p. 305-323) Bibliography of perma*rost soils and vegetation in the USSR Andrews, M., [1978, 175p.] Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., [1978, 81p.] Noncorrosive methods of ice control Minsk, L.D., [1979, p.133-162) Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., [1980, 128p.] MP 1310	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satcr., J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278, MP 881 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p.9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p.9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p.9] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181], MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] Arctic and subarctic environmental analyses from ERTs imagery. Anderson, D.M., et al., [1973, 5p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. 1975.7] Applications of remote sensing in New England. II., et al., [1975, 5p., 14 figs and tables). MP 913 Temporary environment. Cold regions habitability. Bech-	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C. et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1987, p.809-815] Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p.] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p. 251-259] Thermosyphon for horizontal applications S.L., [1988, p. 319-321] MP 2444 MP 24443 DenHartog, MP 24443 MP 1845
Abele, G., 71976, p.51-59) Land treatment of wastewater at Manicca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p) Ross lee Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p) Plant recovery from Arctic oil spills Walker, D.A., et al., (1978, p. 1978, p. 1979, p. 133-162) Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., (1980, 128p) Remote sensing of revegetation of burned tundra, Kokolik River, Alaskas Hall, D.K., et al., (1980, 128p) Remote sensing of revegetation of burned tundra, Kokolik River, Alaskas Hall, D.K., et al., (1980, 128p)	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.] Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181]. Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1031 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.) MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57- IV/68]. Applications of remote sensing in New England II., et al., [1975, 8p., 14 figs and tables; MP 913	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay, New Hampshire, Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions, McFadden, T., [1975, p.18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Tarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p.285-292] Evaporation of chemical agents from ice and snow Leggett, D.C., [1987, p.809-815] Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] MP 2443 MP 2457 Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p] Thermosyphons for horizontal applications Den Hattog, Den
Abele, G., [1976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p) Second progress report on oil spilled on permafrost McFadden, T., et al., [1977, 46p) Ross lee Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., [1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., [1978, 34p) Plant recovery from Arctic oil spills Walker, D.A., et al., [1978, p.242-259) Crude oil spills on black spruce forest Jenkins, T.F., et al., [1978, p.305-323] Shibliography of perma*rost soils and vegetation in the USSR Andrews, M., [1978, 175p) Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., [1978, 81p] Noncorrosive methods of ice control Minsk, L.D., [1979, p.133-162] Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., [1980, 128p) MP 1310 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska Hall, D.K., et al., [1980, p.232-7Ml* 1391	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278] MP 984 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] MP 986 Environmental setting, Barrow, Alaska Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. 114 figs, and tables) MP 137 Applications of remote sensing in New England H.L., et al., [1975, 3p. 114 figs, and tables) MP 130 MCKim, MP 131 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] SR 76-10 Notes on conducting the behavior setting surve by interview method. Ledbetter, C.B., [1976, 133p.] SR 76-10	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C. et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1985, p. 285-292] Leggett, D.C., [1987, p.809-815] Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p.] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p. 251-259] Thermosyphon for horizontal applications S.L., [1988, p. 319-321] Excavation Investigation and exploitation of snowfield sites Mellor, M., 111-A2b
Abele, G., 71976, p.51-59) Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross lee Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Plant recovery from Arctic oil spills Walker, D.A., et al., (1978, 1978, 1978) Crude oil spills on black spruce forest Landray, M., (1978, 175p.) Sar 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 81p.) Noncorrosive methods of ice control Minsk, L.D., (1979, p.133-162) Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., (1980, 128p.) MP 1310 Remote sensing of revegetation of burned tundra, Kokohik River, Alaska Hall, D.K., et al., (1980, p.101-128) Road dust along the Haul Road, Alaska Severti, K.R., (1980, p.101-128) MP 1352	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Satcer, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p.9] Environmental setting, Barrow, Alaska Brown, J., [1970, p.9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 50-64] MP 945 Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68] Applications of remote sensing in New England H.L., et al., [1975, 8p. + 14 figs and tables; MP 913 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] SR 76-10 Notes on conducting the behavior setting survey by interview.	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay, New Hampshire, Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions, McFadden, T., [1975, p.18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1985, p.285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphon for horizontal applications Dendratog, S.L., [1988, p.319-321] Execuration Investigation and exploitation of snowfield sites Mellor, M.
Abele, G., 71976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p) Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p) Ross lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36). MP 1075 Effects of winter military operations on cold regions terrain. Abele, G., et al., (1978, 34p) Second progress report on oil spills. Walker, D.A., et al., (1978, p.242-259). Walker, D.A., et al., (1978, p.242-259). MP 1185 Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., (1978, 175p). SR 78-19 Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., (1978, 81p). CR 78-18 Noncortrosive methods of ice control. Minsk, L.D., (1979, p.133-162). MP 1265 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 128p). MP 1310 Remote sensing of revegetation of burned tundra, Kokolik. River, Alaska. Hall, D.K., et al., (1980, p.263.2° MP 1391). Rosad dust along the Haul Road, Alaska. Everett, K.R., (1980, p.101-128). Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al.,	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water [1989, 9p.] Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.] Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.] MP 1611 Arctic and subarctic environmental analyses withizing ERTS-1. Imagery. Anderson, D.M., et al., [1973, 6p.] MP 1611 Arctic and subarctic environmental analyses withizing ERTS-1. Indicate the subarctic environmental analyses of the properties	Estuaries Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., (1978, 79p) Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., (1987, p. 833-840) MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., (1975, p. 18-27) MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., (1982, p. 176-184) Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., (1985, p. 31-37) MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., (1985, p. 285-292) Leggett, D.C., (1987, p. 809-815) MP 2034 Leggett, D.C., (1987, p. 809-815) MP 2457 Exporation of chemical agents from ice and snow Leggett, D.C., (1988, p. 319-321) Thermosyphons and foundation design in cold regions. M.P. 2443 DenHartog, S.L., (1988, p. 319-321) Excavation Investigation and exploitation of snowfield sites (1969, 57p) Kinematics of axial rotation machines Mellor, M., (1976, 45p) Kinematics of continuous beit machines Mellor, M.,
Abele, G., 71976, p.51-59) Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross lee Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Plant recovery from Arctic oil spills Walker, D.A., et al., (1978, 1978, 1978) Crude oil spills on black spruce forest Landray, M., (1978, 175p.) Sar 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 81p.) Noncorrosive methods of ice control Minsk, L.D., (1979, p.133-162) Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., (1980, 128p.) MP 1310 Remote sensing of revegetation of burned tundra, Kokohik River, Alaska Hall, D.K., et al., (1980, p.101-128) Road dust along the Haul Road, Alaska Severti, K.R., (1980, p.101-128) MP 1352	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] MP 880 Environmental setting, Barrow, Alaska Brown, J., [1970, p. 50-64] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.) MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68] Applications of remote sensing in New England H.L., et al., [1975, 8p. + 14 figs and tables) MP 913 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.) Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.) SR 76-14 Artic transportation operational and environmental evaluation of an air cushion schiele in northern Alaska Abele, G. et al., [1977, p. 176-182) Architects and scientists in research for design of buildings in	Estuaries Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay, New Hampshire, Meese, D.A., et al., [1987, p. 833-840] MP 2251 Eraporation Radiation and evaporation heat loss during ice fog conditions, McFadden, T., [1975, p. 18-27] Removal of trace organics by overland flow MP 2442 Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p. 285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., (1988, p. 251-259] Thermosyphon for horizontal applications S.L., (1988, p. 319-321) Excavation Investigation and exploitation of snowfield sites (1969, 57p.) Kinematics of axial rotation machines Mellor, M., (1976, 24p.) CR 76-16 Kinematics of continuous beit machines Mellor, M., (1976, 24p.)
Abele, G., 71976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p) Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p) Ross lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36). MP 1075 Effects of winter military operations on cold regions terrain. Abele, G., et al., (1978, 34p). SR 78-17 Plant recovery from Arctic oil spills. Walker, D.A., et al., (1978, p.242-259). MP 1185 Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., (1978, 175p). SR 78-19 Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., (1978, 81p). CR 78-18 Noncortrosive methods of ice control. Minsk, L.D., (1979, p.133-162). MP 1265 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 128p). MP 1310 Remote sensing of revegetation of burned tundra, Kokolik. River, Alaska. Hall, D.K., et al., (1980, p.103-128). MP 1391 Road dust along the Haul Road, Alaska. Everett, K.R., (1980, p.101-128). MP 1392 Ecological impact of vehicle traffic on tundra. (1981, p.11-37). MP 1465.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water [1989, 9p.] Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.] Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181], MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1975, p. p. IV/57, IV/68] MP 913 Temporary environment. Cold regions habitability. Bechitel, R.B., et al., [1976, 162p.] SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.] SR 76-14 Arctic transportation operational and environmental evaluation of an air cushion vehicle in northern Alaska. Abele, G., et al., [1977, 176-182] MP 983	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions, McFadden. T., [1975, p. 18-27] Removal of trace organics by overland flow MP 2442 Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37] MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p. 285-292] Ice surface hydrolysis of disopropylfluorophosphate (DFP) Leggett, D.C., [1987, p.809-815] MP 2034 Ice surface hydrolysis of disopropylfluorophosphate (DFP) Leggett, D.C., [1987, p.809-815] MP 2443 Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p. 251-259] Thermosyphons and foundation design in cold regions, S.L., [1988, p. 319-321] Thermosyphon for horizontal applications S.L., [1988, p. 319-321] MP 2444 Excavation Investigation and exploitation of snowfield sites (1969, 57p) Kinematics of axial rotation machines Mellor, M., [1976, 45p) Kinematics of continuous belt machines Mellor, M., [1976, 145p] Exavaiting rock, ice, and frozen ground by electromagnetic radiation Hockstra, P., [1976, 17p) CR 76-36
Abele, G., 71976, p.51-59) Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p) SR 77-31 Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p) Ross Ice Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) MP 1075 Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p) Final recovery from Arctic oil spills Walker, D.A., et al., (1978, 1978, 1797) Final recovery from Arctic oil spills Walker, D.A., et al., (1978, p. 136) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 81p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 81p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 18p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 18p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 18p) SR 78-19 Tundra recovery since 1949 near Fish Creek Alaska Lawson, D.E., et al., (1978, 1979, p. 133-162) Cr 78-28 Noncorrosive methods of ice control Minsk, L.D., (1979, p. 133-162) Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., (1980, 128p) MP 130 Remote sensing of revegetation of burned tundra, Kokohik River, Alaska Hall, D.K., et al., (1980, p. 101-128) MP 1352 Will 1391 Road dust along the Haul Road, Alaska Coutts, H.J., et al., (1980, p. 101-128) MP 1352 Will 1391 Road dust along the Haul Road, Alaska Coutts, H.J., et al., (1980, p. 101-128) MP 1352 SR 78-19	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satcr., J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278, MP 986 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Arctic and subarctic environmental analyses unligning ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] Arctic and subarctic environmental analyses influence ERTs imagery. Anderson, D.M., et al., [1973, 5p.] Arctic and subarctic environmental analyses from ERTs imagery. Anderson, D.M., et al., [1973, 5p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57, IV/63] Applications of remote sensing in New England H.L., et al., [1975, 8p. + 14 figs and tables). MP 913 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.] SR 76-14 Arctic transportation operational and environmental evaluation of an air cushion schiele in northern Alaska. Abele, G., et al., [1977, p. 176-182). Alaska. Ledbetter, C.B., [1977, 8p.) CR 77-23	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p.18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p.285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphon for horizontal applications S.L., (1988, 10p.) Execuration Investigation and exploitation of snowfield sites (1969, 57p.) Kinematics of axial rotation machines Mellor, M., (1976, 24p.) Execuration Hockstra, P., (1976, 17p.) CR 76-16 Kinematics of continuous beit machines (1976, 24p.) Exavaling rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-17 Exavaling rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-17 Exavaling rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) Exavaling rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) Exavaling rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) Exavaling rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.)
Abele, G., [1976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p,] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Ross lee Shelf Project environmental impact statement July, 1974. Parker, B. C., et al., [1978, p.7-36]. MP 1075. Effects of winter military operations on cold regions terrain. Abele, G., et al., [1978, 34p.] Second progress report on oil spills. Walker, D.A., et al., [1978, p.305-323]. MP 1187. Plant recovery from Arctic oil spills. Walker, D.A., et al., [1978, p.305-323]. MP 1187. Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., [1978, 175p.]. SR 78-19. Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., [1978, 81p.]. CR 78-28. Son, D.E., et al., [1978, 81p.]. CR 78-28. Noncorrosive methods of ice control. Minsk, L.D., [1979, p.133-162]. MP 1301. Remote sensing of revegetation of burned tundra, Kokolik. River, Alaska. Hall, D.K., et al., [1980, p.263.2". MP 1391. Road dust along the Haul Road. Alaska. Everett, K.R., [1980, p.101-128]. MP 1391. Road dust along the Haul Road. Alaska. Everett, K.R., [1981, p.512-528]. MP 1395. Ecological impact of vehicle traffic on tundra. Ackele, G., [1981, p.512-528]. MP 1395. Ecological impact of vehicle traffic on tundra. Ackele, G., [1981, p.512-528]. MP 1309. Long-term active layer effects of crude oil spilled in interior active layer effects of crude oil spilled in interior.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Applications and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181], MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.) MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.) MP 1613 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68] Applications of remote sensing in New England. H.L., et al., [1975, 8p. + 14 figs and tables). MP 913 Temporary environment. Cold regions habitability. Bechitel, R.B., et al., [1976, 162p.]. SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.]. SR 76-11 Arctic transportation operational and environmental evaluation of an air cushion schicle in northern Alaska. Abele, G., et al., [1977, 176-182]. MP 985 Architects and scientists in research for design of buildings in Alaska. Ledbetter, C.B., [1977, 8p.). CR 77-22 UV radiational effects on Martian regolith water. Nadeau, P.H., [1977, 83p.]. MP 1072 Ecology on the Yukon-Prudhoe haul road. Brown, J., ed., [1978, 131p.]. MP 1115	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Eraporation Radiation and evaporation heat loss during ice fog conditions. McFadden. T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p. 285-292] Leggett, D.C., (1987, p. 809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1987, p. 809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., (1988, p. 251-259) Thermosyphons and foundation design in cold regions, F.D., et al., (1988, p. 251-259) Thermosyphon for horizontal applications S.L., (1988, p. 319-321) Excavation Investigation and exploitation of snowfield sites Mellor, M., (1969, 57p) Kinematics of axial rotation machines Mellor, M., (1976, 24p) Excavating rock, ice, and frozen ground by electromagnetic radiation Hockstra, P., (1976, 17p) CR 76-16 Removal of demonstration potential politories design in cold regions, MP 2443 CR 76-17 Excavating rock, ice, and frozen ground by electromagnetic radiation Hockstra, P., (1976, 17p) CR 76-16 Permaftrest excavating attachment for heavy bulldozers Garfield, D.E., et al., (1977, p. 144-151) MP 935 Transverse rotation machines for culting and boring in perma-
Abele, G., 71976, p.51-59) Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36). MP 1075. Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Plant recovery from Arctic oil spills. Walker, D.A., et al., (1978, p. 242-259). MP 1185. Crude oil spills on black spruce forest. Jenkins, T.F., et al., (1978, p. 305-323). MP 1185. Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., (1978, 175p.). SR 78-19. Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., (1978, 81p.). CR 78-28. Noncorrosive methods of ice control. Minsk, L. D., (1979, p. 133-162). CR 78-28. Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 128p.). MP 1310. Remote sensing of revegetation of burned tundra, Kokolik. River, Alaska. Hall, D.K., et al., (1980, p. 101-128). MP 1395. Road dust along the Haul Road, Alaska. Coutts, H.J., et al., (1981, p. 11-37). MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., (1981, p. 11-37). MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., (1981, p. 11-37). MP 1352. Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., (1982, p. 175-179). MP 1656.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satch, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] MP 945 Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68] MP 917 Applications of remote sensing in New England. H.L., et al., [1975, 5p. + 14 figs and tables). MP 917 MP 1071 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.] SR 76-14 Arctic transportation operational and environmental evaluation of an air cushion vehicle in northern Alaska. Abele, G., et al., [1977, p. 176-182] Architects and scientists in research for design of buildings in Alaska. Ledbetter, C.B., [1977, 8p.] CR 77-23 UV radiational effects on Martian regolith water. Nadeau, P. 11, [1977, 8p.] Ecology on the Yukon-Prudhoe haul road. Brown, J., ed., [1978, 131p.] Communication in the work place an ecological perspective.	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p.18-27] MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1986, p.285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphons for horizontal applications S.L., (1988, p.319-321) Execavation Investigation and exploitation of snowfield sites (1969, 57p.) Kinematics of axial rotation machines Mellor, M., (1976, 24p.) Execavation Elockstra, P., (1976, 17p.) CR 76-16 Kinematics of continuous beit machines (1916), M. (1976, 17p.) CR 76-16 CR 76-17 Exavating rock, i.e., and frozen ground by electromagnetic radiation Hockstra, P., (1976, 17p.) CR 76-16 CR 76-17 Exavation machines for cutting and boring in permarrost. Mellor, M., (1977, 1944-151) MP 955 Transverse rotation machines for cutting and boring in permarrost. Mellor, M., (1977, 1960)
Abele, G., [1976, p.51-59) Land treatment of wastewater at Manteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.] Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Refeats of winter military operations on cold regions terrain Abele, G., et al., [1978, 34p.] Second progress report on oil spills. Walker, DA, et al., [1978, p.30-323] Crude oil spills on black spruce forest. Jenkins, T.F., et al., [1978, p.305-323] MP 1185 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.] Second progress report on oil spills walker, DA, [1978, 1905-32] Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., [1978, 81p.] Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 128p.] MP 1265 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 128p.] Remote sensing of revegetation of burned tundra, Kokolik. River, Alaska. Hall, D.K., et al., [1980, p.263.2" MP 1391 Road dust along the Haul Road, Alaska. Everett, K.R., [1980, p.101-128] Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., [1981, p.512-528] Ecological impact of vehicle traffic on tundra. Abele, G., (1981, p.512-528) Ecological impact of vehicle traffic on tundra. Abele, G., (1981, p.512-528) Ecological impact of vehicle traffic on tundra. Abele, G., (1981, p.512-528) Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., [1983, p.175-179]. MP 1501 Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., [1983, p.175-179].	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations Sater, J.E., ed., [1962, 11p.] MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 964 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68], d. [1975, p. IV/57-IV/68], et al., [1975, 8p., t. 14, figs and tables). MP 913 Temporary environment. Cold regions habitability. Bechitel, R.B., et al., [1976, 162p.] Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.] SR 76-10 Arctic transportation operational and environmental evaluation of an air cushion schiele in northern Alaska. Abele, G., et al., [1977, p. 176-182] MP 985 Architects and scientists in research for design of buildings in Alaska. Ledbetter, C.B., [1977, 8p.) CR 77-23 MP 107 Ecology on the Yukon-Prudhoe haul road. Brown, J., (1978, 1970). SR 76-10 Invironment of the Alaska an Itaul Road. Brown, J., [1980, Invironment of the Alaska Brud Road.] Invironment of the Alaska and Brown, J., [1980, Invironment of the Alaska and Brown, J., [1980, Invironment of the Alaska and Brown, J., [1980, Invironment of the Alaska and Brown, J., [1980].	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Eraporation Radiation and evaporation heat loss during ice fog conditions. McFadden. T., [1975, p. 18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections. Zailing, J.P., et al., [1985, p. 31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections. Haynes, F.D., et al., [1986, p. 285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow. Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow. Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions. Haynes, F.D., et al., (1988, p. 251-259) Thermosyphons for horizontal applications S.L., (1988, p. 319-321) Excavation Investigation and exploitation of snowfield sites. (1969, 57p.) Kinematics of axial rotation machines. Mellor, M., (1976, 24p.) Excavating rock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-16 Removale design in cellor, M., (1976, 24p.) Excavating took, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-16 Permafrest excavating altachment for heavy buildozers. Garfield, D.E., et al., (1977, 1974, 134-151) MP 955 Transverse rotation machines for cutting and boring in permafrost. Mellor, M., (1977, 36p.) Pavement recycling using a heavy buildozer mounted pulceriter. Eaton R.A., et al., [1977, 12p. + appends.)
Abele, G., 71976, p.51-59; Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p); CR 77-24 Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p); Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p); SR 77-31 Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p); SR 77-44 Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36); MP 1075 Effects of winter military operations on cold regions terrain. Abele, G., et al., (1978, 34p); SR 78-17 Plant recovery from Arctic oil spills. Walker, D.A., et al., (1978, p.242-259); Crude oil spills on black spruce forest. Jenkins, T.F., et al., (1978, p.305-323); SR 78-19 Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., (1978, 81p); SR 78-18 Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162); Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 128p); MP 1306 Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 128p); MP 1310 Remote sensing of revegetation of burned tundra, Kokohik. River, Alaska. Hall, D.K., et al., (1980, p.101-128); Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., (1981, p.13-37); Leg growth and circulation in Kachemak Bay, Alaska. Mp 1352 Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., (1983, p.175-179). MP 1656 Hydrologic modeling from Landsat land cover data McKim, H.L., et al., (1984, 199). SR 84-01. Response of permafrost to disturbance. Lawen, D. E.,	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satch, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278, MP 886 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] MP 945 Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181]. MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68] Applications of remote sensing in New England. H.L., et al., [1975, 5p. + 14 figs and tables). MP 913 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.). SR 76-14 Arctic transportation operational and environmental evaluation of an air cushion vehicle in northern Alaska. Abele, G., et al., [1977, p. 176-182]. MP 985 Architects and scientists in research for design of buildings in Alaska. Ledbetter, C.B., [1977, 8p.]. CR 77-23 UV radiational effects on Martian regolith water. P.H., [1977, 8p.]. MP 1072 Ecology on the Yukon-Prudhoe haul road. Brown, J., ed., [1978, 131p.]. SR 79-03 Invironment of the Alaskan Haul Road. Brown, J., [1980, p.3-52]. MP 1350	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p.18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections. Zarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections. Haynes, F.D., et al., [1985, p.285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow. Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphon for horizontal applications. Denliating, S.L., [1988, p.319-321] Execavation Investigation and exploitation of snowfield sites (1969, 57p.) Kinematics of axial rotation machines. Mellor, M., (1976, 24p.) Kinematics of continuous belt machines. Mellor, M., (1976, 24p.) Exeavating rock, ice, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.) CR 76-16 Removale of membranes of cutting and boring in permartors. Mellor, M., (1977, 12p.) Payement recycling using a heavy buildozer mounted pulverizer. Eaton R.A., et al., [1977, 12p. + appondix SR 77-30
Abele, G., 71976, p.51-59; Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p) Second progress report on oil spilled on permafrost. McFadden, T., et al., (1977, 46p) Ross lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36). MP 1075. Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p). SR 78-17. Plant recovery from Arctic oil spills. Walker, D.A., et al., (1978, p. 242-259). MP 1185. Crude oil spills on black spruce forest. Jenkins, T.F., et al., (1978, p. 305-323). MP 1185. SR 78-19. Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., (1978, 81p). CR 78-28. Noncorrosive methods of ice control. Minsk, L. D., (1979, p. 133-162). Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., (1980, 128p). MP 1310. Remote sensing of revegetation of burned tundra, Kokolik. River, Alaska. Hall, D.K., et al., (1980, p.101-128). MP 1392. Ecological impact of vehicle traffic on tundra. Melodis, p. 512-528. MP 1352. Ecological impact of vehicle traffic on tundra. Abele, G., (1981, p. 512-528). MP 1352. Ung. term. active layer effects of crude oil spilled in interior Alaska. Collins, C.M., (1983, p. 175-179). MP 1656. Hydrologic modeling from Landstat land cover data. McKim, H.L., et al., (1984, 1971). SR 84-01. Response of permafrost to disturbance. Lawson, D.E., (1986, p. 1-7). Disturbance and recovery of arctic Alaska tundra terrain.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satch, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 886 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.) MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57- IV/68] Applications of remote sensing in New England. H.L., et al., [1975, 8p. + 14 figs and tables; MP 913 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.) SR 76-14 Arctic transportation operational and environmental evaluation of an air cushion schicle in northern Alaska. Abele, G., et al., [1977, p. 176-182) MP 985 Architects and scientists in research for design of buildings in Alaska. Ledbetter, C.B., [1977, 8p., CR 77-23] UV radiational effects on Martian regolith water. Nadeau, 1978, 131p., Communication in the work place an ecological perspective Ledbetter, C.B., [1979, 19p.] Ecology on the Yukon-Prudhoe haul road. Brown, J., ed., [1978, 131p.] Communication in the work place an ecological perspective Ledbetter, C.B., [1979, 19p.] Instronmental mapping of the Arctic National Wildife Ref- uge, Alaska. Walker, D.A., et al., [1982, 59p., 2 mapy.)	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p.18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections. Zarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections. Haynes, F.D., et al., [1986, p.285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow. Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphon for horizontal applications. S.L., [1988, p.319-321] Execavation Investigation and exploitation of snowfield sites. [1969, 57p.] Execavation of continuous beit machines. Mellor, M., [1976, 24p.] Execavation exploration machines. Mellor, M., [1976, 24p.] Execavation in lockstra, P., [1976, 17p.] CR 76-16 Kinematics of continuous beit machines. Mellor, M., [1976, 24p.] Execavation and exploitation for non-field sites. [1969, 57p.] Execavation in lockstra, P., [1971, 17p.] Execavation in lockstra, P., [1977, 184-151] MP 2444 Execavation in lockstra, P., [1977, 184-151] MP 2457 Execavation and exploitation for cutting and boring in permaforst. Mellor, M., [1977, 196p.] CR 76-16 Removed the section of the process of the proc
Abele, G., [1976, p.51-59] Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.] Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p.] Second progress report on oil spilled on permafrost McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Ross Ice Shelf Project environmental impact statement Jul., 1974. Parker, B.C., et al., [1978, p.7-36]. MP 1075. Effects of winter military operations on cold regions terrain Abele, G., et al., [1978, 34p.] Final recovery from Arctic oil spills. Walker, D.A., et al., [1978, p.242-259]. MP 1184. Crude oil spills on black spruce forest. Jenkins, T.F., et al., [1978, p.305-323]. MP 1185. Bibliography of permafrost soils and vegetation in the USSR Andrews, M., [1978, 175p.]. SR 78-19. Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., [1978, 81p.]. SR 78-19. Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., [1978, 81p.]. MP 1265. Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al., [1980, 128p.]. MP 1310. Remote sensing of revegetation of burned tundra, Kokohik. River, Alaska. Hall, D.K., et al., [1980, p.101-128]. MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., [1980, p.101-128]. MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., [1981, p.11-37]. Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., [1983, p.175-179]. MP 1656. Hydrologic modeling from Landsat land cover data McKim, H.L., et al., [1984, 19p.]. SR 84-01. Response of permafrost to disturbance. Lawon, D.E., (1986, p.1-7). MP 1656. Disturbance and recovery of arctic Alaska tundra terrain Walker, D.A., et al., [1987, 63p.]. CR 87-11.	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.) Tundra biome program. Brown, J., [1970, p. 1278] MP 881 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.] MP 1611 Arctic and subarctic environmental analyses totalizing ERTS-1 limagery. Anderson, D.M., et al., [1975, p. p. IV/57-IV/63] MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson of City (1975, 1975) Invited Experimental Mexicological problems of the Arctic Alaska Abele, (1975, p. p. IV/67-IR) Arctic transportation operational and environmental evaluation of an air cushion schicle in northern Alaska Abele, G., et al., [1977, p. 176-182] UV radiational effects on Martian regolith water PH, (1977, 8p.) CR 77-23 UV radiational effects on Martian regolith water PH, (1977, 8p.) CR 77-23 UV radiational effects on Martian regolith water PH, (1977, 8p.) CR 77-23 UV radiational effects on Martian regolith water PH, (1978, 131p.) SR 79-03 Invironment of the Alaskan Haul Road Brown, J., ed., (1978, 131p.) SR 79-03 Invironment of the Alaskan Haul Road Brown, J., [1980, p. 3-52] Livironment of the Alaskan Haul Road Brown, J., [1982, 59p. + 2mapsy, 11 p. 11 p	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., (1978, 79p) Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., (1987, p. 833-840) MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., (1975, p. 18-27) MP 1051 Removal of trace organics by overland flow Leggett, D.C., et al., (1982, p. 176-184) Laboratory tests and analysis of thermosyphons with inclined evaporator sections Zarling, J.P., et al., (1985, p. 31-37) MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., (1985, p. 285-292) Leggett, D.C., (1987, p.809-815) MP 2034 Leggett, D.C., (1987, p.809-815) MP 2034 Leggett, D.C., (1988, p. 319-321) Thermosyphons and foundation design in cold regions. Haynes, F.D., et al., (1988, p. 251-229) Thermosyphon for horizontal applications S.L., (1988, p. 319-321) Excavation Investigation and exploitation of snowfield sites (1965, 57p) Kinematics of axial rotation machines Mellor, M., (1976, 24p) Lexavating rock, i.e., and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p) Permatrost excavating attachment for heavy buildozers Garfield, D.E., et al., (1977, 149) Parement recycling using a heavy buildozer mounted pulseries. Eaton R.A., et al., (1977, 12p + appends), (1978, 24p) Undervea pipelines and cables in polar waters. Mellor, M., (1977, 36p) Undervea pipelines and cables in polar waters. Mellor, M., (1977, 30p) Mellor, M., (1977, 12p + appends), (1978, 24p) Mellor, M., (1978, p. 10p) Mellor, M., (1978, p. 10p)
Abele, G., 71976, p.51-59) Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., (1977, 34p.) Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., (1977, 32p.) Second progress report on oil spilled on permafrost McFadden, T., et al., (1977, 46p.) Ross lee Shelf Project environmental impact statement July, 1974 Parker, B.C., et al., (1978, p.7-36) Effects of winter military operations on cold regions terrain Abele, G., et al., (1978, 34p.) Plant recovery from Arctic oil spills Walker, D.A., et al., (1978, 1978, 1978) Errode oil spills on black spruce forest Jenkins, T.F., et al., (1978, p. 305-323) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p.) Tundra recovery since 1949 near Fish Creek, Alaska, Lawson, D.E., et al., (1978, 81p.) Noncorrosive methods of ice control Minsk, L. D., (1979, p. 133-162) Crude oil spills on subarctic permafrost in interior Alaska, Johnson, L.A., et al., (1980, 128p.) Road dust along the Haul Road, Alaska Everett, K.R., (1980, p.101-128) Winter air pollution at Fairbanks, Alaska Coutts, H.J., et al., (1981, p. 13-7) Long-term active layer effects of crude oil spilled in interior Alaska, S.P., (1982, p. (C)1-(C)9) Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., (1983, p. 175-179) MP 1352 Winter air pollution at Fairbanks, Alaska Coutts, H.J., et al., (1981, p. 13-7) Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., (1983, p. 175-179) MP 1656 Hydrologic modeling from Landstat land cover data McKim, H.L., et al., (1984, 1991) Response of permafrost to disturbance Lawson, D.E., (1986, p. 1-7) Disturbance and recovery of arctic Alaskan tundra terrain Walker, D.A., et al., (1987, 63p.) CR 78-21 CR 78-2	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well casings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Satch, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 886 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 50-64] Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181] Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 6p.) MP 1031 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57- IV/68] Applications of remote sensing in New England. H.L., et al., [1975, 8p. + 14 figs and tables]. MP 913 Temporary environment. Cold regions habitability. Bechtel, R.B., et al., [1976, 162p.] Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.). SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.). SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.). SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.). SR 76-10 Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1977, 8p.). CR 77-23 UV radiational effects on Martian regolith water. P.H., [1977, p. 176-182]. MP 115 Communication in the work place an ecological perspective Ledbetter, C.B., [1979, 19p.]. SR 79-03 Invironmental appring of the Arctic National Wildlife Ref. [1978, 137p.). MP 2309 Livironments and standards for military operation. Opitz, MP 2309	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p.] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p.833-840] MP 2251 Evaporation Radiation and evaporation heat loss during ice fog conditions. McFadden, T., [1975, p.18-27] Removal of trace organics by overland flow Leggett, D.C., et al., [1982, p.176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections. Zarling, J.P., et al., [1985, p.31-37], MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections. Haynes, F.D., et al., [1986, p.285-292] Leggett, D.C., (1987, p.809-815) Evaporation of chemical agents from ice and snow. Leggett, D.C., (1988, 10p.) Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p.251-259] Thermosyphon for horizontal applications. S.L., [1988, p.319-321] Execavation Investigation and exploitation of snowfield sites. [1969, 57p.] Execavation of continuous beit machines. Mellor, M., [1976, 24p.] Execavation Hoekstra, P., [1976, 17p.] Execavation Hoekstra, P., [1977, 154-151] MP 2444 Exevation Hoekstra, P., [1977, 154-151] Permafrost execavating attachment for heavy buildozers Garfield, D.E., et al., [1977, 36p.) CR 76-16 Radiation and exploitation machines for cutting and boring in permafrost (1978, 24p.) Leggett, D.C., (1977, 36p.) CR 77-19 Pavement recycling using a heavy buildozer mounted pulcerizer. Eaton R.A., et al., [1977, 12p. + appends.] SR 77-30 Design for cutting machines in permafrost (1978, 24p.) Lidler, M., (1978, 14p.) Legler, M., (278-11) Mechanics of cutting and boring in permafrost (1978, 24p.) Legler, M., (278-11) Mechanics of cutting and boring in permafrost (1978, 24p.)
Abele, G., [1976, p.51-59) Land treatment of wastewater at Maniteca, Calif., and Quincy, Washington. Iskandar, I.K., et al., [1977, 34p.] Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska. Abele, G., et al., [1977, 32p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Second progress report on oil spilled on permafrost. McFadden, T., et al., [1977, 46p.] Ross lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., [1978, p.7-36). MP 1075. Effects of winter military operations on cold regions terrain. Abele, G., et al., [1978, 34p.] Fall Plant recovery from Arctic oil spills. Walker, D.A., et al., [1978, p.242-259]. MP 1184. Crude oil spills on black spruce forest. Jenkins, T.F., et al., [1978, p.305-323]. MP 1185. Bibliography of permafrost soils and vegetation in the USSR. Andrews, M., [1978, 175p.]. SR 78-19. Tundra recovery since 1949 near Fish Creek. Alaska. Lawson, D.E., et al., [1978, 81p.]. SR 78-19. Sonontrosive methods of ice control. Minsk, L.D., [1979, p.133-162]. MP 130. Remote sensing of revegetation of burned tundra, Kokohik. River, Alaska. Hall, D.K., et al., [1980, p.232.]. MP 1310. Road dust along the Haul Road, Alaska. Everett, K.R., (1980, p.101-128). MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., [1981, p.512-258]. MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., [1981, p.512-258]. MP 1352. Winter air pollution at Fairbanks, Alaska. Coutts, H.J., et al., [1981, p.512-258]. MP 1352. Winter air pollution in Kachemak Bay, Alaska. Daly, S.F., [1982, p. (Cl.1-(Cl.9)). MP 1501. Long-term active layer effects of crude oil spilled in interior Alaska. Collins, C.M., [1981, p.175-179]. MP 1501. Disturbance and recovery of arctic Alaskan tundra terrain Walker, D.A., et al., [1987, 63p.]. Second and recovery of arctic Alaskan tundra terrain Walker, D.A., et al., [1987, 63p.]. C.R. 87-11. Chemical analysis of hazardous waster. McGee, E.E., et	Jenkins, T.F., et al., [1989, p. i.3-14] Influence of well easings on well water (1989, 9p.) Environments Arctic environmental factors affecting army operations. Sater, J.E., ed., [1962, 11p.) MP 984 Tundra biome program. Brown, J., [1970, p. 1278] MP 886 Tundra biome applies new look to ecological problems in Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] Environmental setting, Barrow, Alaska. Brown, J., [1970, p. 9] MP 986 Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al., [1973, p. 163-181], MP 964 Arctic and subarctic environmental analyses utilizing ERTS-1 imagery. Anderson, D.M., et al., [1973, 5p.) MP 1611 Arctic and subarctic environmental analyses from ERTS imagery. Anderson, D.M., et al., [1973, 5p.) MP 1613 High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al., [1975, p. IV/57-IV/68] Applications of remote sensing in New England. If L., et al., [1975, 8p., 14 figs and tables). MP 913 Temporary environment. Cold regions habitability. Bechitel, R.B., et al., [1976, 162p.] Notes on conducting the behavior setting survey by interview method. Ledbetter, C.B., [1976, 33p.]. SR 76-10 Arctic transportation operational and environmental evaluation of an air cushion schiele in northern Alaska. Abele, G., et al., [1977, p. 176-182]. MP 985 Architects and scientists in research for design of buildings in Alaska. Ledbetter, C.B., [1977, 8p.). CR 77-22 UV radiational effects on Martian regolith water. Nadeau, P.H., [1977, 8p.). SR 79-03 Instronmental mapping of the Arctic National Wildlife Ref- uge, Alaska. Walker, D.A., et al., [1982, 59p., 2 maps) CR 82-37 Linvironments and standards for military operation. Optit.	Estuaries Estuarine processes and intertidal habitats in Grays Harbor, Washington: a demonstration of remote sensing techniques Gatto, L.W., [1978, 79p] Physical properties of estuarine ice in Great Bay. New Hampshire. Meese, D.A., et al., [1987, p. 833-840] MP 2251 Eraporation Radiation and evaporation heat loss during ice fog conditions. McFadden. T., [1975, p. 18-27] Removal of trace organics by overland flow Braden. T., [1975, p. 18-27] Removal of trace organics by overland flow Cagett, D.C., et al., [1982, p. 176-184] Laboratory tests and analysis of thermosyphons with inclined evaporator sections Carling, J.P., et al., [1985, p. 31-37]. MP 1853 Heat transfer characteristics of thermosyphons with inclined evaporator sections Haynes, F.D., et al., [1985, p. 285-292] Lee surface hydrolysis of disopropylifluorophosphate (DFP) Leggett, D.C., [1987, p. 809-815) Evaporation of chemical agents from ice and snow Leggett, D.C., [1988, 10p] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p. 251-259] Thermosyphons and foundation design in cold regions, Haynes, F.D., et al., [1988, p. 251-259] Thermosyphon for horizontal applications S.L., [1988, p. 319-321] Excavation Inestigation and exploitation of snowfield sites Mellor, M., (1969, 57p) kinematics of axial rotation machines Mellor, M., (1976, 24p) Excavating rock, ice, and frozen ground by electromagnetic radiation Hockstra, P., [1976, 17p) Permafrost excavating attachment for heavy bulldozers Garfield, D.E., et al., [1977, p. 144-151] Design for cutting machines for cutting and boring in permafrost. Mellor, M., (1977, 15p) Pavement recycling using a heavy bulldozer mounted pulverier. Eaton R.A., et al., [1977, 12p + appends, 1798, 24p) Undersea pipelines and cables in polar waters (1978, 24p) Undersea pipelines and cables in polar waters (1978, 24p)

Expeditions	Single fiber measurements for remote optical detection of	Stabilizing fire breaks in tundra vegetation. Patterson, W.A.
Arctic research in the United States, Vol 3 [1989, 72p] MP 2653	TNT. Zhang, Y., et al, [1989, 7p] SR 89-18	III, et al. [1981, p 188-189] MP 1804
Arctic research of the United States, Vol.3, [1989, 71p]	Determination of explosive residues in soil Part 3. Bauer, C.F., et al. (1989, 89p) CR 89-09	Recovery and active layer changes following a tundra fire in northwestern Alaska Johnson, L., et al. (1983, p. 543-
MP 2530	Analytical methods for detecting military-unique compounds	547 ₁ MP 1660
Experimental data	Jenkins, T.F., et al. (1989, p.13-14) MP 2713	Vegetation recovery after tundra fires in northwestern Alaska.
Arching of two block sizes of model ice floes. Calkins, D.J.	Low-temperature effects on systems for composting explo-	Racine, C. et al. (1987, p 461-469) MP 2374
et al, [1976, 11p] CR 76-42	sives-contaminated soils. Ayorinde, OA, et al, [1989,	Firm
Heat transfer over a vertical melting plate. Yen, YC., et al,	18p ₁ SR 89-38	USA CRREL shallow drill. Rand, J.H., (1976, p.133-137)
(1977, 12p.) CR 77-32	Environmental transformation of nitroaromatics and nitra-	MP \$73
Exploration	mines. Walsh, M E., (1990, 21p) SR 90-02	Subsurface measurements of the Ross Ice Shelf, McMurdo
Tundra recovery since 1949 near Fish Creek, Alaska. Law-	Fate and transport of contaminants in frozen soils Ayo- rinde, O.A., et al, (1990, p 202-21); MP 2679	Sound, Antarctica. Kovacs, A. et al. [1977, p.146-148]
son, D.E., et al, [1978, 81p] CR 78-28	Extraterrestrial ice	MP 1013
EXPLOSION EFFECTS Explosions and snow. Mellor, M., (1965, 34p.) M III-A3a	Colloquium on Water in Planetary Regoliths, Hanover, N.H.,	Nitrogenous chemical composition of antarctic ice and snow. Parker, B C., et al. (1981, p.79-81) MP 1541
Explosions and snow. Mellor, M. (1905, 34p)	Oct. 5-7, 1976. [1977, 161p] MP 911	Firn quake (a rare and poorly explained phenomenon). Den-
Explosion effects	Mars soil-water analyzer: instrument description and status	Hartog, S.L., (1982, p 173-174) MP 1571
Ice-cratering experiments Blair Lake, Alaska. Kurtz, M.K.,	Anderson, D.M., et al. [1977, p.149-158] MP 912	Baseline acidity of South Pole precipitation Cragin, J H, et
et al. (1966, Various pagings) MP 1034	First impressions of the comet drilling problem. Mellor, M.	al, [1987, p.789-792] MP 2275
Analysis of explosively generated ground motions using	[1989, p 229-232] MP 2592	FIRNIFICATION
Fourier techniques. Blouin, S.E., et al. (1976, 86p)	Falling bodies	Greenland ice sheet. Bader, H., [1961, 18p] M I-B2
CR 76-28	Airborne-Snow Concentration Measuring Equipment La-	Firnification
Dynamic in-situ properties test in fine-grained permafrost	combe, J., (1982, p 17-46) MP 1981	Sintering and compaction of snow containing liquid water
Blouin, S E., (1977, p 282-313) MP 963	FALLOUT	Colbeck, S.C., et al. (1979, p.13-32) MP 1190
Destruction of ice islands with explosives. Mellor, M, et al.	Radioactive fallout in northern regions. Wilson, C. (1967,	FLEXURAL STRENGTH
[1978, p.753-765] MP 1018	35p. ₁ . M I-A3d Fast ice	Mechanical properties of sea ice Weeks, W.F., et al. (1967,
Ground pressures exerted by underground explosions. John-	Dynamics of near-shore ice. Weeks, W.F., et al. (1976, p.9-	80p ₃ M II-C3
son, P.R., (1978, p 284-290) MP 1520	34 ₁ MP 1380	Flexural strength
High-explosive cratering in frozen and unfrozen soils in Alas- ka. Smith, N, (1980, 21p.) CR 80-09	Grounded ice along the Alaskan Beaufort Sea coast. Koyacs,	Flexural strength of ice on temperate lakes Gow, A.J.,
Impact fise performance in snow (Initial evaluation of a new	A. [1976, 21p] CR 76-32	[1977, p.247-256] MP 1063
test technique) Aitken, G W., et al. [1980, p 31-45]	Dynamics of near-shore ice Kovacs, A, et al. [1977,	Flexural strength of ice on temperate lakes Gow, A J., et al. [1978, 14p.] CR 78-09
MP 1347	p 106-112 ₁ MP 924	Nondestructive testing of in-service highway pavements in
Analysis of non-steady plastic shock waves in snow. Brown,	Movement of coastal sea ice near Prudhoe Bay Weeks,	Maine Smith, N., et al. [1979, 22p] CR 79-06
R.L., [1980, p.279-287] MP 1354	W.F., et al. (1977, p.533-546) MP 1066	Bending and buckling of a wedge on an elastic foundation.
Block motion from detonations of buried near-surface explo-	Decay patterns of land-fast sea ice in Canada and Alaska	Nevel, D E , [1980, p.278-288] MP 1303
sive arrays. Blouin, S.E., [1980, 62p] CR 80-26	Bilello, M.A., (1977, p.1-10) MP 1161	Ice characteristics in Whitefish Bay and St. Marys River in
Prediction of explosively driven telative displacements in	Internal structure of fast ice near Narwahi Island Gow, A.J.,	winter. Vance, G.P., [1980, 27p] SR 80-32
rocks. Blouin, S.E., [1981, 23p.] CR 81-11	et al, [1977, 8p] CR 77-29	Acoustic emission and deformation response of finite ice
Testing shaped charges in unfrozen and frozen silt in Alaska.	Dynamics of near-shore ice. Kovacs, A. et al. 1977,	plates. Xirouchakis, P.C. et al. [1981, p 385-394]
Smith, N., (1982, 10p.) SR \$2-02	p 411-4241 MP 1076 Preferred crystal orientations in Arctic Ocean fast ice	MP 1455
Breaking ice with explosives. Mellor, M. [1982, 64p]	Weeks, W.F., et al. (1978, 24p) CR 78-13	Breakup of solid ice covers due to rapid water level variations.
CR 82-40 Frozen soil characteristics that affect land mine functioning	Sea ice north of Alaska Kovacs, A., (1978, p 7-12)	Billfalk, L., (1982, 17p) CR 82-03
Richmond, P.W., [1983, 18p] SR 83-05	MP 1252	Flexural strength and elastic modulus of ice. Tatinclaux,
Blasting and blast effects in cold regions. Part 1 Air blast.	Dynamics of near-shore ice Kovacs, A, et al. (1978,	J.C., et al, (1982, p.37-47) MP 1568
Mellor, M., (1985, 62p) SR 85-25	p 230-233 ₁ MP 1619	Determining the characteristic length of model ice sheets. Sodhi, D.S., et al. (1982, p. 99-104) MP 1570
Revised guidelines for blasting floating ice. Mellor, M.	Crystal alignments in the fast ice of Arctic Alaska Weeks,	Sodhi, D.S., et al. (1982, p. 99-104) MP 1570 Ice forces on model marine structures Haynes, F.D., et al.
(1986, 37p.) SR 86-10	W.F., et al. (1979, 21p) CR 79-22	(1983, p.778-787) MP 1606
Blasting and blast effects in cold regions. Part 2 underwater	Oil pooling under sea ice Kovacs, A. (1979, p. 310-323)	Fiexural strengths of freshwater model ice Gow, AJ.
explosions Mellor, M. (1986, 56p) SR 86-16	MP 1289	(1984, p.73-82) MP 1826
Eruptions from under-ice explosions. Mellor, M, et al.	Maximum thickness and subsequent decay of lake, river and	Sheet ice forces on a conical structure an experimental study
[1988, 26p.] SR 88-14	fast sea ice in Canada and Alaska Bilello, M.A., [1980, 160p] CR 80-06	Sodhi, D.S. et al. [1985, p 46-54] MP 1915
Blasting and blast effects in cold regions. Part 3 explosions	Shore ice pile-up and ride-up field observations, models,	Uplifting forces exerted by adfrozen ice on marine piles
in ground materials. Mellor, M., (1989, 62p) SR 89-15	theoretical analyses Kovacs, A., et al. (1980, p 209-	Christensen, F.T. et al. (1985, p.529-542) MP 1905
Explosives	298 ₁ MP 1295	Sheet ice forces on a conical structure: an experimental study.
Use of explosives in removing ice jams. Frankenstein, G.E.	Polarization studies in sea ice Arcone, S.A., et al. (1980.	Sodhi, DS, et al. (1985, p 643-655) MP 1906
et al. (1970, 10p) MP 1021	p 225-245 ₁ MP 1324	Flexural and buckling failure of floating ice sheets against structures. Sodhi, D.S., (1986, p.339-359) MP 2134
Composition of vapors evolved from military TNT Leggett.	Alaska's Beaufort Sea coast ice ride-up and pile-up features	Flexural and buckling failure of floating ice sheets against
D C., et al. [1977, 25p] SR 77-16	Kovacs, A., [1983, 51p] CR 83-09	structures Sodhi, D.S., (1987, p.53-73) MP 2315
Block motion from detonations of buried near-surface explo-	Shoreline erosion and shore structure damage on the St Marys River Wuebben, J.L., (1983, 36p) SR 83-15	Flexure and fracture of macrocrystalline S1 type freshwater
sive arrays Blouin, S E . (1980, 62p) CR 80-26	Onshore ice pileup and override. Kovacs, A, et al, 11988.	ice Dempsey, J.P., et al. (1988, p.39-46) MP 2318
Mine/countermine problems during winter warfare. Lunar-	p 108-142 ₁ MP 2336	Growth of EG/AD/S model ice in a small tank. Borland,
dini, V.J., ed. (1981, 43p) SR 81-20	Fatigue (materials)	S L., (1988, p.47-53) MP 2319
Breaking ice with explosives Mellor, M. (1982, 64p)	Cyclic loading and fatigue in ice. Mellor, M. et al. (1981,	Effects of temperature and structure of ice on its flexural
CR 82-40	p 41-53 ₁ MP 1371	strength. Gow, AJ, et al. (1988, 43p) CR 88-06
Review of the propagation of inelastic pressure waves in snow. Albert, D.G., 1983, 26p 3 CR 83-13	Films	Ship model testing in level ice an overview. Tatinclaux, J.C.
Seasonal soil conditions and the reliability of the M15 land	lee fog suppression using monomolecular films McFadden,	[1988, 30p] Cr 88-15
mine. Richmond, P.W., et al. [1984, 35p] SR 84-18	T., (1977, p.361-367) MP 956	Fracture toughness of columnar freshwater ice Bentley, D.L. et al. (1989, p.7-20) MP 2545
Explosive obscuration sub-test results at the SNOW-TWO	Filters	Penetration of floating ice sheets with cylindrical indentors
field experiment Ebersole, J.F., et al. (1984, p. 347-354)	Fortran subroutines for zero-phase digital frequency filters Albert, D.G., 1986, 26p.; SR 86-04	Sodhi, D S , ct al. (1989, p 104) MP 2688
MP 1872	Albert, D.G., (1986, 26p.) SR 86-04 Losses of explicit ses residues on disposable membrane filters	Floating ice
Penetration of shaped charges into ice Mellor, M. (1984.	Jenkins, T.F., et al. (1987, 25p.) SR 87-02	Bearing capacity of floating ice plates Kerr, A D. (1976,
p 137-148 ₁ MP 1995	Evaluation of disposable membrane filter units for sorptive	p 229-268 ₁ MP 884
Chemical analysis of munitions wastewater Jenkins, TF, et	losses and sample contamination Walsh, ME, et al.	Cantilever beam tests on reinforced ice. Obstrom, E.G., et
al. (1984, 95p) CR 84-29	(1988, p.45-52) MP 2328	al. (1976, 12p) CR 76-07
Explosives in soils and sediments Cragin, J H, et al., (1985, 11p.) CR 85-15	Geotestiles and a new way to use them Henry, K., [1988,	Creep theory for a floating ice sheet Nevel, D.L., 1976.
Explosive residues in soil. Jenkins, T.F. et al. (1985, 33p)	p 214-222 ₁ MP 2525	98p) SR 76-04
SR 85-22	Fines	Arching of two block sizes of model ice floes Calkins, D.J.
Sorption of military explosive contaminants on bentonite	Densification by freezing and thawing of fine material	et al. (1976, 11p) CR 76-42
drilling muds. Leggett. D.C., (1985, 33p.) CR 85-18	dredged from waterways Chamberlain, E.J., et al., (1978, p. 622-628) MP 1103	Concentrated loads on a floating ice sheet Nevel, D.L., (1977, p.237-245) MP 1062
Losses of explosives residues on disposable membrane filters	p 622-628 ₁ MP 1103 Fires	Integrated approach to the remote sensing of floating ice.
Jenkins, TF, et al. (1987, 25p) SR 87-02	Utilities on permanent snowfields Mellor, M., (1969,	Campbell, W.J., et al. (1977, p.445-487) MP 1069
Development of an analytical method for explosive residues	42p ₁ MIII-A2d	Compressive and shear strengths of fragmented ice covers
in soil. Jenkins, T.F., et al. (1987, 51p.) CR 87-07	Symposium on fire in the northern environment Slaughter,	Cheng. ST, et al. (1977, 82p) MP 951
Analytical method for determining tetrarane in water	CW, ed. (1971, 275p) MP 878	Viscoelasticity of floating ice plates subjected to a circular
Walsh, M E., et al, [1987, 34p] SR 87-25	1977 tundra fire in the Kokolik River area of Alaska. Hall,	load Takagi, S. (1978, 32p) CR 78-05
Analytical method for determining tetrazene in soil. Walsh,	D.K., ct al., [1978, p.54-58] MP 1125	Bearing capacity of river ice for vehicles Nevel, D.E.
M E, et al. (1988, 22p.) SR 88-15	1977 tundra fire at Kokolik River, Alaska Hall, D K., et al.	(1978, 22p.) CR 78-03
Eruptions from under-ice explosions Mellor, M. et al.	(1978, 11p) SR 78-10	Buckling pressure of an elastic floating plate. Takagi, S.
(1988, 26p.) SR 88-14 Determining nitroaromatics and nitramines in water Jen-	Recovery of the Kokolik River tundra area, Alaska Hall,	(1978, 49p) C'R 78-14
kins, T.F., et al. (1988, 36p) SR 88-23	D.K. et al. (1979, 15p) MP 103h	Intrainment of ice floes into a submerged outlet Stewart,
Development of a membrane for in situ optical detection of	Remote sensing of revegetation of burned tundra, Kokolik	D.M., et al. (1978, p.291-299) MP 1137
TNT. Zhang, Y, et al. (1988, 6p.) SR 88-24	River, Alaska Hall, D.K., et al. (1980, p. 263-272) MP 1391	Horizontal forces exerted by floating ice on structures Kerr, A.D., §1978, 9p. CR 78-15
Ice-water partition coefficients for RDX and TNT Taylor,	Effects of a fundra fire on soil and vegetation Racine, C.,	P. blems of offshore oil drilling in the Beaufort Sea Weller,
S. (1989, 10p) CR 89-08	(1980, 21p) SR 80-37	G. et al. (1978, p.4-11) MP 1250

Floating ice (cont.) Buckling analysis of wedge-shaped floating ice sheets. Sod-	Bank recession of the Tanana River, Alaska Gatto, L.W., [1984, 59p] MP 1746	Study sis of infiltration results proposed North Carolina wastewater treatment site. At e. G., et al., 1984, 24p.
hi, DS., (1979, p.797-810) MP 1232	Bank recession and channel changes of the Tanana River,	SR 84-11
Critical velocities of a floating ice plate subjected to in-plane forces and a moving load. Kerr, A.D., [1979, 12p]	Alaskn. Gatto, L.W., et al., [1984, 98p.] MP 1747 Erosion analysis of the Tanana River, Alaska. Collins, C.M.	Constitutive relations for a planar, in mple shear flow of rough disks. Shen, H.H., et al., (1985, 17p). CR 85-20
CR 79-19	[1984, 8p. + figs.] MP 1748	Hear transfer from water flowing three gh a chilled-bed open
Ice laboratory facilities for solving ice problems. Franken- stein, G.E., [1980, p.93-103] MP 1301	Potential solution to ice jam flooding. Salmon River, Idaho Earickson, J., et al., (1986, p. 15-25) MP 2131	channel Richmond, PW, et al, [, 489, p 51-58] MP 2649
Evaluation of ice-covered water crossings. Dean, A.M., Jr.	Calibrating HEC-2 in a shillow, ice-covered river. Calkins,	Fluid dynamics
(1980, p.443-453) MP 1348 On the buckling force of floating ice plates. Kerr, A.D.,	DJ, et al, [1986, 25 re/s] SR 86-34 Floating debris control; a literature review. Perham, R.E.,	Fluid dynamic analysis of volcanic tremor al. (1982, 12p.) CR \$2-32
(1981, 7p.) CR 81-09	[1987, 22p + 41p. of append.] MP 2252	Source mechanism of volcanic tremor. Ferrick, M.G., it al,
Asymmetric flows: application to flow below ice jams Gögüs, M., et al, (1981, p 342-350) MP 1733	Ice formation downstream of Oahe Dam—1987-1988 winter. Ashton, G.D., (1988, 37p.) MP 2506	(1982, p 8675-8683) MP 1576 Calculation of advective mass transport in heteropy rus
Force distribution in a fragmented ice cover. Daly, S.F., et al., [1982, p. 374-387] MP 1531	Perturbation solution of the flood problem. Discussion and	media. Daly, CJ, [1983, p.73-89] MP 1677
Determining the characteristic length of model ice sheets.	author's reply. Ferrick, M.G., (1988, p 346-349) MP 2536	Automatic finite element mesh generator. Albert, M.R., et al. (1987, 27p) CR 87-18
Sodhi, D.S., et al. (1982, p.99-104) MP 1570	Framework for control of dynamic ice breakup by river regu-	Orthogonal curvilinear coordinate generation for internal
Application of HEC-2 for ice-covered waterways Calkins, D.J., et al, (1982, p 241-248) MP 1575	lation Fernek, M.G., et al, (1989, 14p) Ch. 89-12 Flood forecasting	flows. Albert, M.R., [1988, p.425-433] MP 2540 Fluid flow
Hydraulic model study of Port Huron ice control structure Calkins, D.J., et al., [1982, 59p.] CR 82-34	Hydrologic modeling from Landsat land cover data	Transport equation over long times and large spaces
Buckling loads of floating ice on structures Sodhi, D.S., et	McKim, H.L., et al, [1984, 19p] SR 84-01 Ice-related flood frequency analysis, application of analytical	O'Neill, K. (1981, p.1665-1675) MP 1497 Source mechanism of volcanic tremor Ferrick, M.G., et al.
al, (1983, p 260-265) MP 1626 Experiments on ice ride-up and pile-up. Sodhi, D.S., et al,	estimates. Gerard, R, et al, [1984, p.85-101]	(1982, p 8675-8683) MP 1576
(1983, p.266-270) MP 1627	MP 1712 Perturbation solution of the flood problem. Discussion an 1	Computation of porous media natural convection flow and phase change O'Neill, K, et al, [1984, p.213-229]
Dynamic buckling of floating ice sheets. Sodhi, D.S., [1983, p.822-833] MP 1607	author's reply Ferrick, M.G., (1988, p. 346-349)	MP 1895
First-generation model of ice deterioration. Ashton, GD,	MP 2536 Flo.ding	On the pressure drop through a uniform snow layer. Yen, Y.C., (1988, 10p) CR \$8-14
(1983, p.273-278) MP 2080 Deterioration of floating ice covers. Ashton, G.D., t1984,	Inundation of vegetation in New England. McKim, H.L., et	Fluid mechanics
p.26-33 ₁ MP 1C76	zl, [1978, 13p] MP 1169 Land treatment systems and the environment McKim,	River ice. Ashton, G.D., [1978, p 369-392] MP 1216 Orthogonal curvilinear coordinate generation for internal
Experimental determination of buckling loads of cracked ice sheets. Sodhi, D.S., et al. (1984, p.183-186)	H.L., et al. (1979, p 201-225) MP 1414	flows Albert, M.R., (1988, p.425-433) MP 2540
MP 1687	demoval of organics by overland flow. Martel, C.J., et al. (1980, 9p) MP 1362	Fog Airborne snow and fog distributions Berger, R.H., [1982.
Modified theory of bottom crevasses. Jezek, K.C., [1984, p 1925-1931] MP 2059	Rational design of overland flow systems. Martel, C.J., et al.	p 217-2°3 ₁ MP 1562
Force distribution in a fragmented ice cover. Stewart, D.M., et al, [1984, 16p] CR 84-07	[1980, p 114-121] MP 1400 Energy and costs for agricultural reuse of wastewater. Slet-	Show and fog particle size measurements. Berger, R.H., [1982, p.47-58] MP 1982
Forces associated with ice pile-up and ride-up. Sodhi, DS,	ten, R S., et al. [1980, p 339-346] MP 1401	Fog dispersal
et al. (1984, p 239-262) MP 1887 Buckling analysis of cracked, floating ice sheets Adley,	Forage grass growth on overland flow systems Palazzo, AJ., et al., [1980, p 347-354] MP 1402	Propane dispenser for cold fog dissipation system Hicks, JR, et al. [1973, 38p] MP 1033
M.D. et al, (1984, 28p) SR 84-23	Overland flow: removal of toxic volatile organics Jenkins,	Compressed air seeding of supercooled fog Hicks, J R.,
Determining the characteristic length of floating ice sheets by moving loads. Sodhi, D.S., et al., [1985, p. 155-159]	T.F., et al. [1981, 16p] SR 81-01 Effects of inundation on six varieties of turfgrass Erbisch,	[1976, 9p] SR 76-02 Use of compressed air for supercooled fog dispersal. Wein-
MP 1855	F H., et al. (1982, 25p) SR 82-12	stein, A.I., et al. (1976, p.1226-1231) MP 1614
Deterioration of floating ice covers Asliton, G.D., 1985, p 177-182; MP 2122	lce jams and flooding on Ottauquechee River, VT et al., [1982, 25p] Bates, R. SR 82-06	Suppression of ice fog from cooling ponds. McFadden, T., [1976, 78p] CR 76-43
Techniques for measurement of snow and ice on freshwater Adams, W.P., et al, [1986, p 174-222] MP 2000	Controlling river ice to alleviate ice jam flooding Deck,	Ice fog suppression using reinforced thin chemical films. McFadden, T., et al. (1978, 23p) CR 78-26
Adams, W.P., et al, (1986, p 174-222) MP 2000 Ice cover research—present state and future needs Kerr,	D.S., [1984, p 524-528] MP 1795 Salmon River ice jams Cunningham, L.L., et al., [1984,	McFadden, T., et al. (1978, 23p) CR 78-26 lee fog suppression using thin chemical films. McFadden,
A.D., et al. [1986, p 384-399] MP 2004 Revised guidelines for blasting fle ving ice Mellor, M.	p 529-533 ₁ MP 1796	T, et al. (1979, 44p) MP 1192
(1986, 37p) SR 86-10	Potential solution to ice jam flooding. Salmon River, Idaho. Earickson, J., et al. [1986, p 15-25] MP 2131	lee fog suppression in Arctic communities McFadden, T. (1980, * 54-65) MP 1357
Flexural and buckling failure of floating ice sheets against structures. Sodhi, D.S., [1986, p.339-359] MP 2134	Jökulhlaups from ice-dammed Strandline Lake, Alaska. Sturm, M., et al, (1987, p 79-94) MP 2307	Ice crystal formation and supercooled fog dissipation. Kumai, M 1982, p 579-587; MP 1539
Measurement of characteristic length of floating ice sheets	Jökulhlaups from Strandline Lake, Alaska (especially the	Fog formation
Sodhi, D.S., [1987, n.p. (Ch.7)] MP 2480 Flexural and buckling failure of floating ice sheets against	1982 event) Sturm, M., et al. (1989, 19p) MP 2520	Suppression of ice fog from cooling ponds McFadden, T., [1976, 78p] CR 76-43
structures. Sodhi, D.S., (1987, p.53-73) MP 2315	Floods	Forecasting
DOD floating ice problems Cox, GFN, (1987, p 151- 154) MP 2414	Landsat data analysis for New England reservoir management Merry, C.J., et al. [1678, 619] SR 78-06	Prediction and validation of temperature in tundra soils. Brown, J., et al., [1971, p. 193-197] MP 907
On the determination of the average Young's modulus for a floating ice cover. Kerr, A.D., et al, (1988, p 39-43)	Port Huron ice control model studies Calkins, DJ, et al.	Premoval during land treatment of wastewater Ryden, JC.
MP 2324	(1982, p 361-373) MP 1530 Controlling river ice to alleviate ice jam flooding Deck.	et al. (1982, 12p) SR 82-14 Hydrologic forecasting using Landsat data Merry, CJ, et
Elements of floating-debris control systems Perham, R.E., [1988, 54p + appends] MP 2453	D S . (1984, p 69-76) MP 1885	al. (1983. p.159-168; MP 1691
Imjin River ice boom. Perham, R E., (1988, 10p)	Geographic features and f'oods of the Ohio River H A., et al. (1984, p 265-281) MP 2083	Forecasting river water temperatures Daly, S.F., 1988, p 180-1881 MP 2500
SR 88-22 Flow developers for melting ice—experimental results Ash-	Cold facts of ice jams case studies of mitigation methods	Interfacing geographic data with real-time hydrologic fore-
ton, G D., (1989, p 151-160) MP 2465	Calkins, D.J., (1984, p. 39-47) MP 1793 Ice jam flood prevention measures, Lamoille River, Hardwick	casting models Eagle, T.C., et al. (1989, p.857-851) Mº 2527
Ice reinforced with Geogrid. Haynes, F.D. et al. (1989, p.179-185) MP 2484	VT Calkins, D J., (1985, p 149-168) MP 1940	Forest ecosystems
Penetration of floating ice sheets with cylindrical indentors Sodhi, D.S., [1989, p 377-382] MP 2485	Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont. Ferrick, M.G., et al. §1987, p. 163-	Wastewater applications in forest ecosystems McKim, H L, et al. (1982, 22p) CR 82-19
Effect of ice pressure on marginal ice zone dynamics Flato.	177 ₁ MP 2400	FOREST FIRES
G.M. et al. (1989, p. 514-521) MP 2522 Refractive index structure parameter for a year over the froz-	Jökulhlaups from Strandline Lake, Alaska (especially the 1982 event) Sturm, M. et al. (1989, 19p.)	Symposium on fire in the northern environment. Slaughter, CW, ed. [1971, 275p] MP 878
en Beaufort Sea Andreas, E.L., [1989, p 667-679]	Flow measurement	Forest land
MP 2575 Penetration of floating ice sheets with cylindrical indentors	Resurvey of the "Byrd" Station, Antarctica, drill hole. Gar-	Energy balance and runoff from a subarctic snowpack. Price, A.G., et al. [1976, 29p] CR 76-27
Sodhi, D.S., et al. (1989, p 104) MP 2688	field, D E , et al. (1976, p 29-34) MP 846 Flow rate	Symposium on land treatment of wastewater, CRREL, Aug. 1978, §1978, 2 vols 1 MP 1145
Dynamic analysis of a floating ice sheet undergoing vertical indentation. McGilvary, W.R., et al. [1990, p.195-203]	Temperature and flow conditions during the formation of	Technology and costs of wastewater application to forest sys-
MP 2579 Floating structures	river ice Ashton, G.D., et al. (1970, 12p.) MP 1723	tems Crites, R.W., et al. (1986, p.349-355) MP 2266
Righting moment in a rectangular ice boom timber or pon-	Stability of Antarctic ice Weertman, J. (1975 p 159)	Lores, land treatment with municipal wastewater in New
toon. Perham, R.E., [1978, p.273-289] MP 1136	MP 1042 Analysis of velocity profiles under ice in shallow streams	England Reed S.C. et al. (1986, p.420-430) MP 2280
Wave-induced bergy bit motion near a floating platform. Mak, L.M., et al, [1990, p.205-215] MP 2580	Calkins, D.J., et al (1981, p.94-111) MP 1397	Forest soils
Plood control Construction on permafrost at Longycarbyen on Spitsbergen	Harnessing frazil ice Perham, R.E., (1981, p. 227-237) MP 1398	Upland forest and its soils and litters in interior Alaska Troth, J.L., et al., [1976, p.33-44] MP 867
Tobiasson, W., (1978, p 884-890) MP 1108	One-dimensional transport from a highly concentrated, trans-	Forest tundra
fce jam problems at Oil City, Pennsylvania Deck, D.S., et al., [1981, 1993 SR 81-09	fer type source O'Neill, K., (1982, p.27-36) MP 1489	Climatic and dendroclimatic indices in the discontinuous per- mafrost zone of the Central Alash 'plands Haugen,
Tanana River monitoring and research studies near Fair-	Ottauquechee River analysis of freeze-up processes Cal- kins, D.J., et al. (1982, p. 2-37) MP 1738	R.K., et al., (1978 p. 392-398) MP 1099
banks, Alaska Neill, C.R., et al. (1984, 98p + 5 appends) SR 84-37	Asymmetric plane flow with application to ice jams. Tatin-	Crude oil spills on black spruce forest genkins, T.F., et al. (1978, p.305-323) MP 1185
Chena Flood Control Project and the Tanana River near Fair- banks, Alaska Buska, J.S., et al., [1984, 11p + figs.]	claux, J.C., et al. (1983, p. 1540-1556) MP 1645 Changes in the Ross Ice Shelf dynamic condition Jerek,	Fortifications Defensive works of subarctic snow Johnson, P.R., (1977)
MP 1745	K C. (1984, p 409-416) MP 2058	Defensive works of subarctic snow Johnson, P.R., (1977, 23p) CR 77-06

Test of snow fortifications Farrell, D.R., (1979, 15p.)	Frazil ice formation in turbulent flow. Müller, A, et al.	Salmon River ice jam control studies: interim report. Axelson, K.D., et al. [1990, 8p] SR 90-06
SR 79-33 Snow (urtifications as protection against shaped charge an	Characteristics of ice on two Verinont rivers Deck, D.S.,	Preeze drying
titank projectiles. Farrell, D.R., [1980, 19p] SR 80-11	[1978, 30p] SR 78-30 Ice blockage of water intakes Carey, K.L., [1979, 27p.]	Isothermal compressibility of water mixed with montmorillo- nite. Oliphant, J.L., et al. (1983, p 45-50) MP 2066
Winter field fortifications Farrell, D., [1986, 50p] SR 86-25	MP 1197 Accelerated ice growth in rivers Calkins, D.J., [1979, 5p.]	Explosives in soils and sediments Cragin, J H, et al. (1985, 11p) CR 85-15
Poundations	CR 79-14	Dewaterability of freeze-thaw conditional sludges. Martel, C.J., 1989, p 237-241; MP 2616
Piles in permafrost for bridge foundations. Crory, F.E., et al., [1967, 41p] MP 1411	Modeling of ice in rivers. Ashton, G.D., (1979, p.14/1-14/26) MP 1335	Sludge dewatering by natural freeze-thaw. Martel, C.J.
FOUNDATIONS Foundations of structures in cold regions. Sanger, F.J.,	Freshwater ice growth, motion, and decay Ashton, G.D., [1980, p 261-304] MP 1299	Freeze thaw cycles
[1969, 91p] M III-C4	Harnessing frazil ice Perham, R.E., 1981, p 227-237, MP 1398	Consolidating dredged material by freezing and thawing. Chamberlain, E.J., [1977, 94p.] MP 978
Foundations and subsurface structures in snow. Mellor, M., [1969, 54p] MIII-A2c	Hydraulic model study of a water intake under frazil ice con-	Effect of freeze-thaw cycles on resilient properties of fine- grained soils. Johnson, T.C., et al. (1978, 19p.)
Foundations Field performance of a subarctic utilidor Reed, S.C.	ditions. Tantillo, T.J., (1981, 11p) CR 81-03 Tests of frazil collector lines to assist ice cover formation.	MP 1082
(1977, p.448-468) MP 930	Perham, R.E., [1981, p.442-448] MP 1488 Field investigations of a hanging ice dam. Beltaos, S., et al.	Freeze thaw effect on the permeability and structure of soils. Chamberlain, E.J., et al., [1978, p.31-44] MP 1080
Baceplate design and performance mortar stability report. Aitken, G.W., [1977, 28p.] CR 77-22	(1982, p.475-488) MP 1533	Load tests on membrane-enveloped road sections. Smith, N., et al, [1978, 16p] CR 78-12
Kotzebue hospital—a case study. Crory, F.E., (1978, p.342-359) MP 1084	CRREL 2-inch frazil ice sampler Rand, J H., [1982, 8p] SR 82-09	Densification by freezing and thawing of fine material dredged from waterways. Chamberlain, E.J., et al., 1978,
Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W, (1978, p 884-890) MP 1108	Physical and structural characteristics of antarctic sea ice. Gow, A.J., et al., [1982, p.113-117] MP 1548	p 622-628; MP 1103 Resiliency of silt under asphalt during freezing and thawing.
Details behind a typical Alaskan pile foundation Tobiasson,	Liquid sampler Rand, J H., [1982, 4 col.] MP 2374 Properties of sea ice in the coastal zones of the polar oceans	Johnson, T.C., et al, [1978, p 662-668] MP 1106
Snow studies associated with the sideways move of DYE-3.	Weeks, W.F., et al, (1983, p 25-41) MP 1604	Waterproofing strain gages for low ambient temperatures. Garfield, D E., et al, [1975, 20p] SR 78-15
Tobiasson, W., (1979, p.117-124) MP 1312 Bending and buckling of a wedge on an elastic foundation	Frazil ice Daly, S.F., [1983, p.218-223] MP 2073 Physical mechanism for establishing algal populations in frame	Overconsolidated sediments in the Beaufort Sea. Chamber- lain, E.J., (1978, p.24-29) MP 1255
Nevel, D.E., [1980, p 278-288] MP 1303 Use of piling in frozen ground. Crory, F.E., [1980, 21 p.]	ice Garrison, D.L., et al. (1983, p 363-365) MP 1717	Freeze thaw effect on the permeability and structure of soils. Chamberlain, E.J., et al. (2979, p.73-92) MP 1325
MP 1407	Relative abundance of diatoms in Weddell Sea pack ice. Clarke, D.R., et al., 1983, p.181-182, MP 1786	Freeze thaw effect on reallient properties of fine soils. John-
Construction of foundations in permafrost. Linell, K.A., et al, t1980, 310p.; SR 80-34	Sea ice and biological activity in the Antarctic. Clarke, D.B.,	Stratified debris in Antarctic ice cores. Gow, A.J., et al.
Design of foundations in areas of significant frost penetration Linell, K.A., et al., [1980, p.118-184] MP 1358	et al, [1984, p 2087-2095] MP 1701 Frazil ice dynamics. Daly, S.F., [1984, 46p] M 84-01	(1979, p.185-192) MP 1272 Sulfur foam as insulation for expedient roads Smith, N.
Foundations of structures in polar waters. Chamberlain.	Performance of the Allegheny River ice control structure, 1983 Deck, D.S., et al. (1984, 15p) SR 84-13	al, (1979, 21p.) CR 79-18 Design of foundations in areas of significant frost penetration.
Foundations on permafrost, US and USSR design and prac-	Modeling intake peformance under frazil ice conditions.	Linell, K A, et al. (1980, p 118-184) MP 13*8
tice. Fish, A.M., (1983, p.3-24) MP 1682 Foundations in permafrost and seasonal frost; Proceedings.	Rise pattern and velocity of frazil ice Wuebben, J.L.	Approximate solution to Neumann problem for soil systems. Lunardini, V.J., c al. (1981, p.76-81) MP 1494
1985, 62p 1 MP 1730 Frost jacking forces on H and pipe piles embedded in Fair-	(1984, p 297-316) MP 1816 Dynamics of frazil ice formation. Daly, S.F., et al. (1984.	Cylindrical phase Lange approximation with effective thermal diffusivity Lunardini, V J., (1981, p 147-154)
banks silt. Johnson, J.B., et al., (1985, p.125-133) MP 1930	p.161-172 ₁ MP 1829	MP 1438 Effect of freezing and thawing on resilient modulus of granu-
Heat transfer characteristics of thermosyphons with inclined	Frazil ice formation Ettema, R., et al., [1984, 44p] CR 84-18	
evaporator sections Haynes, F.D., et al. (1986, p.285- 292) MP 2034	St. Lawrence River hanging ice dams, winter 1983-1984. Shen, H.T. et al. (1984, 85p) MP 2178	Deforming finite elements with and without phase change.
Foundation technology in cold regions. Quinn, WF, 1987, p 305-310, MP 2425	USACRREL precise thermistor meter Trachier, G M., et al. [1985, 34p] SR 85-26	Phese change around a circular cylinde: Lunardini, V.J.
Arctic construction working group report. Marvin, E L., et	Frazil ice measurements in CRREL's flume facility Daly.	[1981, p 598-600] MP 1907
Thermosyphons and foundation design in cold regions	Structure to form an ice cover on river rapids in winter Per-	R.A., c. al, (1981, 24p) SR \$1-21
Haynes, F.D., et al. (1988, p 251-259) MP 2443 Thermal stabilization of permafrost with thermosyphons	ham, R.E. (1986, p 439-450) MP 2128 Sub-ice channels and frazil bars, Tanana River, Alaska	(1981, 14p) CR 81-25
Zarling, J.P., et al, (1990, p 323-328) MP 2583 Fracture zones	Lawson, D.E., et al. (1986, p. 465-474) MP 2129 Frazil ice pebbles, Tanana River, Alaska. Chacho, E.F., et	p.160-162 ₁ MP 1304
Investigation of ice forces on vertical structures. Hirayama.	al, (1986, p. 475-483) MP 2130 Field techniques for obtaining engineering characteristics of	MP 1722
Fracturing	frazil ice accumulations. Dean, A.M., Jr., (1986, p 265-	Understanding the Arche sea noor for engineering purposes.
Creep rupture at depth in a cold ice sheet. Colbeck, S.C., et al., [1978, p.733] MP 1168	River ice and salmonids Walsh, M, et al. (1986, p D-4.1-	Conduction phase change beneath insulated heated or cooled
Fracture behavior of ice in Charpy impact testing Itagaki, K., et al, 1980, 13p.; CR 80-13	D-4 261 MP 2477 Development of a frazil ice sampler Brockett, B E. et al.	Full-depth and granular base course design for frost areas.
Investigation of the acoustic emission and deformation re-	(1986, 12p) SR 86-37 Sea-ice investigations during the Winter Weddell Sea Project	Solution of two-dimensional free and and thawing problems.
sponse of finite ice plates. Xirouchakis, P.C., et al., [1981, 199]	Ackley, S.F., et al. (1987, p.88-89) MP 2491	Annual property of the second columns for insulated busied wile
Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al. (1981, p 385-394)	Evolution of frazil ice in rivers and streams research and control Daly, S.F., [1987, p.11-16] MP 2303	inders Lunardini, V.J., (1983, p.25-32) MP 1593
MP 1455 Acoustic emission and deformation of ice plates Xiroucha-	Modelling trash rack freezeup by frazil ice Daly, S.F., 1987, p.101-106; MP 2305	1
kis, P.C., et al. (1982, p 129-139) MP 1589 Acoustic emissions from polycrystalline icc. St Lawrence.	Frazil ice deposits and water channels beneath an ice-covered river Arcone, S.A., et al. (1987, 12p.) CR 67-17	variation Lunardini, V.J., [1983, p.43-45] MP 1598
W.F., et al. (1982, 15p) CR 82-21	Frazil ice in rivers and streams Daly, S.F., (1987, p.19-	tion. Albert, M.R., (1983-66p) CR 83-12
Microstructure and the resistance of rock to tensile fracture. Peck, L., et al. (1985, p.11,533-11,546) MP 2137	Intake design for ice conditions Ashton, G.D., [1988.	rield lests of a frost-neave i wiel. Guyffion, O.C., et al.
Fracture toughness of model ice Dempsey, J.P., ct al. (1986, p 365-376) MP 2125	p 107-1381 MP 2518 Computer-controlled data acquisition system for a hydraulic	Comparison of two-dimensional domain and boundary inte-
Effect of grain size on the internal fracturing of polycrystalline ice. Cole, D.M., [1986, 71p] CR 86-05	flume Zabilansky, L.J., (1988, p.453-460) MP 2349 Development of sea ice in the Weddell Sea. Lange, M.A., et	data Hennadka, TV, il, et al. (1983, p 509-513)
Flexure and fracture of macrocrystalline S1 type freshwater	al, (1989, p.92-96) MP 2615	Fixed mesh finite element solution for cartesian two-dimen-
Fram Strait	Elastic properties of frazil ice from the Weddell Sea, Antare tica Lange, M.A., et al. (1989, p. 208-217)	MP 1702
Crystal structure of Fram Strait sea ice. Gow. A.J., et al. [1986, p 20-29] MP 2221	Compressive strength of antarctic frazilise Richter-Menge	model heat and soil-water flow. Hromadka, TV. II, et al
Winter marginal ice zone experiment, Fram Strait/Greenland Sea, 1987/89 Davidson, K., ed. (1986, 53p.)	JA, et al. (1989, p. 269-278) MP 2621 Time estimation for maximum supercooling in dynamic frame	I (1984, p. 99-104) MP 2104 Design implications of subsoil thawing Johnson, T.C. et al.
SR 86-09	ice formation Daly, S.F., et al. (1989, 13p.) SR 89-20	(1984, p.45-103) MP 1700
Physical properties of sea ice discharged from Fram Strait Gow, A J., et al. (1987, p 436-439) MI ² 2204	Cryogenic sampling of frazil ice deposits Chacho, E.F., Jr.	for cold regions lagoons Schneiter, RW, et al. (1984.
Physical properties of summer ses ace in the Fram Strait Tucker, W.B. et al. (1987, p.6787-6803) MP 2240	et al. (1989, 6p.) Freezeup dynamics of a frazil ice screen Axelson, K.D.	and the same and the same to a second and the
Oceanic heat flux in the Fram Strait measured by a drifting huny. Peroyich, D.K., et al. (1989, p. 995-998)	(1990, 8p) SR 90-0- In-situ sampling and characterization of frazil ice deposits	frozen soils Sellmann, PV, et al. (1984, 1993) SR 84-1
MP 2531	Lawson, D.E., et al. (1990, p. 193-205) MP 269. Comparison of the compressive strength of autaretic frazil to	Design and performance of water-retaining embankments if
Prazil ice Remote sensing of frazil and brash ice in the St. Lawrence	and laboratory-grown columnar ice Richter-Menge, JA	. New classification system for the seasonal snow cover. Col
River. Dean, A.M., Jr., (1977, 19p.) CR 77-08 Remote sensing of accumulated frazil and brash icc. Dean.	Development of an underwater frazil-ice detector Daly	Salt action on concrete Sayward, J M (1984, 69p)
A.M. Jr., (1977, p.693-704) MP 934	ST, et al. [1990, p.77-82] MP 270.	SR 84-21

Progra them surface (rest)	Description of advanced community and a second control of the	
Freeze thaw cycles (cont.) Radar investigations above the trans-Alaska pipeline near Fairbanks. Arcone, S.A., et al., [1984, 15p]	Response of advanced composite space materials to thermal cycling. Dutta, P.K., et al. [1988, p.506-517] MP 2478	Soil tests for frost action and water migration. Sayward, J.M., (1979, 17 p.) Construction of foundations in permafrost. Linell, K.A., et
CR 84-27 Automated soils freezing test. Chamberlain, E.J., (1985,	Development and design of sludge freezing beds. Martel, C.J., (1988, 49p) CR 88-20	al, [1980, 310p.] SR 89-34 Pothole primer; a public administrator's guide to understand-
5p ₁ MP 1892 Hydraulic properties of selected soils. Ingersoll, J. et al.,	Sludge dewatering by natural freeze-thaw. Martel, C.J., [1990, p.116-122] MP 2714	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 24p] MP 1416
g1985, p 26-35; MP 1925 Potential use of artificial ground freezing for contaminant	Freezeap Seasonal regime and hydrological significance of stream ic-	Simulating frest action by using an instrumented soil column. Ingersoil, J., et al., (1981, p.34-42) MP 1485
immobilization. Iskandar, I.K., et al, (1985, 10p) MP 2029	ings in central Alaska. Kane, D.L., et al., [1973, p.528-540] MP 1026	Computer models for two-dimensional steady-state heat conduction. Albert, M.R., et al. (1983, 90p.) CR 83-10
Sessonal variations in pavement performance Johnson, T.C., (1985, c21p) MP 2076	Ice formation and breakup on Lake Champlain Bates, R.E., 1980, p.125-143; MP 1429	Revised procedure for pavement design under seasonal frost conditions Berg, R., et al. (1983, 129p) SR 83-27
Freeze thaw consolidation of sediments, Beaufort Sea, Alaska. Lee, H.J., et al, (1985, 83p) MP 2025	Ottauquechee River—analysis of freeze-up processes Calkins, D.J., et al. [1982, p.2-37] MP 1738	Frost action and its control Berg, R L., ed. [1984, 145p]
Model of freezing front movement. Hromadka, T.V., II, et	St Lawrence River freeze-up forecast. Shen, H.T., et al,	Deteriorated building panels at Sondrestrom, Greenland.
al, [1985, 9p.] MP 2077 Survey of airport pavement distress in cold regions Vinson,	[1984, p.177-190] MP 1713 Forecasting water temperature decline and freeze-up in rivers.	Korhonen, C., [1985, p.7-10] MP 2017 Vertically stable benchmarks, a synthesis of existing informa-
T.S., et al, (1986, p 41-50) MP 2002 Lessons learned from examination of membrane roofs in Alas-	Shen, H.T., et al. (1984, 17p.) CR 84-19 Ice jam research needs. Gerard, R. (1984, p.181-193)	tion. Gatto, L.W., (1985, p. 179-188) MP 2069 Arctic and subarctic construction, general provisions.
ks. Tobiasson, W., et al. (1986, p 277-290) MP 2003	MP 1813 Numerical simulation of freeze-up on the Ottauquechee Riv-	Lobacz, E.F. (1986, 75p) SR 86-17 Frost action predictive techniques: an overview of research
Effects of freeze thaw cycles on granular soils for pavements. Cole, D.M., et al, £1986, 70p CR 86-04	er. Calkins, D.J., [1984, p 247-277] MP 1815 lee regime reconnaissance, Yukon River, Yukon. Gerard.	results. Johnson, T.C., et al. [1986, p.147-161] MP 2267
Engineering surveys along the Trans-Alaska Pipeline. God- frey, R.N., et al. [1986, 85p] SR 86-28	R, et al, (1984, p.1059-1073) MP 2406 Transient two-dimensional phase change. Albert, M.R., et	Performance of pavement at Central Wisconsin Airport.
Deformation of pavements during freeze thaw cycles. John-	al, (1985, p 229-243) MP 2162	Stark, J., et al. (1989, p.92-103) MP 2463 Deep frost effects on a longitudinal edge drain. Allen, W.L.,
son, T.C., et al. (1986, 138p) CR 86-13 Resilient moduli of soil specimens in the frozen and thawed	Instrumentation for an uplifting ice force model. Zabilansky, L.J., [1985, p 1430-1435] MP 2091	(1989, p 343-352) MP 2469 Physical changes in clays due to frost action. Chamberlain,
states. Johnson, T.C., et al. [1986, 62p] CR 86-12 Frost action on roads and airfields. Johnson, T.C., et al.	St Lawrence River freeze-up forecast Foltyn, E.P., et al. (1986, p.467-481) MP 2120	E.J., [1989, p. 863-893] MP 2595 State of the art of pavement response monitoring systems for
(1936, 45p.) CR 86-18 Mec anical and physical properties of soils in sold regions	Modelling trash rack freezeup by frazil ice Daly, S.F., [1987, p.101-106] MP 2305	roads and arrields (1989, 401p.) SR 89-23 Data acquisition: first the FERF then the world. Knuth,
Chamberiain, E.J., [1987, p.155-161] MP 2415 Snow/ice/frozen ground properties: working group report.	Ice cover distribution in Vermont and New Hampshire Atlan- tic salmon rearing streams. Calkins, D.J., et al., [1988,	K.V., (1989, p 136-138) MP 2567
Sterrett, K.F., et al. [1937, p.163-166] MP 2416 Developing a thawing model for sludge freezing beds Mar-	p 85.06) MP 2473 FREEZING	Frost forecasting Relationships between January temperatures and the winter
tel, C.J., [1988, p 1426-1430] MP 2372	Freezing process and mechanics of frozen ground. Scott,	regime in Germany Bilello, M.A., et al. (1979, p.17-27) MP 1218
On the design of polymeric composite structures for cold regions applications. Lord, H.W., et al. [1988, p.435-	R.F., (1969, 65p) M II-D1 Freezing	FROST HEAVE Cold room studies on frost susceptible soils. [1950, 25p.]
4583 MP 2395 Unfrozen water content of undisturbed frozen silt. Tice,	Heat and mass transfer from freely falling drops at low tem- peratures Zarling, J.P., (1980, 14p.) CR 80-18	ACFEL MP BL 1
A.R., et al. (1988, 17p) CR 88-19 Snowmelt increase through albedo reduction. Colbeck, S.C.,	Synoptic meteorology during the SNOW-ONE-A Field Experiment Bilello, M.A., [1983, 80p.] SR 83-10	Foundations of structures in cold regions. Sanger, F.J., (1969, 91p) M III-C4
[1988, 11p] SR 88-26 Predicting freezing design depth of sludge-freezing beds	Two-dimensional heat conduction phase change. Albert,	Frost heave Heat and moisture flow in freezing and thawing soils—a field
Martel, C.J., (1988, p.145-156) MP 2461 Respnse of runway pavement to freeze thaw cycles. Allen,	MR, et al. (1983, p.85-110) MP 2161 Modeling two-dimensional freezing. Albert, MR., (1984,	study Berg, R.L., (1975, p 148-160) MP 1612 Influence of insulation upon frost penetration beneath pave-
W.L., et al. (1989, 31p) SR 89-02	Technique for observing freezing fronts. Colbeck, S.C.,	ments. Eaton, R.A., et al. (1976, 41p.) SR 76-06 Galerkin finite element analog of frost heave. Guymon,
Physical changes in clays due to frost action EJ, [1989, p 863-893] Chamberlain, MP 2595	(1985, p 13-20) MP 1861 Prevention of freezing of wastewater treatment facilities.	G L., et al. [1976, p.111-113] MP 898
Monitoring pavement performance in seasonal frost areas Berg, R.L., (1989, p.10-19) MP 2564	Reed, S.C., et al. (1985, 49p.) SR 85-11 Heat conduction phase change problems. Albert, M.R., et al.	Mathematical model to predict frost heave Berg, R.L., et al., [1977, p.92-109] MP 1131
Resident modulus determination for frost conditions Chamberlain, E.J., et al. (1989, p 320-333) MP 2569	(1986, p 591-607) MP 2159 Problems and opportunities with winter wastewater treat-	Segregation freezing as the cause of suction force for ice lens formation Takagi, S., (1978, p. 45-51) MP 1061
Undersaturation in thawed permafrost at the beginning of freezeback. Ayorinde, O.A., [1990, p 317-321]	ment. Reed, S.C., [1986, p.16-20] MP 2205	Segregation freezing as the cause of suction force for ice lens formation Takagi, S., [1978, 13p] CR 78-06
MP 2582 Proceedings (1990, 318p) SR 90-01	Conduction heat transfer with freezing/thawing. Lunardini, VJ, (1987, p.55-64) MP 2304	Effects of subgrade preparation upon full depth pavement performance in cold regions Eaton, R.A. 1978, p 459-
Effect of freeze-thaw cycles on soils Chamberlain, E. et al. [1990, p.145-155] MP 2678	Geochemistry of freezing brines. Thurmond, V.L., et al. [1987, 11p] CR 87-13	473 ₁ MP 1067 Frost action in New Jersey highways Berg, R L., et al,
Fate and transport of contaminants in frozen soils Ayo-	Rational design of sludge freezing beds. Martel, C.J., (1988, p.575-581) MP 2343	(1978, 80p.) SR 78-89 Design of airfield pavements for seasonal frost and permafrost
rinde, O.A., et al. (1990, p.202-211) MP 2679 FREEZE THAW INDEXES	Thermal conductivity of sludges Vestlind, P.A. et al. MP 2632	conditions. Berg. R.L., et al. (1978, 18p) MP 1189
Heat exchange at the ground surface. Scott, R.F., 1964, 49p. plus append; M II-A1	International Symposium on Cold Regions Heat Transfer, 1989 [1989, 314p] MP 2636	Thermal and load-associated distress in pavements. Johnson, T.C. et al., [1978, p. 403-437] MP 1209
Freeze thaw tests Melting and freezing of a drill hole through the Antarctic shed	Freezing indexes	Full-depth pavement considerations in seasonal frost areas. Eaton, R.A., et al. (1979, 24p) MP 1188
tee Tien, C., et al. (1975, 9421-432) MP 861 Remote-reading tensiometer for use in subfreezing tempera-	Drainage and frost action criteria for a pavement design Berg, R L., (1979, 51p) SR 79-15	Small-scale testing of soils for frost action Sayward, J.M., [1979, p.223-231] MP 1309
tures. McKim, H L., et al., [1976, p.31-45] MP 897 Repetitive loading tests on membrane enveloped road sec-	Freezing nuclei Studies of high-speed rotor icing under natural conditions	Soil tests for frost action and water migration. Sayward, J.M., (1979, 17 p.) SR 79-17
tions during freeze thaw. Smith, N , et al. (1977, p.171-197) MP 962	Itagaki, K., et al. (1983, p.117-123) MP 1635 Freezing points	Mathematical model to correlate frost heave of pavements. Berg, R I., et al. [1980, 49p] CR 80-10
Freeze-thaw tests of liquid descing chemicals on selected	Bottom heat transfer to water bodies in winter O'Neill, K. et 21, [1981, 8p] SR 81-18	Frost heave in an instrumented soil column Berg. R.L., et al., [1980, p 211-221] MP 1331
pavement materials Minsk, L.D., (1977, 16p.) CR 77-28	Effect of variable thermal properties on freezing with an un- frozen water content. Lunardini, V.J., (1988, p.1127-	Summary of the adsorption force theory of frost heaving
Effects of moisture and freeze-thaw on rigid thermal insula- tions Kaplar, C.W., [1978, p.403-417] MP 1085	1132 ₁ MP 2370	Frost heave model based upon heat and water flux. Guy-
Freeze than loading tests on membrane enveloped road sections Smith, N., et al. (1978, p. 1277-1288)	Chemical aspects of soil freezing Henry, K. (1988, 8p.) CR 88-17	mon, G.L., et al. (1980, p. 253-262) MP 1333 Adsorption force theory of frost heaving Takagi, S., (1980,
MP 1158 Overconsolidation effects of ground freezing Chamberlain,	Freezing potential (electrical) Freezing potential of soils Kelsh, D.J. et al.	p 57-81 ₁ MP 1334 Numerical solutions for rigid ice model of secondary frost
EJ. g1980, p.325-337; MP 1452 Neumann solution applied to soil systems Lund finit, V.J.,	tivas, 9p; CR 88-10 Freezing rate	heave O'Neill, K. et al. [1980, p.656-669] MP 1454
(1980, 7p) CR 80-22 Simulating frost action by using an instrumented soil column	Thin ice growth Ashton, G.D., [1989, p 564-566] MP 2657	Construction of foundations in permafrost Linell, K.A., et al., (1980, 310p.) SR 80-34
Ingersoll, J. et al. (1981, p.34-42) MP 1485	Friction	Results from a mathematical model of frost heave Guymon G L., et al. [1981, p.2.6] MP 1483
Comparative evaluation of frost-susceptibility tests Chamberlain, E.J., [1981, p.42-52] 31P 1486	Comment on 'Water drag coefficient of first-year sea see' by M.P. Langleben Andreas, E. L., et al. (1983, p. 779-782)	Comparative evaluation of frost-susceptibility tests. Cham-
Phase change around insulated buried pipes: quasi-steady method. Lunardini, V.J., (1981, p. 201-207,	MP 1577 Constitutive relations for a planar, simple shear flow of rough	berlain, E.J., (1981, p. 42-52) MP 1486 CRRI I, frost heave test, U.SA Chamberlain, E.J., et al.
MP 1496 Freeze-thaw test to determine the frost susceptibility of soils	disks Shen, H.H., et al. [1985, 17p] CR 85-20 FROST ACTION	(1981, p.55-62) MP 1499 Lee segregation in a frozen soil column Guymon, G.L., et
Chamberlain, E.J., (1987, 90p.) SR 87-1 Freeze thaw tests of road and airfield subgrade soils. Cole,	Freezing process and mechanics of frozen ground Scott, R F (1969, 65p) M II-D1	al [1981, p 127-140] MP 1534 Frost susceptibility of soil, review of index tests Chamber-
D.M., et al. (1987, 36p.) CR 87-02 Influence of thermal cycling on fiber composites. Dutta	Frost action Frost action in New Jersey highways Berg, R.L., c. al.	lain, E.J., [1981, 110p] M RI-02 Numerical solutions for a rigid ice model of secondary frost
P.K., et al. (1988, p. 141-147) MP 2435 Structural fiber composite materials for sold regions Dutta,	(1978, 80p) SR 78-09 Small scale testing of soils for frost action Sayward, J.M.	heave O'Neill, K. et al. (1982, 11p.) CR 82-13 Relation hip between the ice and inflorers water phases in
P.K., (1988, p.124-134) MP 2405	(1979, p 223-231) MP 1309	frozen: Tice, A.R., et al., [1982, 4p.] CR 82-15

Initial stage of the formation of soil-laden see lenses. Takagi, S., 21982, p.223-2321 MP 1596	Electrical freezing potential of soils. Kelsh, D.J., et al.	Survey of methods for classifying frost susceptibility. Chang-
Frost susceptibility of soil, review of index tests. Chamber-	(1988, 9p.) CR 88-10 Chemical aspects of soil freezing. Henry, K., (1988, 8p.)	berlain, E.J., et al. (1984, p.104-141) MP 1707 Status of numerical models for heat and mass transfer in frost-
lain, E.J., (1982, 110p.) MP 1557 Frost heave model. Hromadka, T.V., II, et al. (1982, p.1-	CR 88-17 Measurement of frost heave forces on H-piles and pipe piles.	susceptible soils. Berg, R.L., (1984, p.67-71) MP 1851
10 ₁ MP 1567 Full-depth and granular base course design for frost areas.	Johnson, J.B., et al., [1988, 49p.] CR 88-21 Response of runway povement to freeze thew cycles. Allen,	Stabilization of fine-grained soil for road and airfield con- struction. Danylok, L.S., [1986, 37p.] SR 86-21
Eaton, R.A., et al, [1983, p.27-39] MP 1492	W.L., et al. (1989, 31p.) SR 89-02	Evaluation of selected frost-susceptibility test methods.
Physics of mathem. ical frost heave models: a review. O'Neill, K., {1983, p.275-291; MP 1588	Comparison of insulated and noninsulated pavements. Kes- tler, M., et al. (1989, p.367-378) MP 2471	Chamberlain, E.J., (1986, 51p.) CR-86-14 Frost action on roads and airfields. Johnson, T.C., et al,
Frantheave of saline soils. Chamberlain, E.J., (1983, p. 121- 126) MP 1655	Radar profiling of Newton Airfield in Jackman, Maine, Martinson, C.R., [1989, 9p] SR 89-04	(1986, 45p.) CR 86-18 Freeze-thaw test to determine the frost susceptibility of soils.
Field tests of a frost-heave model. Guymon, G.L., et al. [1983, p.409-414] MP 1657	Data acquisition: first the FERF then the world. Knuth, K.V., [1989, p.136-138] MP 2567	Chamberlain, E.J., 1987, 909.3 SR 87-1
Frozen soil-water diffusivity under isothermal conditions.	Steady growth of ice layer in freezing soils. Nakano, Y.,	New freezing test for determining frost susceptibility. Chamberlain, E.J., [1988, p.1045-1050] MP 2346
Nakano, Y., et al. (1983, 8p.) CR 83-22 Revised procedure for pavement design under seasonal frost	(1990, p.207-226) MP 2695 X-ray photography of the frozen fringe of freezing soil.	Comparison of insulated and noninsulated pavements. Kes- tler, M., et al., (1949, p.367-378) MP 2471
conditions. Berg, R., et al. (1983, 129p.) SR 83-27 Offshore mechanics and Arctic engineering symposium.	Alagawa, S., (1990, 69p.) SR 98-05 Case study of potential causes of frost heave. Henry, K.S.,	Determination of frost penetration by soil resourist measure- ments. Atkins, R.T., (1989, p.87-100) MP 2565
1984. (1984, 3 vols.) MP 1675	(1990, 35p) SR 90-09 Frest mounds	Use of soft grade asphalts in airfields and highway pavements
Two-dimensional model of coupled heat and moisture trans- port in frost heaving soils. Guymon, G.L., et al. (1984,	Ice-cored mounds at Sukakpak Mountain, Brooks Range.	in cold regions. Janeo, V.C., (1990, 47p.) SR 98-12 Frost weathering
p.91-98 ₁ MP 1678 Simple model of ice segregation using an analytic function to	Brown, J., et al. (1983, p.91-76) MP 1653 Frost penetration	Bank conditions and erosion along selected reservoirs. Gat- to, L.W., et al. (1987, p 143-154) MP 2196
model heat and soil-water flow. Hromadkä, T.V., II, et al., [1984, p.99-104] MP 2104	Influence of insulation upon frost penetration beneath pave- ments. Eaton, R.A., et al. [1976, 41p.] SR 76-06	Frozen fines
Frost action and its control. Berg. R.L., ed. [1984, 145p.] MP 1794	Mathematical model to predict frost heave. Berg, R.L., et al.	Strength and deformation of frozen silt. Haynes, F.D., [1978, p.655-661] MP 1105
Designing for frost heave conditions. Crory, F.E., et al.	[1977, p.92-109] MP 1131 Frost action in New Jersey highways. Berg, R L., et al.	Resiliency of silt under asphalt during freezing and theming. Johnson, T.C., et al., [1978, p.662-668] MP 1106
[1984, p.22-44] MP 1705 Survey of methods for classifying frost susceptibility. Cham-	[1978, 80p.] SR 78-09 Design of airfield pavements for seasonal frost and permafrost	Frozen gravel Permafrost excavating attachment for heavy buildozers.
berlain, E.J., et al. [1984, p.104-141] MP 1787 Frost jacking forces on H and pipe piles embedded in Fair-	conditions. Berg, R.L., et al. (1978, 18p.) MP 1189 Full-depth pavement considerations in seasonal frost areas.	Garfield, D.E., et al. [1977, p.144-151] MP 955
banks silt. Johnson, J.B., (1984, 42p + appends) MP 2271	Eaton, R.A., et al. (1979, 24p.) MP 1188	Design considerations for airfields in NPRA. Crory, F.E., et al., (1978, p.441-458) MP 1006
Role of hear and water transport in frost heaving of porous	Drainage and frost action criteria for a pavement design. Berg, R.L., (1979, 51p.) SR 79-15	Frozen ground Subsurface explorations in permulsost stees. Case, J.R., Jr.,
soils. Nakano, Y., et al. (1984, p.93-102) MP 1842 lee segregation and frost heaving. (1984, 72p.)	Determination of frost penetration by soil resistivity measurements. Atkins, R.T., [1979, 24p.) SR 79-22	(1959, p.31-41) MP 805
MP 1809 Status of numerical models for heat and mass transfer in frost-	Mathematical model to correlate frost heave of pavements. Berg. R.L., et al., 11980, 499.1	FROZEN GROUND Characteristics of the cold regions. Gerdel, R W., §1969.
susceptible soils. Berg, R.L., (1984, p.67-71) MP 1851	Construction of an embankment with frozen soil. Botz, J.J.,	51p.3 M I-A Freezen ground
Mitigative and remedial measures for chilled pipelines in dis-	et al. (1980, 105p.) SR 80-21 Frost heave in an instrumented soil column. Berg, R L., et	Proposed size classification for the texture of frozen earth
continuous permafrost. Sayles, FH, [1984, p.61-62] MP 1974	al, (1980, p.211-221) MP 1331 Construction of foundations in permafrost. Linell, K.A., et	materials. McGaw, R., [1975, 10p.] MP 921 Stake driving tools: a preliminary survey. Kovacs, A., et al.
Heat and moisture transfer in frost-heaving soils. Guymon, G L., et al. [1954, p.336-343] MP 1765	al. (1980, 310p.) SR 86-34	(1977, 439.) SR 77-13 Second progress report on oil spilled on permafrost. McFad-
Exploration of a rigid ice model of frost heave. O'Neill, K., et al. (1985, p.281-296) MP 1800	Field studies of membrane encapsulated soil layers with additives. Eaton, R.A., et al. (1980, 46p) SR 80-33	den, T., et al. (1977, 46p.) SR 77-44
Automated soils freezing test Chamberlain, E.J., [1985,	Laboratory and field use of soil tensiometers above and below 0 deg C. Ingersoil, J. (1981, 17p.) SR 81-67	Determination of unfrozen water in frozen soil by pulsed nuclear magnetic resonance. Tice, A.R., et al., (1978,
Sp.3 MP 1892 Frost heave forces on piling. Esch, D.C., et al., [1985, 2p.3	Full-depth and granular base course design for frost areas. Eaton, R.A., et al. [1983, p.27-39] MP 1492	p.149-155; MP 1097 Terminal ballistics in cold regions materials. Aithen, G.W.,
MP 1732 Phase equilibrium in frost heave of fine-grained soil. Naka-	Field tests of a frost-heave model. Guymon, G.L., et al.	[1978, 69.] MP 1182 Some aspects of Soviet trenching machines. Mellor, M.
no, Y., et al. (1985, p.50-68) MP 1896	[1983, p 409-414] MP 1657 Comparison of two-dimensional domain and boundary inte-	(1950, 13p) SR 90-07
Stefan problem in a finite domain. Takagi S., (1985, 28p ; SR 85-66	gral geothermal models with embankment freeze-thaw field data. Hromadka, T.V., 11, et al., 11983, p.509-513;	Nose shape and L/D ration and projectile penetration in frozen soil. Richmond, P.W., (1980, 21p.) SR 80-17
Soil freezing response: influence of test conditions. McCabe, E.Y., et al, 1985, p.49-58; MP 1990	MP 1659 Designing for frost heave conditions. Crory, F.E., et al.	Watershed modeling in cold regions. Stokely, J L., (1980, 241p.) MP 1471
Experimental study on factors affecting water migration in frozen morin clay. Xu, X., et al., (1985, p.123-128)	(1984, p.22-44) MP 1705 Evaluating trafficability McKim, H L., (1985, p.474-475)	National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) SR 82-03
MP 1897 Partial verification of a thaw settlement model Guymon,	MP 2023	Relationship between the ice and unfrozen water phases in frozen soil. Tice, A.R., et al. [1982, 8p.] CR 82-15
G L., ct al. (1985, p.18-25) MP 1924	Arctic and subarctic construction: general provisions. Lobacz, E.F., [1986, 75p.] SR 86-17	Effects of see content on the transport of water in frozen soils.
Hydraulic properties of selected soils Ingersoll, J., et al., (1985, p.26-35) MP 1925	Predicting freezing design depth of sludge-freezing bods. Martel, C.J., [1988, p.145-156] MP 2461	Nakano, Y., et al. (1984, p.28-34) MP 1841 Effects - we content on the transport of water in frozen sod.
Frost heave of full-depth asphalt concrete pavements. Ams- erman, 1, et al., (1985, p. 66-76). MP 1927	Deep frost effects on a longitudinal edge drain Allen, W.L., [1989, p.343-352] MP 2469	Nakano, Y., et al. (1984, p.58-66) MP 18-3 Conventional land mines in winter. Richmond, P.W.,
Frost jacking forces on II and pipe piles embedded in Fair-	Comparison of insulated and noninsulated pavements Kes-	(1924, 23p) SR 84-30
banks silt. Johnson, J B , et al. (1985, p 125-133) MP 1930	Monitoring pavement performance in seasonal frost areas	Transport of water in frozen sed. Nakano, Y, et al., [1984, p. 172-179] MP 1819
Ion and moisture migration and frost heave in freezing Morin clay. Qiu, G., et al., (1926, p.1014) MP 1970	Berg, R. L., [1989, p.10-19] MP 2564 Determination of frost penetration by soil resistivity measure-	Unfrorm water content in frozen ground. Xu, X., et al., [1985, p.83-87] MP 1929
Natural electrical potentials that arise when soils freeze. Yarkin, I G., §1986, 24p.; SR 86-12	ments. Atkins, R T., [1989, p.87-100] MP 2565 Proceedings, [1990, 318p] SR 90-01	Experimental and theoretical studies of acoustic-to-seismic coupling. Albert, D.G., [1988, p.19-31] MP 2432
Frost action predictive techniques an overview of research	Frost protection	Observations of moisture migration in frozen soils during
results Johnson, T.C. et al. (1986, p.147-161) MP 2267	Evaluation of MESL membranepuncture, stiffness, temper- ature, solvents. Sayward, J.M., [1976, 60p.]	thawing Cheng, G., et al., (1988, p.308-312) MP 2373
Evaluation of selected frost-susceptibility test methods. Chamberlain, E.J., [1986, 51p.] CR-86-14	Utility distribution practices in northern Europe McFad-	Measurement of the unfrozen water content of soils a cons- parison of NMR and TDR methods. Smith, MW, et al.
Frost action on roads and airfields Johnson, T.C., et al. [1986, 45p.] CR 86-18	den, T. et al. [1977, p.70-95] MP 928 Construction and performance of membrane encapsulated	[1988, p. 473-477] MP 2363 Octanol-water partition coefficients for organophosphonates.
Freeze-thaw test to determine the frost susceptibility of soils	soil layers in Alaska Smith, N., (1979, 27p.)	Britton, K.B., et 11, [1958, 24p.] SR 88-11
Chamberlain, E.J., 1987, 90p 3 SR 87-1 Bank conditions and erosion along selected reservoirs Gat-	CR 79-16 Revised procedure for pavement design under seasonal frost	Unfroren water content of undisturbed froren silt. Tice, AR, et al., [1988, 17p] CR 88-19
to, L.W., et al. [1987, p. 143-154] MP 2196 Benchmark design and installation a synthesis of existing	conditions Berg, R., et al. (1983, 129p.) SR 83-27 Pavement design for seasonal frost conditions Berg, R.L.,	Investigations of dielectric properties of some frozen materials. Arcone, S.A., et al. 1989, 18p.; CR 83-96
information Gatto, L.W., (1987, 73p.) SR 87-10 Foundation technology in cold regions Quinn, W.F.	(1988, 12p) MP 2547 Response of runway pavement to freeze thaw cycles Alien,	Unfrozen water contents of undisturbed and remoided Alas- kan silt. Tice, A.R., et al., (1989, p. 103-111)
(1987, p.305-310) MP 2425	W L., et al. (1989, 31p) SR 89-02	MP 2683
Evaluation of the X-ray radiography efficiency for heaving and consolidation observation. Akagawa, S., (1988, p. 23-	Frost resistance Full-depth pavement considerations in seasonal frost areas	Hydraulic conductivity and unfrozen water content of frozen silt. Black, P.B., et al., 11990, p. 323-329, MP 2551
283 MP 2376 Geotextiles and a new way to use them Henry, K., 1988.	Eaton, R.A., et al. [1979, 24p.] MP 1188 Field studies of membrane encapsulated soil layers with addi-	Fate and transport of contaminants in frozen soils. Ayo- rinde, O.A., et al. [1990, p.202-211] MP 2679
p 214-222; MP 2525 Frost heave forces on H and type foundation piles Buska.	tives Eaton, R.A., et al., (1980, 46p.) SR 80-33 Comparative evaluation of frost-susceptibility tests. Cham	Frozen ground chemistry
J.S., et al., (1988, p.1039-1044) MP 2367	berlain, E.J., (1981, p.42-52) MP 1486	lonic migration and weathering in frozen Antarctic soils Ugolini, F.C., et al., [1973, p. 461-470] MP 941
New freezing test for determining frost susceptibility Chamberlain, E.J., §1988, p. 1045-1050; SEP 2368	CRREL frost heave test, USA Chamberlain, E.J. et al. (1981, p.55-62) MP 1499	Frozen ground compression Increasing the effectiveness of soil compaction at below-freezo
Use of geotextiles to mitigate frost heave in soils Henry, K., (1988, p. 1096-1101) MP 2369	Prost action and its control Berg, R. L., ed. (1984, 145p.) MP 1704	ing temperatures Haas, W. M., et al., [1978, 58p.) 5R 78-25
,		**** - ***** Bar

Pressa ground compression (cont.) Deformation and failure of frazen soils and ice due to stresses.	Determination of frost penetration by soil resistantly recover- ments. Atkins, R.T., (1979, 249.) SR 79-22	Ground pressures exerted by underground explosions. Johnson, P.R., §1978, p.214-290; MP 1530
Figh, A.M., (1962, p.419-428) MP 1553	Electron microscope investigations of frozen and unfrozen	Mechanical properties of froten ground. Ladanyi, B., et al.
Frozen strength characterization of NHRS test sites in Mon- tann. Chamberlain, E.J., et al., (1968, var. p.)	bentonite. Kumni, M., (1979, 14p.) CR 79-28 Thermal diffusivity of frozen soil. Haynes, F.D., et al.	Construction of an embankment with frozen soil. Bott, J.J.,
FROZEN GROUND MECHANICS	(1990, 30p.) SR 30-38 VHF electrical properties of frozen ground near Point Barrow,	ct al. (1990, 105p.) SR 80-21 Use of piling in frazen ground. Crory, F.E., (1900, 21 p.)
Freezing process and mechanics of frezen ground. Scott,	Alaska. Arconc, S.A., et al., (1961, 189.) CR 81-13	MP 1407
R.F., [1969, 65p. ₃ M II-D1 Protes ground mechanics	Phose change around a circular cylinder. Lunardini, V.J., 1981, p.598-600; MP 1507	Kinetic nature of the long term strength of fovors soils. Fish, A.M., §1900, p.95-100; MP 1490
Science exploration in cold regions. Roethlieberger, H.,	Heat conduction with phase changes. Lunardini, V.J.,	Strength of frozen silt as a function of ice content and dry unit
(1972, 136p.) M II-A2a Heat and moisture flow in freezing and thaving soils—a field	Acoustic emissions during creep of frozen soils. Fish, A.M.,	weight. Soyles, F.R., et al. (1900, p.109-119)
study. Berg. R.L., (1975, p.148-160) MP 1612 Finite element model of transient heat conduction. Guy-	et al., (1982, 9.194-206) MP 1495 Understanding the Arctic sea floor for engineering purposes.	Overconnelidation effects of ground freezing. Chemberlain, E.J., (1980, p.325-337) MP 1452
mon., G.L., et al., [1977, 167p.] SR 77-38	(1962, 141p.) SR 83-25	Small caliber projectile genetration in froten soil. Richmond, P.W., (1900, p.801-82); MP 1090
Effect of freeze-thew cycles on resilient properties of fine- grained soils. Johnson, T.C., et al., [19 ** 199.]	Mobility of water in frozen soils. Lunardini, V.J., et al., [1962, c159.] MP 2012	Phase change around a circular pipe. Lunardini, V.J.,
MP 1002	Electrical properties of frozen ground, Point Barrow, Alaska, Arcone, S.A., et al., [1982, p.485-492] MP 1572	(1990, 1863) CR 80-27 Design of foundations in areas of significant frost penetration.
Thermal and creep properties for frozen ground construction. Sanger, F.J., et al., (1978, p.95-117) MP 1624	Transport of water in frozen soil, Part I. Nakano, Y., et al.	Linci, K.A., et al. [1980, p.118-184] MP 1398
Freeze thew effect on resident properties of fine soils. Johnson, T.C., et al., §1979, p.247-276; MP 1226	(1962, p.221-226) MP 1629 Physics of mathematical frost heave models: a review.	Excession of freeza materials. Moore, H.E., et al. (1900, p.323-345)
Thermal and creep properties for frozen ground construction.	O'Neil, K., (1963, p.275-291) MP 1506	Accountic emissions during creep of freezn soils. Full, A.M., et al., (1902, p.194-206) MP 1495
Application of the Andrade equation to creep data for ice and	Effects of ice on the water transport in frozen soil. Nakann, Y., et al. (1983, p.15-26) MP 1601	Alaska Good Friday carthquake of 1964. Swinson, G.K.
freezn soil. Ting, J.M., et al., (1979, p.29-36) MP 1802	Relationship between ice and unfrozen water in frozen soils. Tice, A.R., et al. (1963, p.37-46) MP 1632	Testing shaped charges in unfraten and fraten silt in Alaska.
Groating silt and sand at low temperatures. Johnson, R., (1979, p.937-950) MP 1978	Water migration due to a temperature gradient in frozen soil.	Smith, N., (1902, 10p.) SR 83-02 Phing in frozen ground. Crory, F.E., (1902, p.112-124)
Mechanical properties of frozen ground. Ladanyi, B., et al.	Oliphant, J.L., et al., (1983, p.951-956) MP 1666 Offshore mechanics and Arctic engineering symposium,	36F 1722
(1979, p.7-18) MP 1726 High-explosive cratering in frozen and unfrozen soils in Alas-	1984, [1984, 3 vols.] MP 1675 Two-dimensional model of coupled heat and moisture trans-	Deformation and failure of frozen soils and ice due to serenes. Fish, A.M., (1902, p.419-428) MP 1953
ka. Smith, N., (1990, 21p.) CR 90-09	poet in frost heaving soils. Guymon, G.L., et 2., [1984.	Comparison of unfroten water contents measured by DSC and NMR. Oliphont, J.L., et al., (1982, p.115-121)
Dynamic testing of free field stress gages in frozen soil. Aitk- en, G.W., et al. (1980, 26p.) SR 88-30	Field dielectric measurements of frozen sitt ming VHF pulses.	MP 1914
Overconsolidation effects of ground freezing. Chamberlain, E.J., [1900, p.325-337] MP 1452	Arcone, S.A., et al. (1984, p.29-37) MP 1774 Dielectric measurements of frozen silt using time domain re-	Freezing of soil with surface convection. Lunardini, V.J., (1992, p.205-212) MP 1995
Construction of foundations in permafront. Lincil, K.A., et	ficciometry, Delancy, A.J., et al. (1984, p.39-46) MP 1775	Initial stage of the formation of soil-lades ice leases. Takagi, S., 1902, p.223-232; MP 1996
al, (1900, 310p.) SR 80-36 Simulating frost action by using an instrumented soil column.	Conductive backfill for improving electrical grounding in	Effect of leading on the unfrozen water content of silt. Of-
Ingersoll, J., et al. (1981, p.34-42) MP 1405 Site investigations and submarine soil mechanics in polor re-	frozen soils. Schimana, P.V., et al. (1984, 1993) SR 84-17	Creep behavior of fraces silt under countant unionial stress.
gions. Chomberlois, E.J., (1981, 1893) SR 81-24	Effects of magnetic particles on the unfrazen water content in	Zhu, Y., et al. (1963, p.1507-1512) MP 1005 Erosson of perennially frozen streambanks. Lawson, D.E.,
Thermal properties of soils. Facouki, O.T., 1981, 136p.; M 81-01	soils. Tice, A.R., et al., (1984, p.63-73) MP 1790 Pulse transmission through frozen sile. Arcone, S.A.,	(1963, 22p.) CR 83-39
Deformation and failure of frozen soils and ice due to stremes. Figh. A.M., (1982, p.419-428) MP 1553	[1984, 9p.] CR 84-17 Snow, ice and frozen ground research at the Sleepers River,	Compressive strength of frozen silt. Zhu, Y., et al., 1984, p.3-15 ₂ 36P 1773
Frozen soil characteristics that affect land mine functioning.	VT. Panghurn, T., et al. (1984, p.229-240)	Seasonal soil conditions and the reliability of the M15 land mine. Richmond, P.W., et al. (1984, 35p.) SR 96-10
Richmond, P.W., (1953, 186.) SR 83-65 Creep behavior of frozen silt under constant uniaxial stress.	MP 2071 Deutervan diffusion in a soil-nater-ice mixture. Oliphant.	Shear strength in the zone of freezing in saline soils. Cham-
Zhu, Y., et al. (1983, p.1507-1512) MP 1805	J.L., et al., (1984, 11p.) SR 84-27 Consul waveguide reflectometry for frozen ground and see.	Seriain, E.J., (1985, p.566-574; MP 1879 Strain rate effect on the tensile strength of frozen sile. Zinc.
Frozen soil-water definivity under isothermal conditions. Nakano, Y., et al. (1983, 8p.) CR 83-22	Delancy, A.J., et al. (1984, p.428-431) MP 2048	Y_ et al. (1985, p.153-157) MP 1090
Thermodynamic model of soil creep at constant stresses and strains. Fish, A.M., [1913, 186.] CR 83-33	Impulse radar sounding of frozen ground. Kovacs, A., et al., 1985, p.28-40; MP 1952	Frozen ground physics. Fish, A.M., (1995, p.29-36) MP 1928
Creep behavior of frozen silt under constant uniaxial stress.	Effects of soluble salts on the unfroten water content in salt. Tice, A.R., et al., [1915, p.59-109] MP 1933	Shear strength anisotropy in frozen soline and freshwater solis. Chamberlain, E.J., 21985, p.189-1943
Zhu, Y., et al. (1984, p.33-48) MP 1807 Modeling the resilient behavior of frozen soils using unfrozen	Water migration in froren elay under linear temperature	MP 1931
water content. Colc, D.M., [1984, p.\$23-834] MP 1715	gradients. Xu, X., et al. (1985, p.111-122) MP 1934 Experimental study on factors affecting water migration in	Repeated food triaxiol testing of frozen and thowad soils. Colc, D.M., et al., g1985, p.166-170, MP 2006
Thermodynamic model of creep at constant stress and con-	frozen morin clay. Xu, X., et al. (1985, p. 123-128; MP 1897	Tensile strength of frozen silt. Zhu, Y., et al. (1906, p.15- 25) MP 1971
stant strain rate. Fish, A.M., (1984, p.143-161) MP 1771	Model for dielectric constants of frozen soils. Oliphant, J L.,	Effects of freeze than cycles on granular soils for pavements. Cole, D.M., et al., (1936, 70p.) CR 96-06
Tertiacy creep model for frozen sands (discussion) Fish, A.M., et al., [1984, p.1373-1378] MP 1810	[1955, p.46-57] MP 1926 Frozen ground physics. Fish, A.M., [1985, p.29-36]	Some developments in shaped charge sechnology. Mellor,
Foundations in permafrost and seasonal frost; Proceedings. (1985, 62p.) MP 1730	MP 1928 Factors affecting water migration in frozen soils. Xu, X., et	M., (1986, 296) Auger bet for frozen fire-grained soil. Sellmann, P.V., et al.
Sessonal variations in pavement performance. Johnson,	al. (1987, 16p.) CR 87-09	[1986, 13p.] SR 96-36 Classification and laboratory testing of artificially frottn
T.C., (1985, c21p.) MP 2076 Creep and strength behavior of frozen silt in uniaxial compres-	Mechanical and physical properties of seds in cold regions. Chamberlain, E.J., (1957, p. 155-161) MP 2415	ground Sayles, F.H., et al. (1987, p.22-48) MP 2227
sion, Zhu, Y., et al. (1987, 676.) CR 87-10 Shape of creep curves in frozen soils and polycrystalism see.	Snowficeiftoren ground properties, working group report Sterrett, K.F., et al. (1987, p.163-166) MP 2416	Creep and strength behavior of frozen sitt in minimal compres-
Fish, A.M., (1987, p.623-629) MP 2329	Ground motion suduced by an accustic pulse, and its winter-	stern Zhu, Y., et al. (1987, 67p.) CR 87-10 Tensile strength of frozen silt. Zhu, Y., et al. (1987, 23p.)
Mechanical and physical properties of soils in cold regions. Chamberlain, E.J., (1997, p.155-161) MP 2415	time variations. Peck, L., (1988, p.361-385) MP 2597	CR \$7-15
State of the art, mechanical properties of frozen soil. Sayles, F.H., 1988, p.143-1651 MP 2377	State of the art, mechanical properties of frozen soil Sayles, F.H., (1988, p. 143-165) MP 2377	(1987, 29 ₇₋₃) SR 87-34
Geotestiles and a new way to use them. Henry, K., (1988,	Microstructure of frozen soils examined by SEM Ruman	Freezing a temporary roadway for transport of a 3000 ton dragtine. Maishman, D., et al., (1986, p.357-365)
p.214-2223 MP 2525 Use of geotestries to mitigate frost heave in soils Henry, K.	M., (1988, p.390-395) MP 2361 Borchole investigations of the electrical properties of frozen	MP 2378 Drilling in frozen ground, bitumens and concretes. Sell-
[1988, p.1096-1101] MP 2369 Some peculianties of creep behavior of frozen silt. Fish,	silt. Arcone, S.A., et al., [1988, p.910-915] MP 2364 Physical changes in clays due to frost action. Chamberlain,	mann, PV, et al. [1988, 10p.] SR 38-68
A.M., (1989, p.721-724) MP 2601	£J, (1959, p.863-89); MP 2595	Trianial compressive strength of frozen soils under constant strain rates - Zhu, Y., et al., (1958, p. 1200-1205b)
Nonlinear problems in the study of water movement in frozen soils. Nakano, Y., [1989, p. 383-393] MP 2719	Acoustically induced ground motion in sand under winter conditions Peck, L., [1989, p.37-54] MP 2626	MP 2371 Frozen strength characterization of NHAS test sites in Mon-
Prozen ground physics	Froceedings (1910, 315p.) SR 98-01 Frozen ground settling	tana Chamberlain, E.J., et al., [1988, var. p.] MP 3617
Evaluation of methods for calculating soil thermal conductivi- ty Faronki, O., (1972, 90p.) CR 82-66	Overconsolidation effects of ground freezing. Chamberlain,	Unfroren water contents of six antarctic soil materials. And-
Applications of thermal analysis to cold regions Sterrett, K.F., §1976, p.167-1811 MP 890	E.J., (1980), p. 315-337 ₁ MP 1452. Comparative analysis of the USSR construction codes and the	erson, D.M., et al. (1989, p.353-366) MP 2470 Some peculiarities of creep behavior of froten silt. Fish.
Calculating unfrozen water content of frozen soils McGaw,	US Army technical manual for design of foundations on permafest. Fish, A.M., (1982, 20p.) CR 82-14	A.M., (1989, p.721-724) MP 2601
Computer program for determining electrical resistance in	Frozen ground strength	Blasting and blast effects in cold regions. Fact 3, explosions in ground materials. Mellor, M., (1989, 62p.)
nonhomogeneous ground Arcone, S.A., (1977, 16p.) CR 77-02	Escavating rock, see, and frozen ground by electromagnetic radiation. Hockstra, P., (1976, 17p.). CR 74-36	SR 49-15 Strength of soils and rocks at lon temperatures Selimann.
NMR phase composition measurements on most soils Tice, A.R., et al., §1978, p.11-14; MP 1210	Effect of temperature on the strength of frozen ult. Haynes, FD., et al., (1977, 27p.). CR 77-03	FV. (1959, p.159-190) MP 2005 Fraten ground temperature
Electrical resistivity of frozen ground Arcons, S.A. (120).	Permaferat excavating attachment for heavy buildozers	Slumping failure of an Alaskan earth dam Collins, C.M. et
p.32-37 ₃ MP 1623	Garfield, D.E., et al. (1977, p.144-151) MP 955	al (1977, 31p.) SR 77-21

Control of the table of the control	Managarian of Sandam Same Africa - Matter Co. A. and	Charles and a confinent about a management and
Freezing of soil with surface convectors. Linacian, V.J., [1902, p.205-212] MP 1995	Vegetation of Beechey Point, Alaska. Walker, D.A., et al., [1987, 63p.; CR 87-65	Gracine resolutions related to man-movement pro- cesses. Laurion, D.E., (1999, p.147-149) MP 2072
Relationship between ice and unfrozen water in frozen soils.	Geothemistry	Clockel Seatures
Tice, A.R., et al. (196), p.37-46; MP 1632	Geochemistry of freezing brines. Thursmood, V.L., et al.	Influence of irregularnies of the bed of an ice sheet on deposi-
Relationships between estimated mean samual air and perma-	(1967, 11p.) CR 87-13	tion rate of till. Nobles, L.H., et al. (1971, p.117-126)
front temperatures in North-Central Alaska. Haugen, P.K., et al. (198), p.462-467; MP 1656	Geotheranings	Cloud cutors
Design implications of subsell thaning. Johnson, T.C., et al.,	Emerging meteorite: crystalline structure of the enclosing ice. Gow, A.J., et al., §1909, p.37-91; MP 2903	Glocial geology Schiments of the western Mataunaka Glocier. Lawson, D.E.,
(1984, p.45-103) MP 1706	Geodetic surveys	(1979, 112pg CR 79-09
Prototype dell for core sampling fine-grained perennially	Geodetic positions of borehole sites in Greenland. Mock,	Ger hysics of subglacial geology at Dye 3, Greenland.
frozen ground. Brockett, B.E., et al. (1955, 295.) CR 85-01	\$J_{1976, 7p3 CR 76-41	k~L.K.C., et al. (1965, p.105-116) MP 1941
Review of analytical methods for ground thermal reprincesal-	GEOLOGIC STRUCTURES	Claries hydrology
culotions. Lungralini, V.J., (1985, p.204-257)	Geology and physiography of cold regions. Steams, S.R.,	Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., §1977, p.571-588; MP 1067
MP 1922	(1965, 40p.) M (-A)	Glaciers and sediment. Beringe, A., et al. (1986, p.53-69)
Frozen ground physics. Fish, A.M., (1915, p.29-76) MP 1928	Geologic structures Investigation of an airborne resistavity survey conducted at	36P 2154
	very low frequency. Account, S.A., (1977, 48p.)	Jikschloups from Scrandline Lake, Alaska (especially the
Soil-water potential and unfrozen water content and tempera- ture. Xu, X., et al. (1985, p.1-14) MP 1932	CR 77-20	1962 evert). Storm, M., et al., (1999, 1983) 54P 2530
Drill bits for frozen fine-grained seds. Sellenana, P.V., et al.	Remote sessing for recommissance of proposed countraction	Godel lakes
(1996, 33p.) SR 86-27	site. McKim, H.L., et al. (1978, 9 leaves) MP 1167	Muchings from ice-demned Strandine Lake, Almha.
Transport of water in frozen sed 6 Effects of temperature	Proceedings of the second planetary water and point pro- cesses colloqueum, 1978, (1978, 2093) MP 1193	Starm, M., et al. (1967, p.79-94; MP 2307
Nakano, Y., et al. (1957, p.44-50) MP 2213 Tradica franco front muse must muse humber desert	Remote sessing for earth dam site selection and construction	Distribings from Strandine Lake, Alaska (especially the
Tracking freezing front movement using boundary element method. Heomadia, T.V., II, 11957, Sep. SR 87-88	materials. Merry, C.J., et al., [1990, p.158-170;	1962 event). Sturm, M., et al., (1969, 1983) MP 2530
Rate of water transport due to temperature gradients in frozen	34P 1316	Glodal rivers
soils. Nations, Y., et al. (1998, p.412-417) MP 2362	For permateur tunnel: a late Quaternary geologic record in	Direct Straton of streamborne glacial sile. Ross, M.D., et
Unfrozer, water contents of sea antarctic soil materials. And-	central Alaska. Hamilton, T.D., et al., 1988, p. 949-969; MP 2355	al. (1912, 17p.) CR 82-23
ersee, D.M., et al., (1989, p.352-344) MP 2470	Geology	Permetrost Beares, C., et al. (1986, p.99-106)
Frozen ground thermodynamics Segregation-freezing temperature as the cause of suction	Befreck geology survey in morthern Manne. Sellmann, P.V.,	MP 2156
force. Takagi, S., (1977, p.59-44) MP 901	et al. (1976, 1994) CR 76-37	Clocket att
Segregation freezing to the came of suction force for me iras	Greenerphology	Influence of stregularities of the hed of an ice sheet on deposi-
Section. Takapi, S., (1978, p.45-51) MP 1001	Morphology of the North Slope. Walker, HJ, 1973, p.49- 52: MCP 1004	tion rate of till. Nobles, L.H., et al., [1971, p.117-126; MP 1609
Thermal and creep properties for frozen ground construction.	52; SGP 1006 Geobateant after of the Profine Say region, Alaska.	Sediments of the western Matanuska Glocier Lawson, D.E.,
Songer, F.J., et al. (1978, p.95-117) MP 1624 Thermal and excep properties for frozen ground construction	Walter, D.A., et al., (1990, 69p.) CR 80-16	(1979, 112p.) CR 79-69
Songer, F.J., et al., (1975, p.311-337) MP 1227	Tundra and analogous soils. Everett, K.R., et al., (1981,	Glader sMaties
Introduction to the basic thermodynamics of cold capitary	7.134-176 MP 1405	laSurace of irregularities of the bed of an ice sheet on deposi-
systems. Collect., S.C., 1951, 97.1 SR 81-06	Federate look and channel characteristics as subsectic upland	tion rate of till. Nobles, L.H., et al., [1971], p.117-126; MP 1600
Thermal properties of socis. Facocki, O.T., (1981, 134p.)	catchmenes Shughter, C.W., et al., [1981, p.39-48] MP 1818	Subscript sediment flow of the Matamanka Glacier, Alanka.
M 81-01 Thermodynamic model of soil creep at constant strenes and	Ice-cored mounds at Sukakpak Mountains, Branks Range.	Lausen, D.E., (1982, p.274-360) MP 1006
strains. 1 mb, A.M., (1983, 18g.) CR 83-33	Brown, J., et al. (1983), p.91-96; 36P 1453	Clader hels
Heat distribution research. Pheticplace, G., (1914, p. 2-3)	Perigracial landforms and processes. Kenni Mis., Alaska.	Geophysics of subplaced geology at Dye 3, Greenland, Jereia K.C., et al. (1905, p.105-110). MP 1941
MP 2150	Bailey, P.K., [1985, 40p.] SR 85-03	Jereis, K.C., et al. (1905, p.105-110) MP 1901 Glader flow
Model of heat and soil-water flow complete by soil-water plant	Geophysical surveys	Geobotonical studies on the Take Giociet anomaly Heuro-
change. Hromačka, T.V., II. (1927, 1247). SR 87-09	Geophysical methods for hydrological investigations in per- matrost regions. Hockstra, P., (1976, p.75-90;	er, C.J., et al. (1954, p.224-239) MP 1215
Process lakes	MP 932	Approach roods, Greenland 1955 program, (1959, 100p.)
Imaging radar observations of frozen Arctic lakes. Elachi.	Belisch geology survey in northern Maine. Sellerann, P.V.	MP 1522
C, et al. (1976, p.169-175) MP 1284	ct at. (1976, 1983) CR 76-37	Smill-scale strain measurements on a glocker partiett. Col-
Investigation of the LIZ-) Den Line Station water supply	Science examples of radiohim resistantly surveys for geotech-	beck, S.C., et al. (1971, p.2)7-243; MP 993
Investigation of the LIZ-3 Dew Line Station water supply lake. Kovacs, A., (1990, 10p.) SR 90-11		beck, S.C., et al. (1971, p.237-24); MP 993 Influence of irregularnies of the bed of an see sheet on deposi-
Investigation of the LIZ-) Den Line Station water supply lake. Kornes, A., (1990, 10p.) SR 90-11 Process rock strength	Selected examples of radiohm researcity surveys for geotech- ment exploration. Horistra, P., et al., (1977, 160.)	beck, S.C., et al. (1971, p.237-243) MP 993 Influence of irregularness of the bed of an ace sheet on deposi- tion rate of mil. Nobles, L.H., et al. (1971, p.117-125) 30P 1609
Investigation of the LIZ-) Den Line Station water supply lake. Kovacs, A., (1990, 10p.) SR 90-11 Process rock strength Binsting and blast effects in cold regions. Part 3 explosions in ground materials. Mellot, M., (1889, 62p.)	Science examples of radiohm researchy surveys for geotech- mical exploration. Horistra, P., et al., (1977, 169). SR 77-01. Geophysics in the study of permulsion. Science, W.J., et al., (1979, p.93-115).	beck, S.C., et al. (1971, p.237-243) MP 993 Informer of irregularizes of the bed of an ace sheet on deposi- tion rate of mil. Nobles, L.H., et al. (1971, p.117-124) 36P 1600 Issu, Greenland, glacer freezing study. Ashton, G.D.,
Investigation of the LIZ-3 Den Line Station water supply lake. Kovacs, A., (1950, 109;) SR 99-11 Process rock strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1919, 627;) SR 99-15.	Scienced transples of radiosium resourcity surveys for geotechnical exploration. Horistra, P., et al., (1977, 168); SR 77-01. Geophysics in the study of permatrost. Scient, W.J., et al., (1979, p.93-115). MP 1266. Electromagnetic survey in permatrost. Scienana, P.V., et al.	beck, S.C., et al. (1971, p.237-243). MP 993. Influence of irregularines of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. (1971, p.117-126). MP 1600. Issue, Greenland, glucier freezing study. Ashton, G.D., (1971, p.234-244). MP 1174.
Investigation of the LIZ-3 Den Line Station water supply lake. Kornes, A., (1990, 109). SR 99-11 Process neck strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1889, 62); Strength of soils and rocks at low temperatures. Sections.	Scienced examples of radiohm resouring surveys for geotech- mical exploration. Horistra, P., et al., (1977, 168). SR 77-01 Geophysics in the study of permatriost. Scott, W.J., et al., (1979, p.93-115). MP 1264 Electromagnetic survey in permatriost. Sciiman, P.V., et al., (1979, 73). SR 79-14	beck, S.C., et al. (1971, p.237-243). MP 993 Influence of irregularness of the bed of an ace sheet on deposi- tion rate of mll. Nobles, L.H., et al. (1971, p.117-126). MP 1600 Issa, Greenland, glacer freezing study. Ashina, G.D., (1978, p.256-784). MP 1176 Utrassence investigation on ice cores from Antarctica.
Investigation of the LIZ-3 Den Line Station water supply lake. Kovacc, A., (1990, 10p.; SR 99-11 Process rect strength Binating and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1819, 62p.; SR 99-15 Strength of soils and rocks at loss temperatures. Sellmann, P.V., (1919, p.119-190). MP 2645	Scienced examples of radiohm resouring surveys for geotech- mical exploration. Horistra, P., et al., (1977, 168). SR 77-01 Geophysics in the study of permutient. Scott, W.J., et al., (1979, p.93-115). MP 1266 Electromagnetic survey in permutient. Sciaman, MP 1266 (1979, 73). SR 79-14 Electrical resouring of traven ground. Accord. S.A., (1979.	beck, S.C., et al. [1971, p.237-245]. MP 993 Influence of irregularences of the bed of an ace sheet on deposition rate of ml. Nobles, L.H., et al. [1971, p.137-126]. Sup. 1009 Issue, Greenland, glucier freezing study. Ashton, G.D., [1974, p.234-244]. MP 1174 Ultrasonic investigation on ice cores from Antarctica. CR 79-10 Gacer mechanics. Mellor, M., [1992, p.455-474].
Investigation of the LIZ-3 Den Line Station water supply labe. Kovacc, A., (1950, 10p.) SR 99-11 Process rote strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1959, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. P.V., (1989, p.139-190) Process rock temperature	Scienced examples of radiohm resouring surveys for geotech- mical exploration. Horistra, P., et al., [1977, 168]. SR 77-01. Geophysics in the study of permutions. Science, W.J., et al., [1979, p.93-115]. MP 1266. Electromagnetic survey in permutions. Science, N., p. 91-14. [1979, 7-3]. SR 79-14. Electrical resociating of tienem ground. Accome, S.A., [1979,	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularines of the bed of an see sheet on deposition rate of mll. Nobles, L.H., et al. [1971, p.117-126]. 30P 1000 Issa, Greenland, glacier freezing sindy. Ashina, G.D., [1978, p.254-244]. MP 1174 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al. [1979, 169]. CR 79-10 Glacier mechanics. McBor, M., [1992, p.455-474]. 30P 1532
Investigation of the LIZ-3 Den Line Station water supply labe. Kovacc, A., (1990, 10p.) SR 99-11 Process rock strength. Biasting and blast effects an cold regions. Part 3 explosions in ground materials. Melber, M., (1989, 62p.) SR 99-15. Strength of soils and rocks at loss temperatures. P.V., (1989, p.139-190). Process rock temperature: Engineering properties of submarine permations near Prudhoc Bay. Chamberlin, E.J., et al., (1978, p.829-835).	Scienced examples of radiother resourcity surveys for geotechnical explorations. Horistra, P., et al., (1977, 1683) SR 77-01 Geophysics in the study of permatrost. Scient, W.J., et al., (1979, p.93-115) Electromagnetic survey in permatrost. Scientain, P.V., et al., (1979, 73) SR 79-14 Electrical resourcity of frozen ground. Accome, S.R. (1979, p.32-37) MP 1623	beck, S.C., et al. (1971, p.237-243). MP 9993 Influence of irregularious of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. (1971, p.117-126). Say, Greenland, glacer freezing study. Ashton, G.D., (1978, p.256-764). MP 1174 Utrasente investigation on ice cores from Astarctica, Kohnen, H., et al. (1979, 169). CR 29-10 Gacer mechanics. Mellot, M., (1992, p.455-474). MP 1532. Beechole geometry on the Greenland and Astarctic ice.
Investigation of the LIZ-3 Den Line Station water supply lake. Kovaci, A., (1950, 109.) SR 99-11 Process rock strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melbor, M., (1959, 627) SR 99-15 Strength of soils and rocks at loss temperatures. Sciliann, P.V., (1999, p.189-190) Process rock temperature Engineering properties of schematic permateous near Fruilling Bay. Chamberlain, E.J., et al., (1979, p.629-635) MP 1104	Scienced examples of radiosium resouring surveys for geotechnical explorations. Horistra, P., et al., (1977, 1683). SR 77-01. Geoglepses in the study of permateus. Scient, W.J., et al., (1979, p.93-115). MP 1266. Electromagnetic survey in permateus. Scientain, P.V., et al., (1979, 72). SR 79-14. [1979, 72]. SR 79-14. Electrical resorring of traces ground. Accome, S.A., (1979, p.32-37). MP 1623. Subsea permateus study in the Beautiert Sca. Alinka. Scientain, P.V., et al., (1979, p.207-215). MP 1991. Geophysics of subgiancial geology at Dye. J., Greenhoof.	heck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularences of the bed of an ace sheet on deposition rate of rifl. Nobles, L.H., et al. [1971, p.117-126]. MP 1600 Issa, Greenland, glacter freezing study. Ashton, G.D., [1974, p.254-244]. MP 1174 Ukrasence investigation on ice cores from Astorcico. Kohnen, H., et al. [1979, 169]. CR 79-10 Gacer mechanics. Mellor, M., [1992, p.455-474]. Bacchole geometry on the Greenland and Astorcici ice sheets. Serch, K.C., [1965, p.242-251]. MP 1817
Investigation of the LIZ-3 Den Line Station water supply like. Kovacs, A., (1990, 109.) SR 99-11 Process rock strength Biosting and blast effects in cold regions. Part 3 captorious in ground materials. Melliot, M., (1889, 627.) Strength of soils and rocks at low temperatures. Science, P.V., (1989, p. 139-190). MP 2005 Process rock temperature. Engineering peoperature of submitting peoperature. Buy. Chamberlain, E.J., et al., (1979, p.629-635). MP 1104 Process and	Scienced examples of radiohm resouring surveys for geotech- mical explorations. Horistra, P., et al. (1977, 168). SR 77-01 Geoglaystes in the study of permations. Scient, W.J., et al. (1979, p.93-115). MP 1366. Electromagnetic survey in permations. Scientain, P.V., et al. (1979, 72). Electrical resouring of tiesten ground. Account, S.A., (1979, p. 32-37). MP 1623. Subsea permations study in the Beaution Sea, Alinka. Sell- mann, P.V., et al. (1979, p. 207-213). MP 1991. Geoglaystes of undgland geology at Dye J. Greenhood Jerck, K.C., et al. (1985, p. 105-110). MP 1901.	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularences of the bed of an see sheet on deposition rate of ms. Nobles, L.H., et al. [1971, p.117-1254]. MP 1600 Issa, Greenland, glacier freezing study. Ashton, G.D., [1978, p.254-244]. MP 1174 Ultrasonic investigation on ice cores from Astarctica, Kohnen, H., et al. [1979, 169]. GR 79-10 Gracer mechanics. Mellor, M., [1992, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Serek, K.C., [1985, p.421-251]. MP 1617 Recent glacure-volcane miteractions on Mr. Redonbe, Alpaha.
Investigation of the LIZ-3 Den Line Station water supply lake. Kovacc, A., (1990, 10p.) SR 99-11 Process rock strength. Biasting and blast effects in cold regions. Part 3 explosions in ground materials. Melbor, M., (1989, 62p.) SR 99-15. Strength of soils and rocks at loss temperatures. P.V., (1989, p.139-190). Process rock temperatures of submitting permateration near Profiles. Bey. Chamberlain, E.J., et al., (1978, p.629-635). MP 1164. Process road. Design considerations for autholds in NFRA. Crop., F.E., et	Scienced examples of radiohm resouring surveys for geotech- mical explorations. Horistra, P., et al. (1977, 168). SR 77-01 Geoglaystes in the study of permations. Scient, W.J., et al. (1979, p.93-115). MP 1366. Electromagnetic survey in permations. Scientain, P.V., et al. (1979, 72). Electrical resouring of tiesten ground. Account, S.A., (1979, p. 32-37). MP 1623. Subsea permations study in the Beaution Sea, Alinka. Sell- mann, P.V., et al. (1979, p. 207-213). MP 1991. Geoglaystes of undgland geology at Dye J. Greenhood Jerck, K.C., et al. (1985, p. 105-110). MP 1901.	beck, S.C., et al. (1971, p.237-243). MP 993 Influence of irregularities of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. (1971, p.117-126). Sam, Greenland, glacier freezing study. Ashton, G.D., (1978, p.256-764). MP 1174 Utrasente investigation on ice cores from Astorcises, Robert, H., et al. (1979, 169). CR 29-10 Glacier mechanics. Mellor, M., (1942, p.455-474). MP 1532 Bacchole geometry on the Greenland and Astorcise ice sheets. Jetel, K.C., (1945, p.247-251). MP 1017 Recent glacier-volcasio interactions on Mr. Redoult, Alisha, Sturm, M., et al. (1948, 1891.). MP 2431.
Investigation of the LIZ-3 Den Line Station water supply like. Kovaci, A., (1950, 109.) SR 99-11 Present rock strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melhor, M., (1959, 627) SR 99-15 Strength of soils and rocks at loss temperatures. Sciliann, P.V., (1999, p.189-190) Present rock temperature Engineering properties of schematic permateration near Frudher. Bey. Chamberlain, E.J., et al., (1978, p.629-635) MP 1104 Present sand Design considerations for artificids in NPRA. Cross, F.E., et al., (1978, p.441-455) MP 1006	Scienced examples of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1693. SR 77-01 Geophysics in the study of permuleost. Scient, W.J., et al., (1979, p.9)-1157. MP 1866 Electromagnetic survey in permuleost. Scientain, P.V., et al., (1979, 73). Electrical resolviny of floaten ground. Account, SA., (1979, p. 32-37). MP 1623 Subset permuleost study in the Benufort Sci., Aliada. Sci., Scientain, P.V., et al., (1979, p. 207-213). MP 1991 Geophysics of subglacial geology at Dye. J., Gerenhool. Jorch, K.C., et al., (1995, p. 105-110). MP 1991 Workship on Permuleost Geophysics, Golden, Colorado, 23-24 October 1993. Brown, J., ed., (1995, 113p); SR 85-65	beck, S.C., et al. (1971, p.237-245). MP 993 Influence of irregularones of the bed of an ace sheet on deposition rate of rell. Nobles, L.H., et al. (1971, p.117-126). MP 1609 Issa, Greenland, glacter freering study. Ashton, G.D., (1971, p.234-244). MP 1174 Ultrasente investigation on ice cores from Astarction. Robern, H., et al. (1979, 146). CR 79-10 Glacter mechanics. Mellor, M., (1992, p.455-474). MP 1812 Beechole geometry on the Greenland and Astarctic ice sheets. Jerch, R.C., (1985, p.242-251). MP 1817 Recent glacter-volcano interactions on Mr. Redoule, Alaska, Stirra, M., et al. (1998, 1864). MP 3431 GLACIER ICE.
Investigation of the LIZ-3 Den Line Station water supply lake. Kovacc, A., (1990, 10p.) SR 99-11 Process rock strength. Biasting and blast effects in cold regions. Part 3 explosions in ground materials. Melbor, M., (1989, 62p.) SR 99-15. Strength of soils and rocks at loss temperatures. P.V., (1989, p.139-190). Process rock temperatures of submitting permateration near Profiles. Bey. Chamberlain, E.J., et al., (1978, p.629-635). MP 1164. Process road. Design considerations for autholds in NFRA. Crop., F.E., et	Scienced examples of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1693. SR 77-01 Geophysics in the study of permations. Scient, W.J., et al., (1979, p.93-115). MP 1206 Electromagnetic survey in permations. Scientain, P.V., et al., (1979, 73). Electromagnetic survey in permations. Scientain, P.V., et al., (1979, 73). MP 1623 Subsea permations study in the Beaudiet Sca, Alaska. Scientain, P.V., et al., (1979, p.207-215). MP 1623 Subsea permations study in the Beaudiet Sca, Alaska. Scientain, P.V., et al., (1979, p.207-215). MP 1991 Geophysics of subglacial geology at Dye J., Greenland Jerch, K.C., et al., (1985, p.105-116). MP 1991 Workshop on Permations Geophysics, Golden, Colorado, 23-24 October 1984. Brown, J., ed., (1985, 117); SR 85-05 Review of methods for generating synthetic seamegrams.	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularities of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. No P 1600 Issa, Greenland, glacer freering study. Ashton, G.D., (1978, p.256-264). MP 1176 Utrasente investigation on ice cores from Astorcises. Robsen, H., et al. [1979, 169]. CR 29-0. Gacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Bacchole geometry on the Greenland and Astorcise ice sheets. Jerck, K.C., [1945, p.242-251]. MP 1617 Recent glacerovolcase interactions on Mr. Redouch, Almha, Surm, M., et al. [1948, 1894]. MP 3431 GLACIER ICE Snow and see on the earth's surface. Mellor, M., [1944, 18194]. M 18-C1
Investigation of the LIZ-3 Den Line Station water supply like. Kovacs, A., (1990, 1092) SR 99-11 Process neck strength. Binating and blast effects in cold regions. Part 3 explosions in ground materials. Melliot, M., (1889, 627) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Selfmann, P.V., (1999, p.139-190) Process rock temperature Engineering properties of submanine permatrost near Profiling. Bey. Chamberlain, E.J., et al., (1978, p.629-615) MP 1104 Froces mad Design considerations for artificits in NPRA Cross, F.E., et al., (1978, p.441-458) Part transport	Scienced examples of radiohm resouring surveys for geotechnical explorations. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permatrost. Scient, W.J., et al., [1979, p.93-115] Bectimagnetic survey in permatrost. Scientain, P.V., et al., [1979, 73] SR 79-14 Electrical resouring of traces ground. Account, S.A., [1979, p.31-217] MP 1623 Subses permatrost study in the Beaudiet Sca, Alinka. Scientain, P.V., et al., [1979, p.207-215] MP 1991 Geophysics of subglacial geology at Dye. J., Greenland Jerck, K.C., et al., [1915, p.105-110] Workshop on Permatrost Geophysics, Golden, Colorado, 23-24 October 1983. Brown, J. ed., [1985, 11392] Review of methods for generating synthetic sensoriums. Peck, Li., [1985, 3992] CR 88-10	beck, S.C., et al. [1971, p.237-245]. MP 993 Influence of irregularones of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. No 1000 Issa, Greenland, glacer freering study. Ashton, G.D., (1974, p.234-244). MP 1174 Utrasence investigation on ice cores from Astarctica. Robert, H., et al. [1979, 146]. CR 79-10 Glacer mechanics. Mellor, M., [1992, p.455-474]. MP 1812 Beechole geometry on the Greenland and Astarctic ice sheets. Ferch, K.C., [1965, p.242-251]. MP 1817 Recent glacer-volcano uncractions on Mr. Redoule, Alaska. Stirra, M., et al., [1998, 1984]. MP 3431 GLACIER ICE Show and see on the earth's surface. Mellor, M., [1944, 1979]. MI II-CI. Characteristics of the cold reposis. Gerdel, R.W., [1994.
Investigation of the LIZ-3 Den Line Station water supply like. Kovacs, A., (1990, 1092) SR 99-11 Process rock strength. Binating and blast effects in cold regions. Part 3 explosions in ground materials. Melbot, M., (1989, 627) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Selfmann, P.V., (1999, p.139-190) Process rock temperature Engineering properties of submarine permatrost near Profilese. Bay. Chamberlain, E.J., et al., (1973, p.629-615) MP 1006 Process road Design considerations for anticide in NPRA Cross, F.E., et al., (1973, p.441-458) MP 1006 Process rock ice on coal monement was the inland waterways Lunardim, V.J., et al., (1981, 729) SR 81-13 Fools	Scienced reasonies of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1683. SR 77-01. Geophysics in the study of permulsion. Scient, W.J., et al., 1979, p.93-1153. MP 1266. Electromagnetic survey in permulsion. Sellmann, P.V., et al., 1979, 73. SR 79-14. Electrical resourcing of finates ground. Accomp. S.A., 1979, p.32-37. MP 1623. Subsea permulsion study in the Benedon Sci., Alian. Sellmann, P.V., et al., 1979, p.20-213. MP 1623. Subsea permulsion study in the Benedon Sci., Alian. Sellmann, P.V., et al., 1979, p.20-213. MP 1991. Geophysics of subglacial geology at Dye. J. Greenhard. Jerck., K.C., et al., 1995, p. 109-110. MP 1991. Workshop on Permulsions Geophysics, Golden, Colorado, 23-24. October 1994. Brown, J., ed., 1995, 113p; SR 85-05. Review of methods for generating synthetic sensingrams. Peck., L., 1995, 1997.	beck, S.C., et al. (1971, p.237-243). MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. (1971, p.117-126). MP 1000 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.25-244). MP 1174 Utrasonic investigation on ice cores from Antarctica, Robert, H., et al. (1979, 1963). GR 29-10 Gacer mechanics. Mellor, M., (1942, p.455-474). MP 1532 Borchole geometry on the Greenland and Antarctic ice sheets. Jerch, K.C., (1965, p.242-251). MP 1607. Recent glacier-volcanos interactions on Mr. Redoule, Almka, Sturix, M., et al. (1968, 1864). MP 3431 GLACTER ICE Show and see on the earth's surface. Mellor, M., (1944, 1879). Characteristics of the cold reposit. Gerdel, R.W., (1944, 515). MI-GI.
Investigation of the LIZ-3 Don Line Station water supply labe. Kovaca, A., (1990, 10p.) SR 99-11 Process rock strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1989, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Scillann, P.V., (1999, p.119-190) Process rock temperature. Eagineering properties of soilmantine permaterost near Pruthor. Bey. Chamberlain, E.J., et al., (1978, p.629-63)5; MP 1164 Process soid. Design considerations for artificide in NPRA. Cross, F.E., et al., (1978, p.441-458). MP 1006 Poel transport. Effects of ice on coal monoment was the inland waterways Lunardom, V.J., et al., (1981, 72p.) SR 81-13 Fools. Low temperature automotive criminous. Courts, 11J.	Scienced examples of radiohm resouring surveys for geotechnical explorations. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permatrost. Scient, W.J., et al., [1979, p.93-115] Bectimagnetic survey in permatrost. Scientain, P.V., et al., [1979, 73] SR 79-14 Electrical resouring of traces ground. Account, S.A., [1979, p.31-217] MP 1623 Subses permatrost study in the Beaudiet Sca, Alinka. Scientain, P.V., et al., [1979, p.207-215] MP 1991 Geophysics of subglacial geology at Dye. J., Greenland Jerck, K.C., et al., [1915, p.105-110] Workshop on Permatrost Geophysics, Golden, Colorado, 23-24 October 1983. Brown, J. ed., [1985, 11392] Review of methods for generating synthetic sensoriums. Peck, Li., [1985, 3992] CR 88-10	beck, S.C., et al. (1971, p.237-243). MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. (1971, p.117-126). MP 1030 Issa, Greenland, glacer freering study. Ashton, G.D., (1978, p.256-764). MP 1174 Utrasenic investigation on ice cores from Astarctica, Robsen, H., et al. (1979, 169). CR 29-10 Gacer mechanics. Mellor, M., (1942, p.455-474). MP 1532 Beechole geometry on the Greenland and Astarctic ice sheets. Jetel., K.C., (1945, p.242-251). MP 1017 Recent glacer-volcasion interactions on Mt. Redoule, Alisha, Sirin, M., et al. (1948, 1894). MP 2431 GLACIER ICE Soon and see on the earth's surface. Mellor, M., (1944, 1879). Characteristics of the cold regions. Gerdel, R.W., (1949, 319). Glacier fee
Investigation of the LIZ-3 Den Line Station water supply like. Kovacs, A., (190, 109.) SR 99-11 Present reck strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. McDot, M., (1939, 627) SR 99-15 Strength of soils and rocks at loss temperatures. Scilinaria, P.V., (1999, p.189-190) MP 2665 Proton rock temperature Engineering properties of schematic permateotalecar Friedhor. Bey. Chamberlain, E.J., et al., (1978, p.629-635) MP 1104 From sand Design considerations for artificide in NPRA Crosy, F.E., et al., (1978, p.441-651) MP 1004 Froil transport Effects of ice on coal movement was the instand waterways. Limardina, V.J., et al., (1981, 729.) SR 81-13 Fiels Low temperature automotive emissions. Contin, 11.J., (1993, 2 vols.) MP 1703	Scienced examples of radiosism resouring surveys for geotechnical exploration. Horistra, P., et al., 1977, 1693. SR 77-01. Geophysics in the study of permations. Scientific, 1979, p.93-115. MP 1206. Sectional properties are survey in permations. Scientima, P.V., et al., (1979, 7-3). SR 79-14. Electricalization strategy in the Besufort Sci. Alanka. Sci. p. 32-37; MP 1623. Subses permations study in the Besufort Sci. Alanka. Sci. p. 32-37; MP 1991. Geophysics of subflocial geology at Dye. J. Gerenland Jerch, K.C., et al., (1995, p.105-116). MP 1991. Weekshop on Permations Geophysics, Golden, Colorado, 23-24. October 1994. Brown, J., ed., (1995, 115p.). SR 85-05. Review of methods for generating synthetic sexinggrams. Peck. L., (1995, 19p.). CR 85-10. Preparation of geophysical boetshole site with ground see, Farbards, AK. Deliney, AJ., (1997, 13p.).	beck, S.C., et al. [1971, p.237-243] MP 993 Influence of irregularities of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126] No 1680. Issa, Greenland, glacer freering study. Ashton, G.D., (1978, p.256-764) Utrasente investigation on ice cores from Antarctica. Robert, H., et al. [1979, 169] Gacer mechanics. Mellor, M., [1992, p.455-474] MP 1532 Bacchole geometry on the Greenland and Antarctic ice sheets. Jerck, K.C., [1995, p.242-251] MP 1617 Recent glacertovictass interactions on Mr. Redout, Almha, Surm, M., et al. [1998, 1894] GLACIER ICE Show and see on the earth's surface. Mellor, M., [1994, 18]19 Characteristics of the cold regions. Gerdel, R.W., [1994, 18]19 Glacier lee Influence of streptistics of the bed of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an see sheet on deposition of the of the field of an all field.
Investigation of the LIZ-3 Den Line Station water supply labe. Kovace, A., (1990, 10p.) SR 99-11 Process rock strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. MP 2005, p. 139-190. Process rock temperature. Engineering properties of submitting permaticous near Profiles. Bey. Chamberlain, E.J., et al., (1975, p. 629-635). MP 1104 Process mad. Design considerations for airfields in NPRA. Croy., F.E., et al., (1973, p. 461-658). MP 1006 Process rock fee on coal monement was the instand waterways. Limardim, V.J., et al., (1981, 72p.) SR 81-13 Fields. Low temperature automotive emissions. Courts, 11.J., (1913, 2 vols.). MP 1703 Gas chromotography	Scienced examples of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permatient. Scient, W.J., et al., [1979, p.93-115]. MP 1206 Electromagnetic survey in permatient. Scientain, P.V., et al., [1979, 73]. SR 79-14 Electromagnetic survey in permatient. Scientain, P.V., et al., [1979, p.32-37]. MP 1623 Subsea permatient study in the Beaudiet Sca, Alanka. Scientain, P.V., et al., [1979, p.207-215]. MP 19623 Subsea permatient study in the Beaudiet Sca, Alanka. Scientain, P.V., et al., [1979, p.207-215]. MP 1961 Geophysics of subglacial geology at Dye. J. Gerenland Jerch, K.C., et al., [1987, p.105-110]. MP 1961 Workshop on Permatient Geophysics, Golden, Colorado, 23-24 October 1984. Brown, J., ed., [1985, 1179]. SR 85-05 Review of methods for generating synthetic secungrams. Peck, L., [1985, 199]. Preparation of geophysical boechole site with ground sec. Farbatks, AK. Deliney, AJ., [1987, 1394]. SR 87-07 Antifective scheet brightness temperature variations. See Rev.	beck, S.C., et al. [1971, p.237-245]. MP 9993 Influence of irregularious of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. No P 1600 Issa, Greenland, glacer freering study. Ashton, G.D., [1978, p.256-764]. MP 1176 Utrasente investigation on ice cores from Antarctica. Robiner, H., et al. [1979, 169]. CR 29-80. Glacer mechanics. Mellor, M., [1992, p.455-476]. MP 1532 Boechole geometry on the Greenland and Antarctic ice sheets. Jerch, K.C., [1995, p.242-251]. MP 1017 Recent glacer-volcane interactions on Mr. Redoub, Almida, Surra, M., et al. [1998, 1894]. MP 3431 GLACIER ICE. Soon and see on the earth's surface. Mellor, M., [1964, 1819]. M 14-C1 Characteristics of the cold reposis. Gerdel, R.W., [1909, 181-1]. Glacier lee. Influence of strepularities of the held of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. MP 1609.
Investigation of the LIZ-3 Den Line Station water supply like. Kovacs, A., (190, 109.) SR 99-11 Present reck strength. Blasting and blast effects in cold regions. Part 3 explosions in ground materials. McDot, M., (1939, 627) SR 99-15 Strength of soils and rocks at loss temperatures. Scilinaria, P.V., (1999, p.189-190) MP 2665 Proton rock temperature Engineering properties of schematic permateotalecar Friedhor. Bey. Chamberlain, E.J., et al., (1978, p.629-635) MP 1104 From sand Design considerations for artificide in NPRA Crosy, F.E., et al., (1978, p.441-651) MP 1004 Froil transport Effects of ice on coal movement was the instand waterways. Limardina, V.J., et al., (1981, 729.) SR 81-13 Fiels Low temperature automotive emissions. Contin, 11.J., (1993, 2 vols.) MP 1703	Scienced examples of radiosim resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1693 SR 77-01 Geophysics in the study of permuliost. Sect., W.J., et al., 1979, p.93-115 Eccitomagnetic survey in permuliost. Sellmana, P.V., et al., 1979, p.31-17 Electrical resolving of literem ground. Account, S.A., 1979, p.32-37; Subsca permuliost study in the Beaufort Sea, Alinka, Sellmana, P.V., et al., 1979, p.207-213; MP 1623 Subsca permuliost study in the Beaufort Sea, Alinka, Sellmana, P.V., et al., 1979, p.207-213; MP 1991 Geophysics of subglacial geology at Dye. J. Gerenhand Jerck, K.C., et al., 1995, p. 109-110; Workshop on Permuliont Geophysics, Golden, Colorado, 23-23 October 1984. Brown, J., ed., (1995, 1972) SR 85-65 Review of methods for generating synthetic sensingums, Peck, L., 1995, 1992 Preparation of geophysical beechole site with ground see, Farbatks, AK. Delancy, AJ., (1997, 1394) SR 87-67 Antisectic see sheet benghiness temperature variations. Jerck, K.C., et al., (1990, p.217-223) MP 2736 Germany	beck, S.C., et al. [1971, p.237-243] MP 993 Influence of irregularines of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126] Issa, Greenland, glacer freezing study. Ashson, G.D., [1978, p.236-244] MP 1174 Utrasonic investigation on ice cores from Antarctic, Robert, H., et al. [1979, 1963] MP 1532 Bocchole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1985, p.242-251] MP 1532 Bocchole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1985, p.242-251] MP 1617 Recent glacer-volcane interactions on Mr. Redoule, Alaska, Stirra, M., et al. [1988, 1984] GLACIER ICE Show and see on the carth's surface. Mellor, M., [1984, 1837] Characteristics of the cold reposts. Gerdel, R.W., [1984, 1837] Glacier ice. Influence of strengthenius of the hed of an see sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-126] MP 1600 C-14 and other rootope studies on naturalise. Ocsobert, H.,
Investigation of the LIZ-3 Den Line Station water supply labe. Kovace, A., (1990, 10p.) SR 99-11 Present rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. MP 2005, p. 139-190. Procent rock temperature: Engineering properties of submitting permations near Frishor Bay. Chamberlain, E.J., et al., (1978, p. 629-635). MP 1004 Procent mod. Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 421-658). MP 1004 Procent mod. Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 421-658). MP 1004 Procent mod. Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 421-658). MP 1004 Procent mod. Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 421-658). MP 1006 Final temperature automotive consistents. Counts, 11J., (1993, 2 vals.). MP 1703 Gas chromotography. Vapor pressure of TNT by gas chromatographs. Leggett, MP 915 Gas inclusions.	Scienced examples of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permations. Scient, W.J., et al., [1979, p.93-115]. MP 1206 Electromagnetic survey in permations. Selimana, P.V., et al., [1979, 73]. Electromagnetic survey in permations. Selimana, P.V., et al., [1979, 73]. Electromagnetic survey in permations. Selimana, P.V., et al., [1979, p. 20-21]. MP 1623 Subsea permations study in the Benedict Sea, Alinha. Sellimana, P.V., et al., [1979, p. 207-21]. MP 1623 Subsea permations study in the Benedict Sea, Alinha. Sellimana, P.V., et al., [1987, p. 207-21]. MP 1623 Subsea permations study in the Benedict Sea, Alinha. Sellimana, P.V., et al., [1987, p. 105-110]. MP 1991 Geophysics of subglacial geology at Dye. J., Gerenland. Jerch., K.C., et al., [1995, p. 105-110]. SSR 85-65 Review of methods for generating synthetic securegrams. Peck. L., [1995, 1992]. Frequention of geophysical bacehole site with ground see, Farrhards, AN. Delancy, A.J., [1987, 1593]. SSR 87-67 Antarciae see sheet benglimers temperature variations. SSR 87-67 Antarciae see sheet benglimers temperature variations. See 87-67 Germany. Somefull amounts and sinew depths in Germany and NEUSA.	beck, S.C., et al. [1971, p.237-243]. MP 9931 Influence of irregularious of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. No P 1609 Issa, Greenland, glacer freezing study. Ashton, G.D., (1978, p.256-764). MP 1174 Utrasente investigation on ice cores from Astarctica, Robert, H., et al. [1979, 169]. CR 29-10 Gacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Jerck, K.C., [1965, p.242-251]. MP 1532 Recent glacier-volcano interactions on Mt. Redwick, Almka. Sturn, M., et al. [1998, 1894]. MP 3431 GLACIER ICE Soon and see on the earth's surface. Mellor, M., [1944, 1817]. Characteristics of the cold regions. Gerdel, R.W., [1949, 187]. Characteristics of the cold regions. Gerdel, R.W., [1949, 187]. Glorier fee. Influence of sire gularities of the bed of an see sheet on deposition rate of rdl. Nobles, L.H., et al., [1971, p.117-126]. Cl-14 and other vistory studies on natural see. Ocichoge, H., et al., [1972, p.17-126]. MP 1609
Investigation of the LIZ-3 Den Lime Station water supply like. Kovaca, A., (1950, 10p.) SR 99-11 Process rock strength. Biosting and blast effects in cold regions. Part 3 explosions in ground materials. Melhor, M., (1959, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. P.V., (1999, p.139-190) SR 99-15 Sectionary. P.V., (1999, p.139-190) MP 2465 Process rock temperature of submarine permateron near Profiles. Bay. Chamberlain, E.J., et al., (1978, p.629-635) MP 1066 Process sand Design considerations for artificide in NPRA. Cross, F.E., et al., (1978, p.441-455) MP 1066 Process continuation of the managerial Effects of ice on coal monogenent was the inland waterways. Lunardim, V.J., et al., (1981, 72p.) SR 81-13 Process Low temperature autoentoric emissions. Courts, 11.J., (1993, 2 vols.) Gas chromotography. Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.83-00). Gas inclusions.	Scienced examples of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permatient. Scient, W.J., et al., [1979, p.93-115]. MP 1206 Electromagnetic survey in permatient. Scientain, P.V., et al., [1979, 73]. SR 79-16 Electromagnetic survey in permatient. Scientain, P.V., et al., [1979, p.30-12-17]. MP 1623 Subsea permatient study in the Beaudiet Sci., Alanka. Scientain, P.V., et al., [1979, p.207-21-5]. MP 1991 Geophysics of subglacial geology at Dye. J., Gerenland Jerck., K.C., et al., [1985, p.105-11-6]. MP 1991 Workshop on Permatient Geophysics, Golden, Colorado, 23-24 October 1984. Brown, J., ed., [1985, 1159]. Review of methods for generating synthetic teconograms. Peck. L., [1985, 199]. Preparation of geophysical boethole site with ground see. Farbastic, AK. Delaney, AJ., [1987, 139]. SR 87-07 Antisectic see sheet beightness temperature variations. See R-10 Germany. Sooskal amounts and show depths in Germany and NEUSA. Busin, R.E., et al., [1981, p.107-117]. MP 2001	beck, S.C., et al. [1971, p.237-245]. MP 993 Influence of irregularones of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freering study. Ashton, G.D., [1978, p.254-244]. MP 1174 Utrasente investigation on ice cores from Antarctica, Kohnen, H., et al. [1979, 189]. CR 29-10. Glacer mechanics. Mellor, M., [1992, p.455-474]. MP 1532 Boechole geometry on the Greenland and Antarctic ice sheets. Jerek, K.C., [1985, p.242-251]. MP 1017 Recent glacer-volcano interactions on Mr. Redoubs, Alaska, Stirra, M., et al., [1998, 1994]. MP 3401 GLACIER ICE. Show and see on the earth's surface. Mellor, M., [1944, 18]72. M 18-Clacatteristics of the cold reposit. Gerdel, R.W., [1949, 519]. M 18-Clacatteristics of the cold reposit. Gerdel, R.W., [1949, 519]. M 18-Clacatteristics of the Moles, L.H., et al., [1971, p.117-126]. MP 1602 C-16 and other tostope studies on natural see. Oeschger, H., et al., [1972, p. D70-D92]. MP 1609 C-16 and other tostope studies on natural see. Oeschger, H., et al., [1972, p. D70-D92]. MP 1609 C-16 and other tostope studies on natural see. Oeschger, H., et al., [1972, p. D70-D92]. MP 1609 C-16 and other tostope studies on natural see. Oeschger, H., et al., [1972, p. D70-D92]. MP 1609
Investigation of the LIZ-3 Den Line Station water supply like. Kovacs, A., (1950, 109.) SR 99-11 Present reck strength. Binsting and blast effects in cold regions. Part 3 explosions in ground materials. McDot, M., (1959, 627) Strength of soils and rocks at loss temperatures. Scilinaria, P.V., (1999, p.189-190) Proton rock temperature Engineering properties of scilinariae permationt near Profiling Bey. Chamberlain, E.J., et al., (1978, p.829-835) MP 1064 Proton used Design considerations for artificide in NPRA. Crosy, F.E., et al., (1978, p.441-851) MP 1064 First transport Effects of ice on coal movement was the inland waterways. Limardina, V.J., et al., (1981, 729.) Fiels Low temperature automotive emissions. Courts, 11.J., (1993, 2 vols.) Gas chromotography Vapor pressure of TNT by gas chromatographs. Leggett, MP 915 Gas inclusions. Contituous mounteering of total dissolved gases, a feasibility. Jenkim. J.F., (1975, p.101-105). MP 851	Scienced examples of radiosim resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1683. SR 77-01. Geophysics in the study of permulsiost. Scient, W.J., et al., 1979, p.93-1153. MP 1266. Eccitomagnetic survey in permulsiost. Sellmann, P.V., et al., 1979, p.32-173. MP 1262. Sellmann, P.V., et al., 1979, p.32-173. MP 1623. Subscia permulsiost study in the Beaufort Sci., Alinka, Sellmann, P.V., et al., 1979, p.20-213. MP 1623. Subscia permulsiost study in the Beaufort Sci., Alinka, Sellmann, P.V., et al., 1979, p.20-213. MP 1991. Geophysics of subglacinal geology at Dye. J. Gerenhand Jerck, K.C., et al., 1995, p.109-1109. MP 1994. Workshop on Permulsion Geophysics, Golden, Colorado, 23-23. October 1994. Brown, J. ed., 1995, 115p.; SR 85-05. Review of methods for generating synthetic sensingums. Peck, L., 1995, 199. 199. CR 85-10. Preparation of geophysical beechole site with ground see. Farbatks, AK. Delancy, AJ., 1997, 13p.; SR 87-07. Antisectic see sheet brightness temperature variations. Jerck, K.C., et al., 1990, p.217-223. MP 2736. Germany. Someful amounts and sinew depths in Germany and NEUSA. Bates, R.E., et al., 1998, p.10° 117. MP 2001.—Monich.	beck, S.C., et al. [1971, p.237-243] Influence of irregularines of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126] Issa, Greenland, glacer freezing study. Ashson, G.D., [1978, p.254-244] Utrasonic investigation on ice cores from Antarctic, Robert, H., et al. [1979, 1963] Gacer mechanics. Mellor, M., [1942, p.455-475] Bacchole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1965, p.242-251] Bacchole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1965, p.242-251] MP 1807 Recent glacer-volcane interactions on Mr. Redoule, Alaska, Stirra, M., et al., [1968, 1984] GLACIER ICE Show and see on the carth's surface. Mellor, M., [1964, 1837] Characteristics of the cold reposis. Gerdel, R.W., [1969, 513] Glacier lee Influence of strepularities of the hed of an see sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-126] WP 1600 C-14 and other vistoge studies on naturalise. Oescher, H., et al., [1972, p. D70-D92] Depth of water-filled cress sases that are closely spaced. Robert, M., G. de Q., et al., [1972, p. 343-344] MP 1000
Investigation of the LIZ-3 Don Line Station water supply labe. Kovace, A., (1990, 10p.) SR 99-11 Present rock strength. Binating and blast effects in cold regions. Part 3 explosions in ground materials. Melbor, M., (1989, 62p.) SR 99-15. Strength of soils and rocks at loss temperatures. SR 99-15. Strength of soils and rocks at loss temperatures. Schmann, P.V., (1989, 9,189-190). Protein rock temperature: Engineering properties of submitting permutitost near Profiles. Bay. Chamberlain, E.J., et al., (1978, p. 629-63)5. MP 1066. Protein and Design considerations for anticide in NFRA. Crop., F.E., et al., (1973, p. 641-658). MP 1066. Protein and Design considerations for anticide in NFRA. Crop., F.E., et al., (1973, p. 641-658). MP 1066. From temperature automotive emissions. Courts, 11J., MP 1703. Gas chromatography. Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p. 83)-90. Gas includen. Continuous monitoring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 101-105). MP 935. Gas includen.	Scienced examples of radiosism resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permatient. Scient, W.J., et al., [1979, p.93-115]. MP 1206 Electromagnetic survey in permatient. Scientain, P.V., et al., [1979, 73]. SR 79-16 Electromagnetic survey in permatient. Scientain, P.V., et al., [1979, p.30-12-17]. MP 1623 Subsea permatient study in the Beaudiet Sci., Alanka. Scientain, P.V., et al., [1979, p.207-21-5]. MP 1991 Geophysics of subglacial geology at Dye. J., Gerenland Jerck., K.C., et al., [1985, p.105-11-6]. MP 1991 Workshop on Permatient Geophysics, Golden, Colorado, 23-24 October 1984. Brown, J., ed., [1985, 1159]. Review of methods for generating synthetic teconograms. Peck. L., [1985, 199]. Preparation of geophysical boethole site with ground see. Farbastic, AK. Delaney, AJ., [1987, 139]. SR 87-07 Antisectic see sheet beightness temperature variations. See R-10 Germany. Sooskal amounts and show depths in Germany and NEUSA. Busin, R.E., et al., [1981, p.107-117]. MP 2001	beck, S.C., et al. [1971, p.237-245]. MP 993 Influence of irregularones of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. NOP 1600 Issa, Greenland, glacer freering study. Ashea, G.D., [1978, p.256-764]. MP 1176 Utrasente investigation on ice cores from Antarctica, Kohnen, H., et al. [1979, 169]. CR 29-10. Glacer mechanics. Mellor, M., [1992, p.455-476]. MP 1532 Boechole geometry on the Greenland and Antarctic ice sheets. Jerch, K.C., [1985, p.242-251]. MP 1617 Recent glacer-volcano interactions on Mr. Redoube, Alaska, Stirra, M., et al. [1998, 1894]. MP 1617 GLACIER ICE Show and see on the earth's surface. Mellor, M., [1994, 1819]. M 15-C1 Characteristics of the cold reposis. Gerdel, R.W., [1994, 519]. M 15-C1 Glacier fee. Influence of stregularones of the bed of an see sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. MP 1609 C.14 and other to-supportation natural see. Oscabert, H., et al. [1972, p. D70-D92]. MP 1609 C.14 and other to-supportation of atmospheric precipitation, G. 4c Q., et al. [1972, p.515-544]. MP 1609 Charges in the composition of atmospheric precipitation, Topp, J. J. [1971, p.117-18]. MP 1609
Invisingation of the LIZ-3 Den Lime Station water supply lake. Kovace, A., (1990, 10p.) SR 99-11 Present rock strength. Binating and blast effects in cold regions. Part 3 explosions in ground materials. Melber, M., (1989, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. Schmann, P.V., (1989, p.189-190). Prosent rock temperature: Engineering properties of submitting permations near Profine Bay. Chamberlain, E.J., et al., (1978, p.629-635). MP 1066 Prosent and Design considerations for anticide in NFRA. Coop., F.E., et al., (1973, p.641-658). MP 1066 Profit transport: Effects of see on coal monoment was the inland waterways Lunardim, V.J., et al., (1981, 72p.) SR 81-13 Fields Low temperature automotive emissions. Courts, 11.J., MP 1703 Gas chromatography Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.83-90). Gas includen. Continuous monitoring of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). Gas inclusions in the Antarctic see sheet. Good, A.J., et al., Gas inclusions in the Antarctic see sheet. Good, A.J., et al.,	Scienced examples of radiosim resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1687] Geophysics in the study of permuleost. Scient, W.J., et al., [1979, p.93-115] Electromagnetic survey in permuleost. Scientain, P.V., et al., [1979, 7.3] Electrical resolving of firsten ground. Account, S.A., [1974, p. 32-17] Subscience study in the Beneficial Scientain, S.A., [1974, p. 32-17] Subscience study in the Beneficial Scientain, S.A., [1982, p. 32-17] Geophysics of subglacial geology at Dye. J. Greenhood Jerck, K.C., et al., [1995, p. 105-110] Workshop on Permuleost Geophysics, Golden, Colorado, 23-23 October 1984. Brown, J., ed., [1995, 1179] SKR 85-65 Review of methods for generating synthetic sensingrams. Peck, L., [1995, 1997] Preparation of geophysical beechole site with ground see, Farbarks, AK. Delaney, A.J., [1997, 1594] Antisectic see sheet benglitness temperature variations. Jerck, K.C., et al., [1990, p. 217-127] MP 2736 Germany Soosial amounts and store depths in Germany and NEUSA Batcs, R.E., et al., [1998, p. 107-117] Mesich Frotra precognition and weather, Munchen Riem, West Germany. Biolio, M.A., [1984, 479] Glacial deposits	beck. S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularious of the bed of an see sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freezing study. Ashton, G.D., (1978, p.256-744). MP 1174 Utrasonic investigation on ice cores from Antarctice, Robert, H., et al. [1979, 1963]. CR 29-10 Glacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Jerek. K.C., [1965, p.242-251]. MP 1607. Recent flactor-volcane interactions on Mt. Redoubt, Almha. Sturm, M., et al. [1968, 1964]. MP 3431 GLACIER ICE. Soon and see on the earth's surface. Mellor, M., [1964, 1872]. MI-CI. Characteristics of the cold reposits. Gerdel, R.W., [1964, 1872]. MI-Gotier fee. Influence of irregularines of the hed of an see sheet on deposition rate of irl. Nobles, L.H., et al. [1971, p.117-126]. MP 1602 C-16 and other instone studies on naturalise. Oesthoer, H., et al. [1972, p. D70-D92]. MP 1602 Depth of water-filled creatures that are closely spaced. Robin, G. 6c. Q., et al. [1972, p. 817-91]. MP 1602 Charges in the composition of atmospheric precipitation. Craps, J.H., et al. [1977, p.817-91]. MP 1609. Otygen intopers in the heat groe of Mataniaha Glacori.
Investigation of the LIZ-3 Don Lime Station water supply labe. Kovace, A., (1990, 10p.) SR 99-11 Process rock strength. Biosting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1989, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. Science, P.V., (1999, p.139-190) Process rock temperature: Eaglinering properties of soldmanne permateron near Pruthoc Bey. Chamberlain, E.J., et al., (1978, p.629-835). MP 1066 Process sand Design considerations for artificide in NPRA. Groep, F.E., et al., (1978, p.641-458). MP 1066 Process soil of the monogenetic via the instand waters mys. Lumerdom, V.J., et al., (1981, 72p.) SR 81-13 Fields Low temperature automotive consistons. Courts, H.J., (1993, 2 vols.) Ges chromosography Vapor pressure of TNT by gax chromatographs. Leggett, D.C., (1977, p.83-90). MP 915 Ges includence. Continuous monitoring of total dissolved gases, a feavibility study. Jenkim, T.F., (1975, p.101-105). MP 857 Gis inclusions in the Antarctic see sheet. Groop, A.J., et al., (1975, p.5101-5105). MP 847 Villag GCMS analysis of water in the Mattin repoint. Anderson, D.M., et al., (1972, p.55-61). JP 1195	Scienced examples of radiosin resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] SR 77-01 Geophysics in the study of permations. Scient, W.J., et al., [1979, p.93-115] Dectromagnetic survey in permations. Selimana, P.V., et al., [1979, 73] Electrical resourcity of florein ground. Account, S.A., [1974, p. 32-37] Sibility of the Benefiest Sca, Alinha, Self-mana, P.V., et al., [1979, p. 207-215] MP 1623 Subses permations study in the Benefiest Sca, Alinha, Self-mana, P.V., et al., [1979, p. 207-215] MP 1623 Subses permations study in the Benefiest Sca, Alinha, Self-mana, P.V., et al., [1987, p. 207-215] MP 1623 Subses permations study in the Benefiest Sca, Alinha, Self-mana, P.V., et al., [1987, p. 105-110] MP 1991 Geophysics of subglacial geology at Dye J., Gerenland Jerch, K.C., et al., [1993, p. 105-110] SSR 85-65 Review of methods for generating synthetic securegrams, Peck, L., [1995, 1992] Preparation of geophysical bacehole site with ground sec, Farrhards, AK. Delancy, AJ., [1987, 1593] SSR 85-65 Antiscine see sheet benghiness temperature variations. See 87-67 Antiscine see sheet benghiness temperature variations. See 88-86 Georgian and See 88-88-89 See 88-89 See 88-	beck, S.C., et al. [1971, p.237-243]. MP 9993 Influence of irregularities of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freering study. Ashen, G.D., [1978, p.256-764]. MP 1176 Utrasente investigation on ice cores from Astarctica, Robert, H., et al. [1979, 169]. CR 29-10. Glacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Jetel, K.C., [1945, p.242-251]. MP 1017 Recent glacer-volcano interactions on Mt. Redoule, Alisha, Stirm, M., et al. [1948, 1894]. MP 2431 GLACIER ICE. Soon and see on the earth's surface. Mellor, M., [1944, 1874]. M 11-C1 Characteristics of the cold regions. Gerdel, R.W., [1949, 319]. Glacier lee. Influence of strepularities of the bed of an see sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-126]. MP 1649 C-14 and other rustope studies on natural see. Oschger, H., et al., [1972, p. 100-D9]. Depth of water-filled creations that are closely spaced. Robins, J.H., et al., [1972, p. 147-126]. MP 1659 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679 Osages in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 147-141]. MP 1679
Investigation of the LIZ-3 Den Lime Station water supply like. Kovace, A., (1950, 109.) SR 98-11 Present root strength. Binsting and blast effects in cold regions. Part 3 explosions in ground materials. Melbor, M., (1959, 627) Strength of soils and rocks at loss temperatures. Sciences, P.V., (1999, p.189-190) Proton rock temperature Engineering properties of schematic permations near Pruffice. Bey. Chamberlain, E.J., et al., (1978, p.629-63); MP 1064 Proton used Design considerations for anticide in NPRA. Cross, F.E., et al., (1972, p.441-455). MP 1066 Prot transport Effects of ice on coal monoment was the inland waterways. Limacdom, V.J., et al., (1981, 729). SR 81-13 Prots Low temperature automotive emissions. Courts, 11.J., (1993, 2 vols.) Gas chromotography. Vapor pressure of TNT by gas chromatographs. Legent, D.C., (1977, p.83-00). MP 915 Gas inclusions. Continuous monitoring of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 851 Gas inclusions in the Antiarche see sheet. Gova, A.J., et al., (1975, p.5101-51001). MP 851 Gas inclusions. The color of water in the Mattian repolich. Anderson, D.M., et al., (1978, p.55-61). MP 197 Equations for determining the gas and horse-source in sea.	Scienced examples of radiosim resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1687] Geophysics in the study of permuleost. Scient, W.J., et al., [1979, p.93-115] Electromagnetic survey in permuleost. Scientain, P.V., et al., [1979, 7.3] Electrical resolving of firsten ground. Account, S.A., [1974, p. 32-17] Subscience study in the Beneficial Scientain, S.A., [1974, p. 32-17] Subscience study in the Beneficial Scientain, S.A., [1982, p. 32-17] Geophysics of subglacial geology at Dye. J. Greenhood Jerck, K.C., et al., [1995, p. 105-110] Workshop on Permuleost Geophysics, Golden, Colorado, 23-23 October 1984. Brown, J., ed., [1995, 1179] SKR 85-65 Review of methods for generating synthetic sensingrams. Peck, L., [1995, 1997] Preparation of geophysical beechole site with ground see, Farbarks, AK. Delaney, A.J., [1997, 1594] Antisectic see sheet benglitness temperature variations. Jerck, K.C., et al., [1990, p. 217-127] MP 2736 Germany Soosial amounts and store depths in Germany and NEUSA Batcs, R.E., et al., [1998, p. 107-117] Mesich Frotra precognition and weather, Munchen Riem, West Germany. Biolio, M.A., [1984, 479] Glacial deposits	beck, S.C., et al. [1971, p.237-245]. MP 9993 Influence of irregularones of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freering study. Ashea, G.D., [1978, p.250-784]. MP 1176 Utrasente investigation on ice cores from Antarctica. Kehnen, H., et al. [1979, 189]. CR 29-80. Glacer mechanics. Mellor, M., [1992, p.455-474]. MP 1532 Boechole geometry on the Greenland and Antarctic ice sheets. Jerch, K.C., [1985, p.242-251]. MP 1017 Recent glacer-volcane interactions on Mr. Redoude, Alaska, Stirra, M., et al., [1998, 1894]. MP 3401 GLACIER ICE Show and see on the earth's surface. Mellor, M., [1964, 18]72. MISC. Characteristics of the cold reposis. Gerdel, R.W., [1964, 519]. MISC. Characteristics of the cold reposis. Gerdel, R.W., [1964, 519]. MISC. Characteristics of the cold reposis. Gerdel, R.W., [1964, 519]. MISC. Characteristics of the cold reposis. Gerdel, R.W., [1964, 519]. MISC. Characteristics of the cold reposis. Gerdel, R.W., [1964, 519]. MP 1609 C-16 and other instope studies on natural see. Oscider, H., et al., [1972, p.310-614]. MP 1609 Charges in the composition of atmospheric precipitation, G. de Q., et al., [1972, p.873-544]. MP 1609 Charges in the composition of atmospheric precipitation, G. de Q., et al., [1972, p.873-545]. MP 1079 Ougen instopers in the hand rome of Mataniaka Glacer. Lauson, D. E., et al., [1972, p.873-645]. MP 1077 Radar wave speech in polar glacers. Jerch, K.C., et al.
Investigation of the LIZ-3 Don Lime Station water supply labe. Kovace, A., (1990, 10p.) SR 99-11 Process rock strength. Biosting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1989, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. Science, P.V., (1999, p.139-190) Process rock temperature: Eaglinering properties of soldmanne permateron near Pruthoc Bey. Chamberlain, E.J., et al., (1978, p.629-835). MP 1066 Process sand Design considerations for artificide in NPRA. Groep, F.E., et al., (1978, p.641-458). MP 1066 Process soil of the monogenetic via the instand waters mys. Lumerdom, V.J., et al., (1981, 72p.) SR 81-13 Fields Low temperature automotive consistons. Courts, H.J., (1993, 2 vols.) Ges chromosography Vapor pressure of TNT by gax chromatographs. Leggett, D.C., (1977, p.83-90). MP 915 Ges includence. Continuous monitoring of total dissolved gases, a feavibility study. Jenkim, T.F., (1975, p.101-105). MP 857 Gis inclusions in the Antarctic see sheet. Groop, A.J., et al., (1975, p.5101-5105). MP 847 Villag GCMS analysis of water in the Mattin repoint. Anderson, D.M., et al., (1972, p.55-61). JP 1195	Scienced examples of radiosin resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1693. SR 77-01. Geophysics in the study of permatient. Scient, W.J., et al., (1979, p.93-115). MP 1206. Electromagnetic survey in permatient. Scientina, P.V., et al., (1979, 7.3). SR 79-14. Electrical resourcity of floren ground. Accome, S.A., (1979, p. 20-21). MP 1623. Subses permatient study in the Besudort Sca, Alaska. Scientina, P.V., et al., (1979, p. 20-21). MP 1991. Geophysics of subglacial geology at Dye. J. Gerenland Jerch, K.C., et al., (1995, p. 105-110). MP 1991. Workshop on Permatient Geophysics, Golden Colorado, 23-24 October 1994. Brown, J. ed., (1995, 113p.). SR 85-05. Review of methods for generating synthetic seisingrams. Peck, L., (1995, 19p.). CR 85-10. Preparation of geophysical boethole site with ground see, Farbank, AK. Delany, A.J., (1987, 15p.). SR 87-07. Anisecus we sheet beginness temperature variations. Jerch, K.C., et al., (1990, p. 217-223). MP 2730. Germany. Sonofall amounts and snow depths in Germany and NEUSA. Bates, R.E., et al., (1995, p. 107-117). MP 2001.—Monich. Froster perceptition and weather, Munchen Riem, West Germany. Biology, MA, (1984, 47p.). SR 84-32. Glacial deposits.	beck, S.C., et al. [1971, p.237-243]. MP 9993 Influence of irregularious of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freering study. Ashen, G.D., (1978, p.256-764). Utrassence investigation on ice cores from Antarctica. Robust, H., et al. [1979, 169]. Gaeser mechanics. Mellor, M., [1992, p.455-474]. MP 1332 Bacchole geometry on the Greenland and Antarctic ice sheets. Jerck, K.C., [1995, p.242-251]. MP 1017 Recent glacer-volcasse interactions on Mr. Redout, Almha, Surm, M., et al. [1998, 1894]. MP 3431 GLACIER ICE. Sams and see on the earth's surface. Mellor, M., [1964, 1837]. Chracteristics of the cold reposis. Gerdel, R.W., [1909, 1871]. Glacier fee. Influence of streptistics of the bed of an see sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-126]. MP 1600 C-14 and other instoge studies on naturalists. Oschger, H., et al., [1972, p.100-D92]. MP 1600 C-14 and other instoge studies on naturalists. Oschger, H., et al., [1972, p.100-D92]. MP 1600 C-14 and other instoge studies on naturalists. Oschger, H., et al., [1972, p.170-D93]. MP 1600 C-15 and other instoge studies on naturalists. Oschger, H., et al., [1972, p.170-D93]. MP 1600 C-14 and other instege studies on naturalists. Oschger, H., et al., [1972, p.70-D93]. MP 1607 Ostgen insteges in the basid zone of Mataniaka Glacier. Lawson, D.E., et al., [1972, p.37-d-81]. MP 1077 Ostgen insteges in polar glaciers. Jerck, K.C., et al., [1983, p.39-205]. Rheology of glacier ice. Jerck, K.C., et al., [1985, p.1315-
Invisingation of the LIZ-3 Den Line Station water supply labe. Kovaca, A., (1990, 10p.) SR 99-11 Process rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1889, 62p.) Strength of soils and rocks at loss temperatures. Scimann, P.V., (1989, p.139-190). MP 2605. Strength of soils and rocks at loss temperatures. Scimann, P.V., (1989, p.139-190). MP 2606. Bry. Chamberlain, E.J., et al., (1978, p.629-63). MP 1066. Broom sond. Design considerations for airfields in NPRA. Croex, F.E., et al., (1973, p.629-63). MP 1066. Process sond. Design considerations for airfields in NPRA. Croex, F.E., et al., (1973, p.621-63). MP 1066. Process sond. Design considerations for airfields in NPRA. Croex, F.E., et al., (1973, p.621-63). MP 1066. Process sond. Design considerations for airfields in NPRA. Croex, F.E., et al., (1973, p.621-63). MP 1066. Self-term temperature autoentories rimissons. Courts, 11.J., (1993, 2.565). MP 1763. Gas chromotography. Vapor pressure of TNT by gas chromatographs. Leggett, DC, (1977, p.83-69). MP 935. Gas inclusions. Continuous mentioring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p.101-105). MP 835. Gas inclusions. Continuous in the Antarctic (et sheet: Good, A.J., et al., (1975, p.510-61). MP 835. Gas inclusions in the Antarctic (et sheet: Good, A.J., et al., (1975, p.510-61). MP 845. Gas inclusions for determining the gas and lesson downess in sea. sec. samples. Cost, G.F.N., et al., (1992, 1). CR 92-36. Mathematical sumulation of miregen interactions in sea.	Scienced examples of radiosim resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] Geophysics in the study of permuleost. Scient, W.J., et al., [1979, p.93-115] Decrinosagestic survey in permuleost. Scientain, P.V., et al., [1979, p.33-115] Electrical resolving of floren ground. Account, S.A., [1979, p.32-37] MP 1623 Subsca permuleost study in the Beaufort Sci. Alinka. Sci.nman, P.V., et al., [1979, p.20-213] Geophysics of subglacial geology at Dye. J. Greenhaddert, K.C., et al., [1995, p.105-110] Workshop on Permuleost Geophysics, Golden, Colorado, 23-23 October 1984. Brown, J., ed., [1985, 115p.; SR 85-65] Review of methods for generating synthetic sensingums. Peck. L., [1985, 199.; application of geophysical beechole site with ground see, Farbataks, AK. Delancy, A.J., [1987, 139.; SR 87-67] Antiferior see sheet brightness temperature variations. Jerch, K.C., et al., [1990, p.217-223] Germany Soonstal amounts and show depths in Germany and NEUSA. Bates, R.E., et al., [1988, p.10° 117] MP 260 Germany Glacial deposits Influence of streplaciness of the bed of an see where deposition rate of till. Nobles, L.H., et al., [1971, p.11° 119; MP 1609 Schments of the weitern Matansika Glacia: Lancon, D.E., (T. 20-69)	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.25-244). MP 1174 Utrasonic investigation on ice cores from Astarctica, Robert, H., et al. [1979, 106]. CR 29-10 Gacer mechanics. Mellor, M., [1992, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Jerch, K.C., [1965, p.242-251]. MP 1607. Recent glacier-volcano interactions on Mt. Redoubt, Almka, Sturik, M., et al. [1998, 1894]. MP 3431 GLACIER ICE. Show and see on the earth's surface. Mellor, M., [1964, 1879]. MI-CI. Characteristics of the cold reposits. Gerdel, R.W., [1964, 1879]. MI-CI. Characteristics of the cold reposits. Gerdel, R.W., [1964, 1879]. MP 1600. Characteristics of the cold reposits. Gerdel, R.W., [1964, 1879]. MP 1600. C-14 and other isotoge studies on naturalistic. Oscillar, H., et al., [1972, p.17-126]. MP 1602. Depth of water-filled creasures that are closely spaced. Robin, G. de O., et al., [1972, p.513-543]. MP 1602. Charges in the composition of atmospheric precipitation, G. de O., et al., [1972, p.917-831]. MP 1602. Charges in the composition of atmospheric precipitation, G. de O., et al., [1972, p.917-831]. MP 1602. Charges in the composition of atmospheric precipitation, G. de O., et al., [1972, p.917-831]. MP 1602. Charges in the composition of Matanisha Glacer. Lanson, D.E., et al., [1972, p.917-831]. MP 1602. Radier water speeds in polar glacers. Jerek, K.C., et al., [1985, p.1335-1337]. MP 1603.
Invisingation of the LIZ-3 Den Lime Station water supply lake. Kovaca, A., (1990, 10p.) SR 99-11 Present rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melber, M., (1889, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. MP 168-199, p.139-190. Procent rock temperature: Engineering perpentitions near Fruthore Bey. Chamberlain, E.J., et al., (1978, p.629-635). MP 1066 Procent and Design considerations for anticide in NFRA. Coop., F.E., et al., (1973, p.641-658). MP 1066 Procent and Design considerations for anticide in NFRA. Coop., F.E., et al., (1973, p.641-658). MP 1066 Procent and Design considerations for anticide in NFRA. Coop., F.E., et al., (1973, p.641-658). MP 1066 Procent and Design considerations for anticide in NFRA. Coop., F.E., et al., (1973, p.641-658). MP 1066 Frocent remojeration. Effects of ice on coal monometric variable instand waterways. Lonardin, V.J., et al., (1981, 72p.). SR 81-13 Frols. Low temperature automotive emissions. Courts, H.J., MP 1078 Gas included. Con includes. Contituous monitoring of total dissolved gases, a feasibility of standard study. Jenkins, T.F., (1975, p.101-105). MP 851 Gas inclusions in the Antarctic received: Good, A.J., et al., (1975, p.5101-5106). MP 987 Viling GGMS analysis of water in the Mattian repolated and control of the standard standard response in the Antarctic received: Good, A.J., et al., (1975, p.5101-5106). AP 1195 Equations for determining the gas and loss solutions for determining the gas and loss solutions in soils see samples. Cos., GFN, et al., (1982, 1) Mathematical samulations of entroper interactions in soils seem, H.M., et al., (1983, p.241-248). MP 2051 Mathematical samulations of entroper interactions in soils seem, H.M., et al., (1983, p.241-248). MP 2051	Science examples of radiolim resourcity surveys for geocechmical exploration. Horistra, P., et al., 1977, 1693. SR 77-01. Geophysics in the study of permulsost. Scient, W.J., et al., 1979, p.93-115. MP 1366. Electromagnetic survey in permulsost. Sellmann, P.V., et al., 1979, 733. SR 79-14. Electromagnetic survey in permulsost. Sellmann, P.V., et al., 1979, p. 32-37. MP 1623. Subscia permulsost study in the Benefiest Sci. Alinda. Sellmann, P.V., et al., 1979, p. 207-213. MP 1623. Subscia permulsost study in the Benefiest Sci. Alinda. Sellmann, P.V., et al., 1997, p. 207-213. MP 1991. Geophysics of subglacial geology at Dye. J. Gerenheid Jerck, K.C., et al., 1995, p. 105-110. MP 1991. Workshop on Permulson Geophysics, Golden, Colorado, 23-24 October 1984. Brown, J., ed., 1995, 113p; SR 85-85. Review of methods for generating synthetic seasongrams. Peck. L., (1995, 1997). SR 85-85. Review of methods for generating synthetic seasongrams. Peck. L., (1995, 1997). SR 85-85. Review of methods for generating synthetic seasongrams. Peck. L., (1995, 1997). SR 85-85. Review of methods for generating synthetic seasongrams. Peck. L., (1995, 1997). SR 85-85. Review of methods for generating synthetic seasongrams. Peck. L., (1995, 1997). SR 85-85. Review of methods for generating synthetic seasongrams. Peck. L., (1995, 1997). SR 85-85. Review of methods for generating synthetic seasongrams. Peck. R. et al., (1990, p. 217-123). SR 85-85. Review of methods for generating stemperature variations. Seasongrams. Seasongram	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. MP 1009 Issa, Greenland, glacer freezing study. Ashton, G.D., [1978, p.256-764]. MP 1174 Utrasente investigation on ice cores from Astarctica, Robert, H., et al. [1979, 169]. CR 29-10 Gacer mechanics. Mellot, M., [1942, p.455-474]. MP 1532 Bocchole geometry on the Greenland and Astarctic ice sheets. Jerck, K.C., [1965, p.242-251]. MP 1807. Recent glacier-volcano interactions on Mt. Redoule, Almia, Stura, M., et al. [1968, 1864]. MP 3401 GLACIER ICE Soon and see on the earth's surface. Mellot, M., [1964, 1872]. MI-CI Characteristics of the cold reposits. Gerdel, R.W., [1969, 319]. MI-GI Characteristics of the cold reposits. Gerdel, R.W., [1964, 1872]. MI-GI Characteristics of the Nobles, L.H., et al., [1971, p.117-126]. MP 1609 C-14 and other viscope studies on natural see. Oeschage, H., et al., [1972, p. D'D-D'2]. MP 1609 C-14 and other viscope studies on natural see. Oeschage, H., et al., [1972, p. 137-126]. MP 1609 Charges in the composition of atmospheric precipitation. Craps, J.H., et al., [1973, p. 33-344]. MP 1609 Charges in the composition of atmospheric precipitation. Craps, J.H., et al., [1973, p. 33-345]. MP 1017 Radar wave speeds in polar glaciers. Jerck, K.C., et al., [1985, p. 133-137]. MP 367 Radoulescology by V.V. Bogeenstak, et al. Jerrk, K.C., et al., [1974, p. 137-127]. MP 1609
Investigation of the LIZ-3 Den Lime Station water supply like. Kovace, A., (1950, 10p.) SR 99-11 Present rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melloct, M., (1959, 62p.) SR 99-15 Strength of soils and rocks at loss temperatures. Scilinatin, P.V., (1999, p.189-190) Present rock temperature Engineering properties of salemantic permateous near Profiling. By. Chamberlain, E.J., et al., (1978, p.629-835) MP 1066 Protent sand Design considerations for artificids in NPRA. Croep, F.E., et al., (1972, p.441-455). MP 1066 Prot transport Effects of ice on coal monoment was the inland waterways. Limitedim, V.J., et al., (1981, 72p.). SR 81-13 Prots Low temperature autoentoric emissions. Coeffs, H.J., (1993, 2 vols.). MP 1703 Gas chromotography Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.83-00). MP 351 Gas inclusions mentioning of total desires of gases, a feasibility study. Jenkins, T.F., (1975, p.101-105). MP 851 Gas inclusions in the Antarctic ice sheet. Good, A.J., et al., (1975, p.51-101-105). MP 851 Gas inclusions in the Antarctic ice sheet. Good, A.J., et al., (1975, p.5101-3105). MP 851 Gas inclusions. O.M., et al., (1978, p.55-64). 4P 1195 Equations for determining the gas and between some sease ice samples. Cost, G.F.N., et al., (1971, p. 17-11). (CR 82-36) Mathematical simulation of entropert interactions in sease. Seim, H.M., et al., (1973), p.241-245. (CR 82-36) Mathematical simulation of entropert interactions in sease.	Scienced examples of radiosin resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] Geophysics in the study of permations. Scient, W.J., et al., [1979, p.93-115] Decremagnetic survey in permations. Scientain, P.V., et al., [1979, 73] Electrical resourcity of floren ground. Accord. S.A., [1974, p. 32-37] Sibility of the Benefit of Sci., Aliaka. Sci., p. 32-37] Subset permations study in the Benefiet Sci., Aliaka. Sci., p. 32-37] Subset permations study in the Benefiet Sci., Aliaka. Sci., p. 32-37] Geophysics of subglacial geology at Dye. J., Gerenland. Jerch., K.C., et al., [1995, p. 105-116]. MP 1991 Geophysics of subglacial geology at Dye. J., Gerenland. Jerch., K.C., et al., [1995, p. 105-116]. MP 1992 Residue on Fermitions Geophysics, Golden, Colorado, 23-24-October 1994. Brown, J., ed., [1995, 117]; Sci., [1995, 1997] Preparation of methods for generating synthetic sessingtime. Feek., L., [1995, 1997] Preparation of geophysical boschole site with ground see. Farrharks, AK. Deliney, A.J., [1997, 159] Sci., K.C., et al., [1996, p. 217-223] Antisectic see sheet benghinesis temperature variations. Sci. R. 2-46 Germany. Somefull amounts and sinon depths in Germany and NEUSA. Butes, R.E., et al., [1996, p. 107-117] —Mossich Froten precipitation and weather, Munchen Riem, West Germany. Biotic, M.A., [1994, 47p.] Giacol deposition. M.A., [1994, 47p.] Sci., R. 2-2-6-83, MP 1009 Sci., R. 2-2-6-83, MP 1276 MP 1009 Sci., R. 2-2-6-83, MP 1276	beck, S.C., et al. [1971, p.237-243]. MP 9993 Influence of irregularities of the bed of an act sheet on deposition rate of rifl. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freering study. Ashton, G.D., (1978, p.256-764]. MP 1176 Utrassenic investigation on ice cores from Antarctica, Robert, H., et al. [1979, 169]. CR 29-81. Gacer mechanics. Mellor, M., [1992, p.455-474]. MP 1917 Barchole geometry on the Greenland and Antarctic ice sheets. Jerek, K.C., [1995, p.242-251]. MP 1917 Recent glacersvolcano interactions on Mr. Redoubt, Almha, Surm, M., et al. [1998, 1994]. MP 1917 Recent glacersvolcano interactions on Mr. Redoubt, Almha, Surm, M., et al. [1998, 1994]. MP 1917 Glacer free Sono and see on the carth's surface. Mellor, M., [1994, 1879]. MI-G. Chiracteristics of the cold regions. Gerdel, R.W., [1994, 1879]. MI-G. Gacter fee Influence of streptianties of the bed of an see sheet on deposition of an Nobles, L.H., et al. [1971, p.117-126]. MP 1909. CH and other instoge studies on naturalistic. Oschquet, M., et al. [1972, p.100-109]. MP 1909 CH and other instoge studies on naturalistic. Oschquet, M., et al. [1972, p.100-109]. MP 1909. Chapes in the composition of animospheric precipitation. Craps, J.H., et al. [1972, p.313-343]. MP 1979 Otygen instoges in the basid proc. of Mataniaka Glacer. Lawson, D.E., et al. [1972, p.313-343]. MP 1979 Otygen instoges in the basid proc. of Mataniaka Glacer. Lawson, D.E., et al. [1972, p.313-343]. MP 1979 Otygen insteges in polar glacers. Jerek, K.C., et al. [1983, p.199-206]. MP 3957 Recologicalogy by V.V. Bopendickt, et al. [1975, p.1131-117]. MP 1979 Fadoglacuslopy by V.V. Bopendickt, et al. [1974, MP 2338
Invisingation of the LIZ-3 Den Line Station water supply labe. Kovaca, A., (1990, 10p.) SR 99-11 Process rotes strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. Schmann, P.V., (1989, p.139-190). Process rock temperature Engineering properties of submitting permations near Profilese Bey. Chamberlain, E.J., et al., (1978, p.629-63); MP 1006 Process und Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Low temperature autoentories consistent. Conti, H.J., (1973, p.621-65); Gas chromotography Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.83-60). Gas inclusions Continuous mentioring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p.101-105). Gas inclusions in the Antarctic rec sheet. Cons., A.J., et al., (1975, p.5101-5105). Willing GCMS analyses of water in the Martian repolich, Anderson, D.M., et al., (1978, p.55-61). Equations for determining the gas and benomenous in sease ce samples. Cost, G.F.N., et al., (1981, p.241-245). Mathematical simulation of integer interactions in soils Schim, H.M., et al., (1983, p.241-245). MP 2051 Equations for determining gas and benome solumes in sea see. Cost., G.F.N., et al., (1983, p.241-245). MP 2051 Equations for determining gas and benome solumes in sea see. Cost., G.F.N., et al., (1983, p.241-245). MP 2051	Scienced examples of radiosim resourcity surveys for geocechmical exploration. Horistra, P., et al., [1977, 1687] Geophysics in the study of permuleost. Scient, W.J., et al., [1979, p.93-115] Electromagnetic survey in permuleost. Scientain, P.V., e. al., [1979, p.33-17] Electromagnetic survey in permuleost. Scientain, P.V., e. al., [1979, p.32-17] SR 79-14 Electromagnetic survey in permuleost. Scientain, P.V., e. al., [1979, p.32-17] SR 79-18 Electromagnetic survey in the Benedort Sci., Alian. Sci., p. al., p. al.	beck. S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularones of the bed of an sea sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. MP 1609 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.256-744]. MP 1174 Utrasonic investigation on ice cores from Antarctice, Robert, H., et al. [1979, 109]. CR 29-10 Glacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astaccise ice sheets. Jerck. K.C., [1965, p.242-251]. MP 1607. Recent flacurer-volcano interactions on Mt. Redoubt, Almka. Sturm, M., et al. [1998, 1894]. MP 2431 GLACIER ICE Show and see on the carth's surface. Mellor, M., [1944, 1817]. MI-CI. Characteristics of the cold reposits. Gerdel, R.W., [1994, 1897]. MI-CI. Characteristics of the cold reposits. Gerdel, R.W., [1994, 1877]. MI-CI. Characteristics of the cold reposits. Gerdel, R.W., [1994, 1999]. MP 1609. Classification of mergularones of the bed of an see sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. MP 1609. Classes in the composition of atmospheric precipitation, G. 60, et al. [1972, p. 817-631]. MP 1609. Charges in the composition of atmospheric precipitation, Craps, J.H., et al. [1972, p. 817-631]. MP 1609. Charges in the composition of atmospheric precipitation, Craps, J.H., et al. [1972, p. 817-631]. MP 1609. Radar mare speeds in polar glaciers. Jerck, K.C., et al. [1983, p. 193-205]. MP 2609. Radoughecology by V.V. Bopendicket et al. Jerck, K.C., [1991, p. 817-64]. Affelies on artisactic glacier see. Mellor, M., et al. [1999.]. Articities on artisactic glacier see. Mellor, M., et al. [1999.].
Invisingation of the LIZ-3 Den Lime Station water supply like. Kovaca, A., (1990, 10p.) From rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melber, M., (1889, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Schmann, P.V., (1989, p.139-190) Process rock temperature Engineering properties of solomatine permations near Frudhor. Bey. Chamberlain, E.J., et al., (1978, p.629-635) MP 1066 Process und Design considerations for anticide in NFRA. Crop., F.E., et al., (1973, p.641-658) MP 1066 Process und Design considerations for anticide in NFRA. Crop., F.E., et al., (1973, p.641-658) MP 1066 Process und Design considerations for anticide in NFRA. Crop., F.E., et al., (1973, p.641-658) Effects of ice on coal monoment is in the inland waters mys. Limarchin, V.J., et al., (1981, 72p.) SR 81-13 Frols Low temperature automotive emissions. Courts, 11.J., MP 1078 Gas chromatography Vapor pressure of TNT by gas chromatographs. Leggett, MP 915 Gas inclusions Continuous monitoring of total dissolved gases, a feasibility of site of the Antarctic rec sheet. Gova, A.J., et al., (1975, p.5101-5105) Gas inclusions in the Antarctic rec sheet. Gova, A.J., et al., (1975, p.5101-5105) Gas inclusions in the Antarctic rec sheet. Gova, A.J., et al., (1975, p.5101-5105) WP 915 Gas inclusions in the Antarctic rec sheet. Gova, A.J., et al., (1975, p.5101-5105) WP 916 Mp 917 Or 82-36 Mathematical samulation of surrogen interactions in sela see consider. Con., G.F.N., et al., (1913, p.241-245) MP 2055 Gases Gases Gases	Scienced examples of radiosim resourcity surveys for geocedmical exploration. Horistra, P., et al., 1977, 1683. Geophysics in the study of permuleost. Sect., W.J., et al., 1979, p.91-115. Geophysics in the study of permuleost. Sect., W.J., et al., 1979, p.91-115. Electromagnetic survey in permuleost. Sellmann, P.V., et al., 1979, p.32-37. Electrical resolvinity of literem ground. Account, S.A., 1979, p.32-37. Subsea permuleost study in the Beaufort Sea, Alinka. Sellmann, P.V., et al., 1979, p.20-213. MP 1623. Subsea permuleost study in the Beaufort Sea, Alinka. Sellmann, P.V., et al., 1995, p.20-213. MP 1991. Geophysics of subglacinal geology at Dye. J., Gerenhand Jerck. K.C., et al., 1995, p. 199-110; Workshop on Permuleost Geophysics, Golden, Colorado, 23-23. October 1994. Brown, J. ed., p. 1915, 117-12. SR 85-65. Revens of methods for generating synthetic sensingums, Peck., L., 1995, 1993. Preparation of geophysical basehole site with ground see, Farbatks, AK. Delancy, A.J., p. 1917, 139-13. SR 87-67. Antiseries seabest benghiness temperature variations. Jerck., K.C., et al., p. 1990, p. 217-223. Germany Sonoifall amounts and sinon depths in Germany and NEUSA. Bater, R.E., et al., p. 1994, p. 10° 117. MP 2001. —Monich Frotra precognition and weather, Munchen Riem, West Germany. Biolio, M.A., p. 1994, p. 10° 117. SR 84-32. Glocial deposits. Influence of strepularities of the bed of an see where on deposition rate of till. Nobles, L.H., et al., p. 11° 1.19°	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularines of the bed of an ace sheet on deposition rate of rill. Nobles, L.H., et al. [1971, p.117-126]. ISBN Greenland, glacer freezing study. Ashson, G.D., (1978, p.25-244]. MP 1174 Utrassence investigation on ice cores from Antarctica, Robert, H., et al. [1979, 106]. CR 29-10 Gacer mechanics. Mellor, M., [1992, p.455-475]. MP 1532 Boechole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1965, p.242-251]. MP 1532 Recent glacier-volcane interactions on Mr. Redoule, Alaska, Sturia, M., et al., [1998, 1984]. MP 3431 GLACIER ICE Show and see on the carth's surface. Mellor, M., [1964, 1837]. MI-60 Characteristics of the cold reposits. Gerdel, R.W., [1964, 1837]. MI-61 Glacier lee. Influence of strengthenius of the bed of an see sheet on deposition rate of rill. Nobles, L.H., et al., [1971, p.117-126]. MP 1600 C-14 and other instone studies on naturalistic Oeschaper, H., et al., [1972, p. 917-914]. MP 1600 C-14 and other instone studies on naturalistic Oeschaper, H., et al., [1972, p. 917-914]. MP 1602 Depth of water-office creasures that are closely spaced. Robins, G. de Q., et al., [1972, p. 917-914]. MP 1602 Osygen instones in the heal zone of Mataniska Glacier. Lanson, D.E., et al., [1972, p. 917-914]. MP 1602 Robinson, J.H., et al., [1972, p. 917-914]. MP 1603 Rheology of glacier ice. Jeteck, K.C., et al., [1985, p. 1335-1335]. MP 1804 Salongheadign. by V.V. Bogoendikk et al., Jetek, K.C., et al., [1985, p. 91-95]. MP 1804 Journal of the core classifier ice. Mellor, M., et al., [1989, V.] Journal of the core classifier ice. Anti-glose, Antaricka on antaricki glacier ice. Care characteristics, Antaricka Dominion and anticides on antaricki glacier ice. Care characteristics, Antaricka on antaricki glacier ice. Care characteristics, Antaricka
Invisingation of the LIZ-3 Den Line Station water supply labe. Kovaca, A., (1990, 10p.) SR 99-11 Process rotes strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. Schmann, P.V., (1989, p.139-190). Process rock temperature Engineering properties of submitting permations near Profilese. Bey. Chamberlain, E.J., et al., (1978, p.629-63); MP 1006 Process und Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1006 Process and Low temperature autoentories consistent. Count, H.J., (1973, p.621-65); Gas chromotography Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.83-60). Gas inclusions Continuous mentioring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p.101-105). Gas inclusions of mentioring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p.101-105). Gas inclusions in the Antarctic rec sheet. Coso, A.J., et al., (1975, p.5101-105). WP 267 Process received in the Martinia repolich, Anderson, D.M., et al., (1978, p.55-61). MP 268 Mathematical simulation of surrogen interactions in soils seem, H.M., et al., (1933, p.241-245). Mathematical simulation of surrogen interactions in soils Schim, H.M., et al., (1933, p.241-245). MP 265 Equations for determining gas and benon solumes in sea see Cost., G.F.N., et al., (1933, p.241-245). MP 265	Science examples of radiolim resourcity surveys for geocechnical exploration. Horistra, P., et al., [1977, 1683] Geophysics in the study of permuleost. Scient, W.J., et al., [1979, p.93-115] Electromagnetic survey in permuleost. Scientina, P.V., et al., [1979, p.39-115] Electromagnetic survey in permuleost. Scientina, P.V., et al., [1979, p.32-37] SR 79-14 Electromagnetic survey in permuleost. Scientina, P.V., et al., [1979, p.32-37] SR 79-14 Electromagnetic survey in the Benufest Sci., Alinia. Sci., MP 1623 Schien permuleost study in the Benufest Sci., Alinia. Sci., min., P.V., et al., [1979, p.207-213] MP 1623 Surveys of subglacial geology at Dye. J. Gerenhood Jerick, K.C., et al., [1985, p. 105-110]. MP 1981 Workshop on Permuleost Geophysics, Golden, Colorado, 23-24 October 1984. Berown, J., et., [1985, 115p.; SR 85-85 Review of methods for generating synthetic sensingrams. Peck. L., [1985, 1997. Preparation of geophysical beechole size with ground see, Farbatiks, AK. Delaney, A.J., [1987, 15p.; SR 85-85 Antisectic see sheet beightness temperature variations. Jerick, K.C., et al., [1990, p. 217-223]. MP 2334 Germany Somital amounts and show depths in Germany and NEUSA Bates, R.E., et al., [1981, p. 107-117]. MP 2401 —Mostich Frostes precapitation and weather, Munchen Riem, West Germany. Biolio., M.A., [1984, 47p.; SR 84-32 Glacial deposits. Influence of strigularities of the bed of an see sheet on deposition rate of tal. Nobles, L.H., et al., [1971, p.117-128]. MP 1409 Schments of the western Malantisks Glacier. Lawson, D.E., [1979, p.279-843]. MP 1404 Deposits in the placial crawrommers. Lawson, D.E., [1979, p.279-843]. Diametons at the margin of the Malantisks Glacier, Alasks. Lawson, D.E., [1981, p.78-84]. Diametons at the margin of the Malantisks Glacier, Lawson, D.E., [1981, p.78-84]. Diametons at the margin of the Malantisks Glacier, Lawson, D.E., [1981, p.78-84]. Diametons at the margin of the Malantisks Glacier, Lawson, D.E., [1981, p.78-84].	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularones of the bed of an see sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. MP 1009 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.256-744]. MP 1174 Utrasonic investigation on ice cores from Antarctice, Robert, H., et al. [1979, 109]. CR 29-10 Glacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astaccise ice sheets. Jerck, K.C., [1965, p.242-251]. MP 1807 Recent flacure-volcano interactions on Mt. Redoubt, Almán. Sturm, M., et al. [1998, 1894]. MP 2431 GLACIER ICE Show and see on the carth's surface. Mellor, M., [1944, 1817]. MI-CI Characteristics of the cold reposit. Gerdel, R.W., [1949, 187]. MI-CI Characteristics of the cold reposit. Gerdel, R.W., [1944, 1847]. MI-CI Characteristics of the cold reposit. Gerdel, R.W., [1944, 1847]. MP 1609. Classification of the cold reposit. Gerdel, R.W., [1944, 1847]. MP 1609. Classification of the cold reposit. Gerdel, R.W., [1944, 1847]. MP 1609. Classification of the cold reposit. Gerdel, R.W., [1944, 1847]. MP 1609. Classes in the composition of annuspheric perceptation. Craps. J.H., et al., [1977, p.817-631]. MP 1609. Charges in the composition of annuspheric perceptation. Craps. J.H., et al., [1977, p.817-631]. MP 1609. Charges in the composition of annuspheric perceptation. Craps. J.H., et al., [1977, p.817-631]. MP 1609. Rador mare speeds in polar glaciers. Jerck, K.C., et al., [1978, p.817-631]. MP 1609. Rador mare speeds in polar glaciers. Jerck, K.C., [1978, p.817-64]. MP 2609. Radorglacudogs by V.V. Bopendickt, et al., [1978, p.817-81]. MP 1609. Particles on annuscing glacier see. Mellor, M., et al., [1999, p.71]. Dominon. Range see. core. characteristics. Antarctics. MP, 2007.
Investigation of the LIZ-3 Den Lime Station water supply lake. Kovaca, A., (1990, 10p.) From rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Mellor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. Scillann, P.V., (1999, p.139-190) Strength of soils and rocks at loss temperatures. Scillann, P.V., (1999, p.139-190) From rock temperature Engineering properties of solematine permateous near Pruthor. Bey. Chamberlain, E.J., et al., (1978, p.629-83)5; MP 1104 From sand Design considerations for artificits in NFRA. Groep, F.E., et al., (1978, p.641-458). MP 1006 From sand Design considerations for artificits in NFRA. Groep, F.E., et al., (1978, p.641-458). MP 1006 From temperature automotive emissions. Courts, H.J., (1993, 2. vols.) Gos. thromosomerophy. Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.63-90). MP 915 Gos. inclusions in monitoring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p.101-105). MP 873 Gos. inclusions in the Antarctic tee sheet. Groop, A.J., et al., (1975, p.5101-5105). MP 847 Villing GCMS analysis of water in the Mattin repoint. Anderson, D.M., et al., (1973, p.55-61). JP 1975 Equations for determining the gas and beautiful in repoint. Anderson, D.M., et al., (1973, p.55-61). JP 1975 Equations for determining gas and brane volumes in sea see samples. Cos., G.F.N., et al., (1933, p.201-145). MP 2655 Goses Trace gas analysis of Arctic and substractions in sea see Cotten of the determining of mater samples. Craps, 131. MP 2655 Goses	Scienced examples of radiosin resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] Geophysics in the study of permations. Scient, W.J., et al., [1979, p.93-115] Dectromagnetic survey in permations. Scientain, P.V., et al., [1979, 73] Electrical resourcity of florein ground. Account, S.A., [1974, p. 32-37] Sibility of the Beneficial Scientain, P.V., et al., [1976, 73] Electrical resourcity of florein ground. Account, S.A., [1974, p. 32-37] Sibility of the Beneficial Scientain, P.V., et al., [1979, p.207-215] MP 1623 Subtaing permations study in the Beneficial Sci., Alinka. Sci., man., P.V., et al., [1987, p. 207-215] MP 1623 Subtain germations study in the Beneficial Sci., Alinka. Sci., man., P.V., et al., [1987, p. 105-110] MP 1991 Geophysics of subglacial geology at Dye. J., Gerenhand. Jerch., K.C., et al., [1993, 1993, p. 105-110] Mechiling on Permations Geophysics, Golden, Colorado, 23-24-October 1994. Brown, J. et., [1995, 1173] SSR 85-65 Review of methods for generating synthetic securograms. Peck., L., [1995, 1997] Preparation of geophysical bacehole site with ground sec., Exchanks, A.W. Defancy, A.J., [1997, 1593] SR 87-67 Antisecus see sheet benghiness temperature variations. Sci. 87-67 Germany. Sometial amounts and sinew depths in Germany and NEUSA. Baces, R.E., et al., [1990, p. 217-223] MP 2001 —Messich Frotein precapitation and weather, Munchen Raem, West. Germany. Biology, M.A., [1994, 4793] SR 84-32 Glorial deposits. Influence of strengularities of the bed of an see sheet on deposities influence of strengularities of the bed of an see sheet on deposities for size of tell. Nobles, L.H., et al., [1971, p. 117-154] MP 1009 Sedments of the western Malannika Glacer. [1979, 1129]	beck, S.C., et al. [1971, p.237-243]. MP 9993 Influence of irregularious of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. No P 1609 Issa, Greenland, glacer freering study. Ashton, G.D., [1978, p.256-764]. MP 1174 Utrasente investigation on ice cores from Astarctica, Robert, H., et al. [1979, 169]. CR 29-10 Glacer mechanics. Mellor, M., [1942, p.455-474]. MP 1532 Beechole geometry on the Greenland and Astarctic ice sheets. Jerck, K.C., [1965, p.242-251]. MP 1807 Recent glacer-volcano interactions on Mr. Redoule, Alaska, Surar, M., et al. [1978, 1894]. MP 2807 GLACIER ICE Soon and see on the earth's surface. Mellor, M., [1964, 1894]. M 11-C1 Characteristics of the cold regions. Gerdel, R.W., [1964, 1894]. M 11-C1 Characteristics of the cold regions. Gerdel, R.W., [1964, 1894]. Sign. Glacer fee. Influence of strengularities of the hed of an ace sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-126]. MP 1609 C-14 and other motope studies on natural see. Oschger, H., et al., [1972, p. 10-D02]. MP 1609 C-14 and other motope studies on natural see. Oschger, M., et al., [1972, p. 543-544]. MP 1609 Charges in the composition of atmospheric precipitation. Craps, J.H., et al., [1972, p. 543-544]. MP 1609 Origen motopes in the hasal piece of Matanisha Glacore. Lanson, D.E., et al., [1972, p. 543-544]. MP 1677 Radar mare speeds in polar glaciers. Jerck, K.C., et al., [1983, p. 193-507]. Rheology of glacier see. Jerck, K.C., et al., [1985, p. 193-507]. MP 1807 Rheology of glacier see. Jerck, K.C., et al., [1985, p. 1335-1337]. MP 1807 Phomison. Range see. core. characteristics, Astarctica. Mayerski, F.A., et al., [1990, p. 11-19]. MP 2707 Glacer many balance.
Invisingation of the LIZ-3 Den Line Station water supply labe. Kovaca, A., (1990, 10p.) From rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1889, 62p.) Strength of soils and rocks at loss temperatures. Scimann, P.V., (1989, p.139-190). Protein rock temperature Engineering properties of submitting permations near Profiles. MP 2005. Bey. Chamberlain, E.J., et al., (1978, p.629-63)5. MP 1104 Protein sond Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.441-653). MP 1006 Protein sond Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.441-653). MP 1006 Protein sond Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.441-653). MP 1006 Protein sond Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.451-653). MP 1006 Protein sond Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.451-65). SR 81-13 Protein Limitation, V.J., et al., (1981, 72p.). SR 81-13 Protein Continuous mentioning of total distorted gases, a feasibility study. Jeakins, T.F., (1975, p.101-105). MP 207 Gas inclusions Continuous mentioning of total distorted gases, a feasibility study. Jeakins, T.F., (1975, p.101-105). MP 207 Value GCMS analysis of water in the Martian repolith. Anderson, D.M., et al., (1973, p.55-61). MP 207 My 207 My 208 Mathematical simulation of material interactions in seas see samples. Cost, G.F.N., et al., (1972, p. 11-24). My 205 Gases Trace gas analysis of Arciae and subarciae atmosphere Meremann, R.P., (1971, p. 199-20). Meremy contamination of water samples. Cropps, J.H. Mereny contamination of water samples. Cropps, J.H. MP 2055	Scienced examples of radiosim resourcity surveys for geotechnical exploration. Horistra, P., et al., 1977, 1683. Geophysics in the study of permuleost. Sect., W.J., et al., 1979, p.91-1153. Bectivemagnetic survey in permuleost. Sellmann, P.V., et al., 1979, p.93-1153. Electrical resolving of literem ground. Account, S.A., 1979, p. 32-373. Sibera permuleost study in the Beaufort Sea, Alinka. Sellmann, P.V., et al., 1979, p. 32-373. Subsca permuleost study in the Beaufort Sea, Alinka. Sellmann, P.V., et al., 1979, p. 20-213. Subsca permuleost study in the Beaufort Sea, Alinka. Sellmann, P.V., et al., 1979, p. 20-213. Subsca permuleost study in the Beaufort Sea, Alinka. Sellmann, P.V., et al., 1995, p. 109-1103. MP 1991 Geophysics of subglacial geology at Dye. J. Gerenhand Jerck. K.C., et al., 1995, p. 109-1104. Workshop on Permuleost Geophysics, Golden, Colorado, 23-23-0-ctober 1994. Brown, J. ed., 11955, 11973. SR 85-65 Review of methods for generating synthetic sensingiams. Peck. L., 1995, 1997. Preparation of geophysical beechole site with ground sec., Farbatks, AK. Delancy, A.J., 1997, 139-13. SR 87-67 Antiferior receive exhect beginness temperature variations. Jerck., K.C., et al., 1990, p. 217-223. MP 2704 Germany. Soon-fall amounts and sinon depths in Germany and NEUSA. Bure, R.E., et al., 1994, p. 10°-117. Machielle. Forter precognition and weather, Munchen Riem, West Germany. Biology, M.A., 1994, 47-p. SR 84-92. Glorial deposits. Influence of streptianties of the bed of an set where in deposition rate of till. Nobles, L.H., et al., 119°1, p. 11°-116, MP 1000. Sedments of till. Nobles, L.H., et al., 11°12, p. 11°-116, MP 1000. Sedments of the western Matantisks Glacer. Lawson, D.E., (1994), p. 21-225. Diametrons at the margin of the Matantisks Glacer, Alaska. Lawson, D.E., (1992), p. 279-484. Supposed in the places cannonness. Lawson, D.E., (1991), 1994. Supposed in the Matantisks Glacer, Alaska. Lawson, D.E., (1992), p. 279-487.	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. No P 1600 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.25-244]. MP 1174 Utrasonic investigation on ice cores from Antarctica, Robert, H., et al. [1979, 106]. CR 29-10 Gacer mechanics. Mellor, M., [1992, p.455-475]. MP 1532 Borchole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1965, p.242-251]. MP 1532 Recent glacer-volcano interactions on Mr. Redoule, Almka, Sturix, M., et al. [1998, 1894]. MP 3431 GLACIER ICE Show and see on the earth's surface. Mellor, M., [1964, 1872]. MP 3431 Glacier lee Influence of strengularities of the bed of an see sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. MP 1600 C-14 and other isotope studies on naturalistic Occupant, H., et al. [1972, p. 343-343]. MP 1602 Orphod water-filled cressues that are closely spaced. Robin, G. de Q., et al. [1972, p. 917-91]. MP 1602 Otages in the composition of atmospheric precipations, G. de Q., et al. [1972, p. 917-91]. MP 1602 Otages in the composition of atmospheric precipations, G. de Q., et al. [1972, p. 917-91]. MP 1602 Changes in the composition of atmospheric precipations, G. de Q., et al. [1972, p. 917-91]. MP 1602 Dispersionally by V.V. Bogerodick et al. [1975, p.133-1337]. MP 1307 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1307 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1307 Rador water species of glacers for core characteristics. Antarctica Mayemata, P.A., et al. [1970,
Investigation of the LIZ-3 Den Lime Station water supply lake. Kovaca, A., (1990, 10p.) SR 99-11 Present rote strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melbor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Melbor, N., (1989, 62p.) Procent rock temperature Engineering properties of submitting permutirost near Profine Bay. Chamberlain, E.J., et al., (1978, p. 629-63); MP 1006 Procent said Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 629-64); MP 1006 Procent said Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 629-64); MP 1006 Procent said Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 629-64); MP 1006 Procent said Design considerations for autificids in NFRA. Croy., F.E., et al., (1973, p. 629-64); MP 1006 Procent said Low temperature automotive emissions. Courts, H.J., (1991, 2 vols.) MP 1703 Gas thermotography Vapor pressure of T.NT by gas chromatographs. Leggett, MP 1703 Gas inclusions Continuous monitoring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 101-105). MP 851 Gas inclusions Continuous monitoring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 101-105). MP 851 Gas inclusions Continuous monitoring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 101-105). MP 851 Gas inclusions Continuous monitoring of total dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 101-105). MP 851 Gas inclusions Continuous monitoring of stotal dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 101-105). MP 851 Gas inclusions Continuous monitoring of stotal dissolved gases, a feasibility study. Jenkins, T.F., (1975, p. 955-61). AP 1995 Gas inclusions Continuous monitoring of stotal dissolved gases, a feasibility study. Jenkins, T.F., (1979, p. 955-61). AP 1995 Gas inclusions	Scienced examples of radiosim resourcity surveys for geocechmical exploration. Horistra, P., et al., 1977, 1693. SR 77-01. Geophysics in the study of permulsiost. Scient, W.J., et al., 1979, p.93-1157. MP 1366. Electromagnetic survey in permulsiost. Scientina, P.V., et al., 1979, p.33-179. SR 79-14. MP 1366. Electromagnetic survey in permulsiost. Scientina, P.V., et al., 1979, p.30-213. MP 1623. Subsen permulsiost study in the Benufort Sci., Alinda. Sci., Electrical resourcing of floaten ground. Account. SA., 1979. p.30-213. MP 1623. Subsen permulsiost study in the Benufort Sci., Alinda. Sci., Electrical Sci., 2019. p. 207-213. MP 1991. Geophysics of subglacial geology at Dye. J. Gerenhod. Jerck., K.C., et al., 1995, p.105-1109. MP 1991. Workship on Permulsion Geophysics. Golden. Colorado, 23-24 October 1982. Benum. J., ed., 1995, 113-25. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating season-free same grains and season-free variations. Jerk., K.C., et al., (1990), p.217-123-3. MP 2001.	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularones of the bed of an ex-sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. MP 1009 Issa, Greenland, glacer freezing study. Ashton, G.D., (1978, p.256-764). MP 1174 Utrasonic investigation on ice cores from Antarctica, Robert, H., et al. [1979, 1963]. CR 29-10 Glacer mechanics. Mellor, M., [1992, p.455-474]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Jerck, K.C., [1965, p.242-251]. MP 1807 Recent flactor-volcano interactions on Mt. Redoule, Alman. Sturn, M., et al. [1998, 1994]. MP 3431 GLACIER ICE Soon and see on the earth's surface. Mellor, M., [1964, 1872]. MI-CI Characteristics of the cold reposits. Gerdel, R.W., [1969, 1872]. MI-CI Characteristics of the cold reposits. Gerdel, R.W., [1964, 1872]. MI-CI Cut and other vologe studies on natural see. Onesdger, H., et al., [1972, p. D70-D92]. MP 1602 Depth of water-filled creasures that are closely spaced. Robin, G. 64, O., et al., [1972, p. 817-81]. MP 1602 Charges in the composition of atmospheric precipitation. Craps. J.H., et al., [1972, p. 817-81]. MP 1602 Charges in the composition of atmospheric precipitation. Craps. J.H., et al., [1972, p. 817-81]. MP 1002 Charges in the composition of atmospheric precipitation. Craps. J.H., et al., [1972, p. 87-845]. MP 1017 Radar mane speech in polar glaciers. Jerck, K.C., et al., [1973, p. 87-845]. MP 1017 Radar mane speech in polar glaciers. Jerck, K.C., et al., [1973, p. 87-845]. MP 1002 Radonical on artistic glacier see. Mellor, M., et al., [1994, p. 77-11]. MP 1804 Particular on atmospheric precipities. Assection. Majernals, P.A., et al., [1990, p. 11-19]. MP 2007 Glacter mans hollance.
Investigation of the LIZ-3 Don Lime Station water supply like. Kovaca, A., (1990, 10p.) Rose Strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melloc, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Scillann, P.V., (1999, p.118-190) Process rock temperature Engineering properties of solomatine permaterost near Pruthor. Bey. Chamberlain, E.J., et al., (1978, p.629-83)5; MP 1164 Process unid Design consolderations for artificids in NPRA. Cross, F.E., et al., (1978, p.441-458). MP 1006 Process value. Effects of ice on coal monoment was the inland waterways. Limardon, V.J., et al., (1981, 72p.). SR 81-13 Fools Low temperature automotive comissions. Courts, H.J., (1993, 2 vols.). Gas chromotography. Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.53-90). Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T	Scienced examples of radiosin resourcity surveys for geotechnical exploration. Horistra, P., et al., [1977, 1683] Geophysics in the study of permations. Scient, W.J., et al., [1979, p.93-115] Dectromagnetic survey in permations. Scientain, P.V., et al., [1979, p.33-17] Electrical resourcity of floren ground. Account, S.A., [1974, p. 32-37] Sibility of the Beneficial Scientain, P.V., et al., [1976, p.32-37] Sibility permations study in the Beneficial Sci., Alinka. Scientain, P.V., et al., [1979, p.207-215] MP 1623 Subsets permations study in the Beneficial Sci., Alinka. Scientain, P.V., et al., [1987, p.207-215] MP 1623 Subsets permations study in the Beneficial Sci., Alinka. Scientain, P.V., et al., [1987, p.105-110] MP 1991 Geophysics of subglacial geology at Dye. J., Gerenland. Jerck., K.C., et al., [1993, p.105-110] MP 1992 Review of methods for generating synthetic securegrams. Peck., L., [1993, 1992] Frequention of geophysical bacehole site with ground sec., Fartharks, A.K. Delancy, A.J., [1987, 1593] SR 87-87 Antiferic see sheet benghiness temperature variations. Scient., K.C., et al., [1990, p.217-223] Germany Sannial amounts and sinew depths in Germany and NEUSA. Bases, R.E., et al., [1994, p.107-117] MP 2001 Measich Frotes precapitation and weather, Munchen Raem, West Germany. Biletin, M.A., [1984, 4793] Glocal deposits. Influence of strengularities of the bed of an see sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-154] Schments of the western Malannika Glacier. Lasson, D.E., [1979, 1129] Pebble constitution see and glacial deposits. Lasson, D.E., [1979, 1129] Deposits in the margin of the Malannika Glacier, Alinka Lasson, D.E., [1981, p.22-25] Direct filtration of streamborne glacial set. Ros., M.D., et al., [1982, p.279, KOO] Direct filtration of streamborne glacial set. Ros., M.D., et al., [1982, p.279, KOO] Direct filtration of streamborne glacial set.	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. No P 1600 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.25-244]. MP 1174 Utrasonic investigation on ice cores from Antarctica, Robert, H., et al. [1979, 106]. CR 29-10 Gacer mechanics. Mellor, M., [1992, p.455-475]. MP 1532 Borchole geometry on the Greenland and Antarctic ice sheets. Iceck, K.C., [1965, p.242-251]. MP 1532 Recent glacer-volcano interactions on Mr. Redoule, Almka, Sturix, M., et al. [1998, 1894]. MP 3431 GLACIER ICE Show and see on the earth's surface. Mellor, M., [1964, 1872]. MP 3431 Glacier lee Influence of strengularities of the bed of an see sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. MP 1600 C-14 and other isotope studies on naturalistic Occupant, H., et al. [1972, p. 343-343]. MP 1602 Orphod water-filled cressues that are closely spaced. Robin, G. de Q., et al. [1972, p. 917-91]. MP 1602 Otages in the composition of atmospheric precipations, G. de Q., et al. [1972, p. 917-91]. MP 1602 Otages in the composition of atmospheric precipations, G. de Q., et al. [1972, p. 917-91]. MP 1602 Changes in the composition of atmospheric precipations, G. de Q., et al. [1972, p. 917-91]. MP 1602 Dispersionally by V.V. Bogerodick et al. [1975, p.133-1337]. MP 1307 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1307 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1807 Rador water species in polar glacers. Ferck, K.C., et al. [1975, p. 133-1337]. MP 1307 Rador water species of glacers for core characteristics. Antarctica Mayemata, P.A., et al. [1970,
Invisingation of the LIZ-3 Den Line Station water supply labe. Kovaca, A., (1990, 10p.) From rock strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Methor, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. Scilmann, P.V., (1989, p.139-190). Process rock temperature Engineering properties of submitting permations near Profilese Bey. Chamberlain, E.J., et al., (1978, p.629-63); MP 1004 Process mad Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.629-63); MP 1004 Process mad Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1004 Process mad Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1004 Process mad Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1004 Process mad Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); MP 1004 Process mad Design considerations for airfields in NPRA. Croey, F.E., et al., (1973, p.621-65); Ges temperature autoentories rimissous. Courts, H.J., (1993, p.661-65); Ges chromosters of TNT by gas chromatographs. Leggers, D.C., (1977, p.83-60). Ges inclusions Continuous mentioring of total dissolved gases, a feasibility study. Jeakins, T.F., (1975, p.101-105). MP 851 Gas inclusions in the Antarctic tee sheet. Good, A.J., et al., (1975, p.510-61). MP 851 Gas inclusions in the Antarctic tee sheet. Good, A.J., et al., (1975, p.55-61). MP 851 Equations for determining the gas and below solutions in sea see samples. Cot., G.F.N., et al., (1973, p.50-61). MP 265 Equations for determining gas and below solutions in sea see samples. Cot., G.F.N., et al., (1973, p.70-11). MP 265 Genes Trace gas analysis of Arctic and subarctic atmosphere. Morrmann, R.P., (1971, p.199-201, MP 205. MP	Scienced examples of radiosim resourcity surveys for geocechmical exploration. Horistra, P., et al., 1977, 1693. SR 77-01. Geophysics in the study of permulsiost. Scient, W.J., et al., 1979, p.93-1157. MP 1366. Electromagnetic survey in permulsiost. Scientina, P.V., et al., 1979, p.33-179. SR 79-14. MP 1366. Electromagnetic survey in permulsiost. Scientina, P.V., et al., 1979, p.30-213. MP 1623. Subsen permulsiost study in the Benufort Sci., Alinda. Sci., Electrical resourcing of floaten ground. Account. SA., 1979. p.30-213. MP 1623. Subsen permulsiost study in the Benufort Sci., Alinda. Sci., Electrical Sci., 2019. p. 207-213. MP 1991. Geophysics of subglacial geology at Dye. J. Gerenhod. Jerck., K.C., et al., 1995, p.105-1109. MP 1991. Workship on Permulsion Geophysics. Golden. Colorado, 23-24 October 1982. Benum. J., ed., 1995, 113-25. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating synthetic season-grains. Peck. L., (1993), 199-3. SR 85-85. Review of methods for generating season-free same grains and season-free variations. Jerk., K.C., et al., (1990), p.217-123-3. MP 2001.	beck, S.C., et al. [1971, p.237-243]. MP 9993 Influence of irregulariours of the bed of an ace sheet on deposition rate of rdl. Nobles, L.H., et al. [1971, p.117-126]. NP 1009 Issa, Greenland, glacer freering study. Ashen, G.D., (1978, p.256-764]. MP 1176 Utrasenic investigation on ice cores from Astarctica, Robert, H., et al. [1979, 169]. CR 29-61. Glacer mechanics. Mellor, M., [1992, p.455-474]. MP 1532 Beechole geometry on the Greenland and Astarctic ice sheets. Jetel, K.C., [1995, p.242-251]. MP 1017 Recent glacer-volcano interactions on Mr. Redoule, Alisha, Sturn, M., et al. [1998, 1994]. MP 2431 GLACIER ICE Soon and see on the earth's surface. Mellor, M., [1944, 1872]. MP 1407. Characteristics of the cold regions. Gerdel, R.W., [1949, 319]. Glacier lee linfluence of stregularious of the hed of an see sheet on deposition rate of till. Nobles, L.H., et al., [1971, p.117-126]. MP 1609 C-14 and other sustope studies on natural see. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-14 and other sustope studies on natural see. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-15 and other sustope studies on natural see. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-15 and other sustope studies on natural see. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-15 and other sustope studies on natural see. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-15 and other sustope studies on anistrature. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-15 and other sustope studies on anistrature. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-15 and other sustope studies on anistrature. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-16 and other sustope studies on anistrature. Oschger, H., et al., [1972, p. 170-D92]. MP 1609 C-16 anison, D.E., et al., [1972, p. 170-D92]. MP 1609 Osciger sustopes in the basal zone of Matamisha Glacer. Lausen, D.E., et al., [1972, p. 170-D92]. MP 1807 Radar wave speeds in polar glacers. Jerek, K.C., et al., [1985, p. 199-D92]. MP 1807 Radar wave spee
Investigation of the LIZ-3 Don Lime Station water supply like. Kovaca, A., (1990, 10p.) Rose Strength Blasting and blast effects in cold regions. Part 3 explosions in ground materials. Melloc, M., (1989, 62p.) Strength of soils and rocks at loss temperatures. SR 99-15 Strength of soils and rocks at loss temperatures. Scillann, P.V., (1999, p.118-190) Process rock temperature Engineering properties of solomatine permaterost near Pruthor. Bey. Chamberlain, E.J., et al., (1978, p.629-83)5; MP 1164 Process unid Design consolderations for artificids in NPRA. Cross, F.E., et al., (1978, p.441-458). MP 1006 Process value. Effects of ice on coal monoment was the inland waterways. Limardon, V.J., et al., (1981, 72p.). SR 81-13 Fools Low temperature automotive comissions. Courts, H.J., (1993, 2 vols.). Gas chromotography. Vapor pressure of TNT by gas chromatographs. Leggett, D.C., (1977, p.53-90). Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T.F., (1975, p.101-105). MP 915 Gas inclusions. Continuous monitoering of total dissolved gases, a feasibility study. Jenkim, T	Scienced examples of radiosim resourcity surveys for geocechmical exploration. Horistra, P., et al., [1977, 1683] Geophysics in the study of permulsion. Sect., W.J., et al., [1979, p.93-115] Electromagnetic survey in permulsion. Sellmann, P.V., et al., [1979, p.33-17] Electromagnetic survey in permulsion. Sellmann, P.V., et al., [1979, p.32-17] SR 79-14 Electromagnetic survey in permulsion. Sellmann, P.V., et al., [1979, p.32-17] SR 79-18 Electromagnetic study in the Benufort Sea, Aliaka. Sellmann, P.V., et al., [1979, p.20-21] Sheap permulsion study in the Benufort Sea, Aliaka. Sellmann, P.V., et al., [1997, p.20-21] Geophysics of subglacial geology at Dye. J. Gerenhod. Jerek. K.C., et al., [1995, p. 109-110] Workshop on Permulsion Geophysics, Golden, Colorado, 23-23 October 1984. Brown, J. ed., [1995, 117] SR 85-05 Review of methods for generating synthetic sensingrams. Peck. L., [1995, 1997] Preparation of geophysical beechole site with ground see. Farbarks, AK. Delaney, A.J., [1997, 1394] Antiserie see sheet begittiness temperature variations. Jorch. K.C., et al., [1990, p. 217-223] Germany. Sonosial amounts and show deeplys in Germany and NELSA. Bates, R.E., et al., [1998, p. 107-117] MP 2001 Mentology proposition. MA, [1984, 479] SR 86-32 Glacial deposits. Influence of surgularities of the bed of an see sheet on deposition rice of till. Nobles, L.H., et al., [1971, p. 117-118] MP 1009 Sediments of the western Matannika Glacier. Alaska. Lawson, D.E., [1991, p. 279-854] Diametons at the margin of the Matannika Glacier, Alaska. Lawson, D.E., [1991, p. 279-854] Diametons at the margin of the Matannika Glacier, Alaska. Lawson, D.E., [1981, p. 279-869] Direct filtration of streamborne glacial set. Ross, M.D., et al., [1992, 179] Pobble observants from of the Matannika Glacier, Alaska. Lawson, D.E., [1992, p. 279-869] Direct filtration of streamborne glacial set. Ross, M.D., et al., [1992, 179] Pobble follor in an sec-safted diameton. Demaid, E.W., et al., [1992, p. 279-861]	beck, S.C., et al. [1971, p.237-243]. MP 993 Influence of irregularious of the bed of an ace sheet on deposition rate of rall. Nobles, L.H., et al. [1971, p.117-126]. MP 1000 Issa, Greenland, glacer freezing study. Ashson, G.D., (1978, p.25-244]. MP 1174 Utrasonic investigation on ice cores from Astarction, Robert, H., et al. [1979, 106]. CR 29-10 Gacer mechanics. Mellor, M., [1992, p.455-475]. MP 1532 Borchole geometry on the Greenland and Astarctic ice sheets. Iceck, K.C., [1965, p.242-251]. MP 1532 Recent glacer-volcane interactions on Mt. Redoubt, Almka, Sturik, M., et al. [1998, 1894]. MP 3431 GLACIER ICE Soon and see on the earth's surface. Mellor, M., [1964, 1879]. MI-CI Characteristics of the cold reposis. Gerdel, R.W., [1964, 1879]. MI-CI Characteristics of the cold reposis. Gerdel, R.W., [1964, 1879]. MI-CI Characteristics of the cold reposis. Gerdel, R.W., [1964, 1879]. MI-CI Characteristics of the cold reposis. Gerdel, R.W., [1964, 1879]. MP 1600 C-14 and other isotoge studies on nateralistic Oscillar, H., et al., [1972, p.17-126]. MP 1602 Depth of materified cressuss that are closely spaced. Robin, G. de Q., et al., [1972, p.513-543]. MP 1602 Charges in the composition of atmospheric precipitation, G. de Q., et al., [1972, p.97-843]. MP 1602 Charges in the composition of atmospheric precipitation, Crapix, 114, et al., [1972, p.97-843]. MP 1602 Charges in the composition of Mataniska Glacer. Lanson, D.E., et al., [1972, p.97-843]. MP 1602 Charges in the composition of atmospheric precipitation, Crapix, 114, et al., [1972, p.97-843]. MP 1603 Charges in the composition of atmospheric precipitation, Little, p. 1973, p. 133-31. Redoughtessdags by V.V. Bogorodick, et al., [1975, p.133-31]. Dominion Range see core characteristics, Antarctica Mayerski, P.A., et al., [1980, p.13-12]. MP 1603 Clarter man balance. Finetiaty and estraplisactary event records in polar see caps. Jeffer, E.J., et al., [1980, p.13-12]. MP 1603 Reconsiglators of core characteristics, Antarctica Mayerski, P.

Clades military forces	Effects of inambusian on six varieties of purigram. Erbisch,	Winner marginal ice zone experiment, From Strait i Greenland
Glader melting (cont.) Subscript sediment flow of the Matanuska Glacier, Alaska.	F.H., et al., (1962, 25p.) SR 82-12	Sea, 1987/89. Decideon, K., ed. (1994, 53p.)
Lauren, D.E., (1962, p.279-100) MP 1006 Glader excitation	Effects of soil covers on late-full seedings of four tall fescue varieties. Palazzo, A.J., (1992), 5p.; SR 89-17	Coupled ice-mised toper model for the Greenland Sea.
Gindology's grant unsolved problem. Westman, J., (1976, p.284-216) MP 1056	Gravel Selected examples of radiohm resistivity surveys for geotech-	Housain, M.N., (1966, p. 225-240) SIP 2143 Physical peoperties of summer sea ice in the Frant Strait, June-
Deposits in the placial environment. Lausen, D.E., (1961,	meni exploration. Hockstra, P., et al. (1977-169.) SR 77-01	July 1944. Gom, A.J., et al., [1967, \$19.; CR 87-16.
Saw oner and glacier variations. Collects, S.C., etc.	Reventation at two construction sites in New Hamphine and	Marybetrgy of the North Stope. Walter, M.L. (1971, p. 49.
(1999, 111p.) MP 2672 Clarier serieces	Alieka. Palezas, A.J., et al. (1900, 21p.) CR 80-03 Plant growth on a gravel soil: precahouse studies. Palezas,	525 MP 1006 Proposed size elumination for the restore of from earth
Jikuihing involving a potholod glacier in AK. Storm, M.,	AJ, n al. [191], Sp. 1	materials. McGow, R., (1975, 1983 SEP 921
ct at, (1999, p.125-126; MP 2766 Glader surveys	Management of morthern gravel sites for successful reclaim- tion: a review — Johnson, L.A., (1967, p.535-536)	Ou the origin of pingos—a comment. Mockey, FR., 21976, p.295-296; SIP 916
Rulio echo sounding in the Allin Hills, Astroctica. Koraco, A., p1900, 9p. 2	MP 2375 Grazing	Pipeline hand road between Livengood and the Yukon River. Berg, R.L., et al., [1976, 719.] SR 26-11
Bibliography on placers and permateust, Chan, 1938-1979.	Word model of the Barrow consystem. Boson, J., et al., 1970, p.41-43; MP 943	Segregative-freezing temperature as the cause of ruction
Shex, J., ed. (1912, 449.) SR 82-30 Glader thickness	Software of grazing on Arctic tundra ecosystems. Butth,	Periodic structure of New Hampshire wit in open-oppiess
Radio echo sounding in the Alisa Hills, Astroctica. Kornes, A., §1900, 9p.; SR 80-23	GO., et al. (1976, p.153-160; MP 970 Great Lakes	feering. McGon, R., (1977, p.129-134) MP 902. Segregation feering as the counc of suction force for feet
Gloders	Effect of vessel size on shorelines along the Great Listes clean-	Securition. Takagi, S., (1978, p.45-52) SOP 1001
Sciunic exploration in cold regions. Roethloberger, H., 41972, 130p.; M. H-Ažu	Water quivey during winter over annigation session. Sixt-	Segregation freezing as the count of suction force for ice lens formation. Takagi, S., (1978, 1364) CB 78-06
Water flow through versus in ice. Collects, S.C., § 1976, Sp. CR 76-96	tet, R.S., (1968, 56p.) SR 88-10 Simulation of oil sinchs in rivers and lakes. Shee, H.T., et al.	Determination of unforces water in fereen soil by pulsed author magnetic resonance. Tice, A.R., et al. (1978,
Hydrodic transfers: a seamic source is volcanors and gla-	(1996, 29 ₇₋₁ CR 90-0)	p.149-1553 307 1097
ders. St. Limence, W.F., et al., (1979, p.654-654) MP 1181	GREENLAND Methods of building on permanent susuaficids. Meline, M.,	Remote sensing of massive see in permuloset along pipelines in Alman. Kovacs, A., et al., (1979, p.266-279)
Dynamics of soon and see masses. Collects, S.C., et., 1980, 446p.; MP 1297	(1946, 4)p.; M III-Ale	MP 1175 Electromagnetic survey at permilions. Sellmann, P.V., et al.
CLACIOLOGY	Gerentinal elimate changes shown by ice over. Dangasel,	(1979, 1 ₇₄₎ SR 79-14
Saws and ice on the earth's surface. Melior, M., (1964, 1639s) M II-CI	W., et al. (1971, p.17-22) MP 998 Oxygen motope profiles through ice sheets. Johnsen, S.J., et	Freshwater pool et lar-detected near an Alukan river delta. Koracs, A., et al., [1979, p.161-164] MP 1236
Cladding	st. (1972, p.429-434) MP 997	Eccomagnetic surveys of permulant. Account S.A., et al., [1979, 24p.; CR 79-23
Soom and ice. Colheck, S.C., et al., \$1975, p.435-441, 475- 487; 30P 864	Souly of piles installed in polar snow. Koracs, A., (1976, 1924). CR 76-23	Drilling and corne of forces ground as northern Alaska.
Durish deep dell, peopless report: Feleusry-Match 1979. Rand, J.H., §1910, 37p.; SR 80-03	Vacadisms and other elements in Greenland see cores. Her- ron, M.M., et al., §1976, 49.3 CR 76-24	Spirig 1979 - Lausser, D.E., et al. (1986, 14p.) 58: 88-12
1979 Greenland lee Sheet Program. Plane I caning opera-	Gendetic processes of herehole sites in Gerestand. Mock,	Steenight of traces site as a function of tre content and dry unit weight. Surfey, F.H., et al., §1900, p. \$09-119;
sion. Rand, J.H., [1910, 13p.; SR 80-36 Cold Regions Science and Technology Bibliography. Cam-	S.J., (1974, 7p.) CR 76-81 Assumption trace metals and suffice in the Gerenhard Ice	30F 1451
mings, N.H., (1991, p.73-75; MP 1372) Deposits in the glacial environment. Lansac, D.E., (1901,	Sheet. Herron, M.M., et al. (1977, p.915-929)	Numerical solutions for equivace model of recordary from heree. O'Nell, K., et al., (1990, p.654-449)
(4p.; CR 81-27	Vanadism and other elements in Gorenhaul see poets. Her-	30° 1454
Bibliography on glaciers and permateus; China, 1938-1979 Shen, J., ed., g1952, 44p4 SR 82-20	rot, M.M., et al. (1977, p.98-102) MP 1092 1979 Greesland Lee Sheet Program. Phase 1: caming opera-	Comparative evaluation of front-succeptibility tests. Cham- berlain, E.J., §1981, p. 42-52; SIP 1406
Proceedings of the Symposium on Applied Guessings, Ind.	time Rand, J.H., glyse, 1963 SR 98-36	Dispersion of model subsurface radar guines at complex dis- lectrics. Accord. S.A., (1991, p.855-944) 30P 1472
Georgial assaugations using the synthetic operator radio	Application of a numerical sea ice model to the East Goess- land sees. Tucker, W.S., (1991, 1995). MP 1535	Conferment of the material section of the Conferment of the Confer
imaging system - Bendschadler, R.A., et al., (1987, p.11- 19; - MP 2342	Application of a numerical sea see model to the East Goren- land seen. Tucker, W.B., g1912, 40p.; CR 82-16	lanced stage of the formation of ambitudes are lesses. Takage,
Almia synthetic aperture eathe (SAR) facility project. Car- sec, F., et al. (1917, p.59)-599. SRP 2008	Developing a water well for the are backfilling of DYE-:	S., (1952, p.223-232) MP 1966 Electrical properties of favora ground, Point Burrow, Almka
sey, F., et al., (1987, p.593-599; 36P 2008 Grain since	Rank J.H., (1992, 1993) SR 82-32 Radio wave speeds in polar glacies. Jerek, K.C., et al.	Assembly S.A. of all (1982), p.685-8921 30P 1572
Antectic sed statics using a semining election interscope Kumai, M., et al. (1978, p.106-117) MP 1306	(195), p.195-266; MP 2057	Transport of water in forces and, Part 1 Nations, Yuet al., 1992, p.221-226; Soft 1429
Gam distants wer same Collects, S.C., (1979, g.)?!	Descriptive concrete panels on buildings at Soulitestron, Greenland, Archones, C., (1994, 11p.) SR 84-12	Effects of ace on the water transport or favoren and Nobano, Y, et al. (1983, p. 15-26; NOB 1001
1945 MP 1267 Influence of gram sure on the ducators of see Cole, D.M.,	Calculating borehole geometry — Serch, K.C., et al., (1994, 1973 — SR 94-15	Relationship between ace and unforces water in forces soils.
[1984, p.150-157] MP 1686 Gram size and the conspressive strength of see Cole, D.M.,	lee flow leading to the deep core hole at Dye J. Greenland.	Tire, A.R., et al. (1913, p.37-16; MP 1632 lee-corel mounds at Sukalpak Mountain, Brooks Range,
(1965, p.220-224) 34P 1856	Whites, I.M., et al., (1994, p.185-199) MP 1824 Secondary stress within the structural frame of DVE-3 1972.	\$500 E. J. et al. (1913, p. 91-96) MP 1063
Grain size and the compressor strength of see Gole, D.M., (1985, p.369-374) MP 1907	1993 Eccla, H.T., et al. (1994, 447). SR \$4-36 Borch-fe co-mercy on the Greenhad and Assures: see	Geombics in personally from relaterate, northern Alman Linuxes, D.E., (1993), p.595-300; MP 1661
Crack medication in polycrystalline see	sheets Herek, K.C., (1995, p.242-251) MP 1817	Seasone velocities and subsea permations in the Bernfort Sea, Alaska Neave, K.G., et al., (1988, p.884-1989)
Mechanical properties of multi-year seasor. Rudical-Meaga-	Geophysics of subglacial geology at Dye 3, Greenland Seach, K.C., et al., 1985, p. 165-1165. MP 1941	30P 144\$
JA, ct al. (1993, 17p) CR 88-05 Gennes	Descriptives building panels at Sondrestron, Gerentand	Two-dimensional model of coupled here and monthing trans- port or frost heromy soils - Guymon, G.L., et al., [1964]
Urban water as a source of heavy metals at land treatment filameter, I.K., (1976, p.417-47); MP 977	Characterization entragations using the synthetic aperture radia	p 91-95; SOP 1678 Sample model of are repressions some an analysis function to
Effects of materials application on beings granes. Palazzo,	magnig system - Bindscholler, R.A., et al., (1997), p.11- 19; - MP 2342	model here and notice meet from Histographic, T.V., II, et al., (1984, p. 48-184).
Al. (1974, 5p.) CR 75-39 Effects of unitenance on the growth and chemical componi-	US global are over research program West Assurence and	Effects of ace content on the transport of water on finder ands.
tion of Georges - Palazzo, A.J., (1977, p.121-150). MP 975	-Camp Centery	Values, Y., et al. (1984) p. 19-34; 30P 1001 Congressor strength of froten wit. Thu, Y., et al. (1984)
Adaptabiles of locage granes to wantewater employee	Camp Century survey 1994 - Gundestrup, N.S., et al., [1995, p. 251-251; MP 2331	7 july MP 1773
Palazza, A.J., et al., §147a, p. 157-163q. MP 1153. Effects of wastewater and shulpt on turigranes. Palazza,	-Casto Toto	First dielectric measurements of frozen aft many VHF police. Accome, S.A., et al. (1984, p. 29-37) MP 1776
AJ, (1976, 1174 SR 78-20	Approach reads, Gerenkand 1955 perspans, ₁ 1949, 199 ₇ ; MP 1522	Dielectric measurements of frozen silt using time domain re- fectionisty Delancy, A.L. et al., (1994, p. 99-46)
Landapphenomed uniterated effect on and and plant pota- sium. Palazzo, A.J., et al. (1979, p. 309-312)	- Dyr 3	MP 1775 Effects of ace content on the transport of water as frozen soil
MP 1228 Rengeration at two countraction rates in New Hampshire and	Folding in the Greenland see sheet Whilliam, I M, et al. 21957, p. 285-293; MP 2185	Salara, V., et al. (1995, p. 1844) MP 1843
Almia Palazza A.J. et al. (1980, 17); CR 2043 Forage grass growth on overland from systems. Palazza.	Goverhand Sea Physical properties of the see cover of the Greenland Sea	ter regregation and from heaving, §1964, 72pg. MP 1800
Al. et al. 1880, p. 345-3841 MP 1002	Model W.F., plant 1794 SR 42-24	Engineering of a regulary model of trost brane. O'Neill, K.,
First position a product producer states. Painte, A1, ct al. (1911, 5p.). SR 81-64	Marginal for Ione Experiment, From Street Governand Sex. 1984 - Johannessex, O.M., ed., (1993, 4°7)	Defector studies of permittent. Atomic, S.A., et al., [1985].
Sexual greath and agains of maneras by organigrous ore-	SR SF-12 Companion of different sea level pressure analysis fields on	p 1.5; MP 1951 Impulse radio sounding of treers ground - houses A, et al.
picel with mixtension - Palaste, A.J., et al., p. 981, 1973 CR 8146	the East Greenland Sea - Tucker, W. R., 1985, p 1684.	12654 p.26-204 MP 1952
Resegration along the trans-Aluka psychne, 1975-1978 Johnson, A.J., 1981, 1157. CR 81-12	Feet Greenland Sea see variabiles en large-scale mobil segu-	Galanic methods for mapping remover scaled features. Sedimum, P.S., et al., §1915, p. 91, 931. MP 1935.
Chena River Lakes Proprie reseptiones sends there-year summary. Johnson, L.A., et al. 1981, 8974	inners Walsh, J.E., et al. (1984, p. \$14) MP 1779 Fluorest properties of season with Greenland Sea. Tucker,	Preparation of prophysical bordists not with ground see, Europaids, UK. Delivery, A.J., 1997, 1894.
CR 81.13	William Strategy MP 1963	SR ST-07
Waterate treatment and plant growth: Palaise, VI., (1982, 11pg SR 8245)	From the ment in the state of t	Berther magnificants of the electronic properties of finers of: hecone, S.A., et al. (1998, p. 916-918) MP 2366

irrand thereing. Pursulant and active layer on a methern Almhan sond.	influence of well ensing muterials on chronest species so ground unter Parker, L.V., et al. (1983, p.459-461)	Growth of factors crystals in a same contr. Collects, S.C., 1992, 1994
Berg, R.L., et al., (1978, p.415-421) MP 1102	MP 3454	Growth of Mach ace, soon are and soon thefaton, solutein
Resiliency of subgrade and during freezing and thanning. Johanna, T.C., et al., §1973, §1983 CR 78-23	Development of a membrane for structure optical detection of TNT Zhang, Yu et al., [1918, 49.] SR 28-24	butins. Lepytenata, M., (1963), p.59-76; SIP 2063. Freezing in a ripe with turbulent flow. Afters, M.R., et al.,
Neuman solution applied to soil system. Lancelini, V.J.,	influence of well crossing composition on trace metals at ground under Heurit, AD (1997, 1994 SR 89-49	(141), p. 103-112; MP 1093
(1960, 7p.; CR 90-)2 Effect of freezing and thawing on resiscan modelin of gram-	Leading of ment pointed took will comp. Hear,	Atmospheric dynamics in the anti-etic imeginal ice trac. Andreas, E.L., et al., §1984, p.649-661; 30P 1667
he soils Cole, D.M., et al. [1981, p. 19-26] 36P 1004	AD, (1992, 11); SR 29-32 Influence of well camps on well water. Hower, AD, et al.	Toward more building Routes measurement. Finaless,
CO2 effect on permutous terrain. Booms, s, et al. (1982).	1997, 564 MP 2717	SN, et al. (1984, 1994) CR 84-01 Measuring thermal performance of building exvelopes: aince
34 _{K3} MP 1546	Well comings for commissioning trace segments on ground water Factor, L.V., et al., §1909, 20pg CR 89-18	case states. Funders, S.N., §1905, 14p.; CR 85-07
Dielectric geogethes of thereof across layers. Acoust, S.A., et al., §1962, p.618-426; SEP 1567	Serface changes in well cannot exposed to require pollutanes.	Energy exchange over anticetic sea set in the spring. An- dress, E.L., et al., (1965, y 7199-7212) 307 1000
Freezing and thomag heat belance integral approximations. Limitediate, V.J., g1913, g.34-37; Sept. 1997	Taylor, S., et al., (1990, 149); SR 90-07 influence of county materials on trace-level chemicals in well.	Heat flow sensors on walls-what can we letter. Finalest,
Governal cor as percentrally favores sediments, methors Almila.	witter Parker, L.V., et al., (1996, 14, 15). MP 2738	S.N., (1915), p. 191-189; MP 2002 Confedence in here first transfered inconvenients of build-
Lausen, D.E., (1993, 7,895-780). SIP 1661	Counted for	stgs. Flanders, S.N., (1965, p.515-531) 36P 2290
Througheacth undered structures on permateut. Larac- dini, V.J., §1903, p.756-755; MP 1642	leveringstoine of the mands on Bubbage Right - Koraca, A., et al., [1971], 44 leaving - MP 1301	In-recommend of two retrofic would less. Funders, S.N., 1994, p. 32-44; MP 2172
Denga supficiency of subsolithming Ashanas, V.C., et al., 1964, 4,45-103. MP 1704	lifereds of grounded see Kornex, A., et al. (1875, p.21). 216; 30P 852	Measuring building Residues with theratography and heat flux sensors. Finalers, S.N., (1987, 1988). SR 87-86.
1964, p.45-103; MP 1706 Design and performance of water-returning embendments in	Souly of a governed Society near Remoter Island, Alaska	scases Funders, S.N., (1947), 1994 SR 87-66 Filterating turbulent surface heat funes over polar, marine
personner. Septen, F.H., (1994, p.31-42) MP 1050	Southern of all the country for the form of a Western	meines. Auben, El., (1911, 74544) MP 3008
Shredine envious processes: Oruell Lake, Messensia. Rest, IR., 1965, 1963; CR 94-32	Problems of offshore oil define as the Besshore Sea. Weller, G., et al., (1973, p.4-11). MP 1250	Measurement of the puth-averaged turbulent surface heat firs. Andreas, E.L., (1998, p.219-229) MP 2526
Throng of ferres clays Anderson, D.M., et al., (1985, p. 1-	Sen see pling at Farmey Rock, Berney Strat, Abaka. Konaca, A., et al., §1951, p.995-1999; MP 1880	Two-contents median of meaning path-mengel turba-
73 MP 1923 Pariet senticione of a three sentement model: Gaymon,	Man balance of a portion of the Ross fee She'll Jerel, E.C.	feat surface heat them. Andreas, E.L., 1999, p.196- 292; 30P 2608
GL, c: £, (195), p. (1-25) MP 1926	er si, (1984, p.381-384; MP 1919 for properties in a grounded manomade for inhad. Cos.,	Occasion heat they as the Frant Street memoral by a defining
Model for distincting constants of froces solds. Cliphans, J.L., 1995, p. 66-57; MP 1926	GFN, est 1996, \$135-162; MP 302	hos Provide D.K. et al. (1999, 3,999-999) 50P 2531
Repeated Soul Likeral senting of fivers and stamped wolk.	Country of anis an art t management of terrors and to	Heat conduction in sizes — Yes, Y.C., (1909, p.21-32) MP 2546
Cole, D.M., et al., (1995), p. 146-176; SIP 3008. Effects of freeze than epides on granular seas for presentation.	Gorating of soils as cold environments is literature secoch. Johnson, R., (1977, 197). SR 77-42	Occasio heat flux in the Fran Strut memored by a defining
Cric D.M. et al. (1964, 74); CR 96-04	Governe silt and sand at less temperatures a laborators suscentiation. Johnson, R., (1979, 1891) CR 2946	From Provide D.K., ct al., (1910, p.291-296, 307-294)
Exact solution for melting of froces and with their consolutions. Languages, V.J., (1907, p. 97-192). 30P 2191	Governg self and sand at low temperatures. Johnson, R.,	Three-wavelength sensitiation measurement of turbulent bear
Exchange althorn macrosis Gold & D.L. et al.	¿1979, p. 437.456; MP 1078 Granth	Sixten Andreas, E.L., (1990, p.74-77) MP 2006 Heat bear
(1967, p.181-183) SOP 2306 Franklines technologi at cold reports. Quant, W.F.,	Analysis of posteriors of printing posterious in timbre growth	Radiation and evaporations bear loss dering are log conditions.
(1447, p.345-358) MP 3425	Some Victoria L.L., et al., (1981, p. 295-354) MP 1433	McFables, T., (1975, p.19-37) MP 1051 Thermal energy and the environment. Cooks, R.L., et al.,
Observations of generative imaginism us thoses with density thursing. Chesg. G. et al., (1988, p.348-315)	Seminal growth and accumulation of L. P. and K by grass	2003), Jan e Da Spag - MP 1400
34P 2373	empted with names. Palazzo, A.J., (1941, 7 64-64). MP 1425	Astroian sen ner dynamics und an possible elimatic effects. Achies, S.F., et al., (1974, p.53-74-) 30P 1379
Freezing and thaming of tools at cylindrical coordinates. Lanachine, V.J., §1919, p. 113-200; 307-2006	Plant growth on a greet well perculosese studies. Palares.	Detecting structural legs bears with mobile unknown thermog-
Physical changes as clays due to front action. Chandrellan, E.J., (1981, p.343-313). MP 2595	A J., et al., (1911), by: Sementing with and update of numerically enchantering min-	capita, Part IV - Monte, R.H., et al. (1976, 974 CR 7633
E.J., (1982, p.363-313). Shoop, S.A., (1982, Vehicle mobiles on through softs. Shoop, S.A., (1982,	profeshancemer Patron Ad. et al. (1981, 1971	Compact desired heat requeences for buildings in cold
14pt SR 99-31	CR 21-00	regions - Bennetti, F.L., (1977, 1179); SR 77-03
	Chesa River Likes Project resegrations study otherwises summary Johnson, L.A., et al. (1991, 1994)	regions Bentett, F.L., (1977, 1179) SR 77-03 Observation and analysis of protected membrane roofing sys- tems. Schuder, D., et al., (1977, 499) CR 77-11
tops SR 89-31 Gound outer longs descript from sufface water and ground water Carey, K.L., g1073, 712-3. M 111-83	Chesa Reser Lakes Propert resognations study - there-year	regions. Bennem, F.L., (1977, 1879). SR 77-03. Observation and analysis of protected membrane cooling systems. Schaeller, D., et al., (1977, 1899). CR 77-11. Measuring sometimed steam use with a condensate pump-circle counter. Johnson, P.R., (1977), 2-849-840.
16pg SR 89-31 Ground outer Longs Acceloped from surface water and ground water Carry, K.L., (167), 21pg M III-85 Fagul offictions of journey senage efficience Control Devels, Manachinesters Surfaceshire, M.R., et al., (1976, 16pg.)	Chem River Lides Propert resognation study—there-year summary—behavior, L.A., et al., §1951, §594 CR 81-16 Vegetation solution and management for occupied from sys- tems—Palazio, A.J., et al., §1951, § §15-154.	regions. Bennem, F.L., (1977, 1839). Servicion and analysis of processed membrane roofing systems. Schaefer, D., et al., (1977, 489). CR 77-11. Messaging sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977, p. 638-64). 389 957.
Tops SR 89.31 Goods where Longs descripted from surface water and ground water Carey, K.L., [1973, 717.5] M III-83 Fagul softension of general sensing efficient at Fort Desens, Manachusetts. Sutterniste, M.R., et al., [1974, 187.6] CR 76-46	Cheza Roser Lokes Propert resegration study—thereeyes summary Johnson, L.A., et al., §1952, 959-3. CR 81-18 Vegetation selection and standard from exclaind from systems—Polazzo, A.J., et al., §1992, 9.135-1542. Mandenster tectomest and plant growth—Polazzo, A.J.,	regions. Bennem, F.L., (1977, 1879). SR 77-03. Observation and analysis of protected membrane cooling systems. Schaeller, D., et al., (1977, 1899). CR 77-11. Measuring sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977, 2-53-454). SRP 957. Remulating old word frame buildings with membrandemide-lyde from. Tologisco, W., et al., (1977, p. 473-487).
tops SR 89-31 Good other Longs developed from surface water and ground water Carry, K.L., (1973, 747); Papel softmation of pursary sensing efficient at Fost Devers, Massachusen. Sumeroline, M.R., et al., (1974, 1974). CR 76-46 Land trestiment of waters not at Massack. Cald, and Quincy, Watengron. Marsack IX, et al., (1977, 1974).	CR \$140 CR \$140 Project resegration study detergor summary. Johnson, L.A., et al., [1991, 1994] CR \$1-16 Vegetation selection and management for overland from ayricana. Palazzo, A.J., et al., [1992, p.135-134] MP 1511 Bandenider measures and plant growth. Palazzo, A.J., [1992, 2174]. SR \$2-65.	regions. Bennem, F.L., §1977, 1839; SR 77-03. Observation and analysis of processed membrane cooling systems. Schaefer, D., et M., §1977, 809; CR 77-11. Messaging summered steam use with a condensate pump-cycle counter. Johnson, P.R., §1977, p. 638-643; MP 957. Remarking old model frame buildings with mess-demolderyle from. Johnson, B., et M., §1877, p. 638-657; 347-958.
I dept SR 89-31 Goodel water Longs descloped from surface water and ground water Carry, K.L., [1973, 717.5] M 111-83 Fapul inflimation of general sensing efficient at Fost Desens, Manachistens. Sutternation, M.R., et al., [1974, 187.5] CR 76-86 Land treatment of waterwater at Manaca, Cald., and Opinio, Wathington. Infancial U.S., et al., [1977, 187.5] CR 77-26	Chema River Lukes Propert resognation study—thereeyess summary—blusson, L.A., et al., [1991, 959-]. CR 81-18 Vegetation selection and examplement for overland flow systems—Palazzo, A.J., et al., [1992, 9.135-154]. Mantenater treatment and plant growth—Palazzo, A.J., [1992, 157-15]. SR 82-05 Effects of municipies on on symmetry of surfaces. Ethica, E.P.L., et al., [1902, 159-2]. SR 82-15	regions. Bennem, F.L., (1977, 1879). SR 77-03. Observation and analysis of protected membrane cooling systems. Schaeller, D., et M., (1977, 1879). CR 77-11. Measuring sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977, 2-53-64); MP 997. Remulating old wood frame buildings with membrandomaldohyde from. Johnson, W., et al., (1977, p.475-645); MP 998. Infrared thermography of buildings. Mines, R.H., et al., (1977, 179); SR 77-03.
Logg SR 89-31 Lound unter Longs dereloyed from surface water and ground water Cacey, K.L., (1973, 71g) M 111-89 Fagul officenties of journey senspectifiers at Foot Devera, Manuclesters. Surrending, M.R., et al., (1976, 1953, Land treatment of untersions at Manueca, Cald, and Opmey, Washington. Marshin Th. et al., (1971, 1974, CR 77-26 Fresh unter supply for an Abidan village. McFadde, T. et al., (1972, 1954) SR 78-97	CR \$140 Chem River Lakes Project resegration study—ferences summary—lehanon, L.A., et al., [1981, 1994] CR \$1-16 Vegetation selection and management for oscilant flow systems—Palario, A.I., et al., [1982, p. 135-136] Bandesider treatment and giant growth Palario, A.I., [1992, 2194] Lifetts of municipies on not squarties of studgms—left and, [1992, 2194] Bandesider applications in Societ ecosystems—Malario, Malario, Malario	regions. Bennem, F.L., e[1977, 1819; SR 77-03. Observation and studying of processed memberne cooling systems. Schaefer, D., et M., e[1977, 489; CR 77-11. Messaging sometimed steam use with a condensate pump cycle counter. Johnson, P.R., e[1977, p. 638-452]; MP 957. Remarking old wood frame buildings with mendermide-layer from. Johnson, B., et M, et
Idea SR 89.31 Good water Longs descioned from surface water and ground water Carey, K.L., [1973, 717.5] M BIL-83 Papel softeninos of postary senspe efficient at Fort Deseas, Mastachiston Sumerwhee, M.R., et al., [1974, 187.5] CR 76-48 Land trestiment of waterwhee at Mastera, Cale, and Quincy, Washington Harnelm IX et al., [1977, 147.5] Fresh water supply for an Alman village McFadden, Y et al., [1978, 187.5] SR 78-67 Village GCMS analysis of water in the Masters regulation	Chema River Lakes Propert resegrations study—thereeyes summary—blusson, L.A., et al., [1981, 1994] CR 81-18 Vegetation selection and stategement for oscilland flow systems—Palazio, A.J., et al., [1992, p.135-134] Mandemater incoment and plant growth—Palazio, A.J., [1992, p.135-134] Mandemater incoment and plant growth—Palazio, A.J., [1992, 137] Chem. of structures on no summary of infigures—Library, F.H., et al., [1992, 1992, Mandemater applications in Societ economics. McKnin, 1982, et al., [1982, 139] Vegetations in two adjacent times kelekute, members Andala.	regions. Bennem, F.L., (1977, 1879). Servicion and analysis of processed membrane roofing systems. Schaefer, D., et al., (1977, 1879). CR 373-11. Measuring sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977, 2-53-44); 309-957. Remailating old wood frame buildings with membranderhilde-lyde from. Johnson, W., et al., (1977, p.475-483); July 956. Islanded thermography of buildings. Suns, R.H., et al., (1977, 179); Infrared thermography of buildings. Music, R.H., et al., (1977, 179). July 777, 1797. Infrared schemography of buildings. Music, R.H., et al., (1977, 179). Diermal schemography of buildings.
Idea SR 89-31 Cound unter Lings Accelepted from surface water and ground water Cacep, K.L., (1973, 71); M. 111-85 Fapul selferation of pennary sewage efficient at Foot Deseas, Just and section of Surreschief, M.R., et al., (1976, 34); CR 70-46 Land treatment of water water at Manneau, Cald, and Owney, Washington. Ideascher IA. et al., (2977–34); CR 77-26 Fresh water supply for an Alindau village. McFalles, Y. et al., (1978, 18); SR 78-87 Village GCMS aradista of under in the Manneau regoliet. Anderson, D.M., et al., (1973, p. 53-81). MP 1195 Rithographs on techniques of users detection to old regions.	CR \$140 CR \$140 Separate respections study decrease summary. Johnson, L.A., et al., [1991, 1994] CR \$140 Vegetation software, L.A., et al., [1991, 1994] CR \$140 Vegetation software and management for occalizations systems. Palazzo, A.I., et al., [1992, p. 135-136]. Basiconater measurem and plant growth. Palazzo, A.I., [1992, 2194]. SR \$246 Effects of municipies on set stratures of tentimes. SR \$246 Effects of municipies on set stratures of tentimes. SR \$246 Effects of municipies on set stratures of tentimes. SR \$246 Effects of municipies on set stratures of tentimes. SR \$245 Effects of municipies on second consequences. SR \$249 Vegetation on two adjacent travels habitate, nontract, Alaska, Roode, D.A., [1991, p. 1994-1645]. MP 2004	regions. Bennem, F.L., e[1977, 1839; SR 77-03. Observation and analysis of processed membrane cooling systems. Schaefer, D., et M., e[1977, 489.; CR 77-11. Messaging summered steam use with a condensate pump cycle counter. Johnson, P.R., e[1977, p. 638-452]; MP 957. Remarking old wood frame buildings with wea-dormalde-layer from Johnson, W., et al., e[1977, p. 478-4517]. SP 998. Istraned thermography of buildings. Sumon, R.H., et al., e[1977, 179.; SR 77-29]. Intraced thermography of buildings. Sumon, R.H., et al., e[1977, 279.; SR 77-36]. Dermal scanning systems for detecting building lett loss. Good, R.A., et al., e[1975, p. 871-879].
Ideal SR 89.31 Ideal water Lings derefored from unface water and ground water Care, K.L., (1973, 717); Million Papel officiations of pursary senage efficient at Fort Devena, Manuachusetti. Satternésie, M.R., et al., (1974, 187); (R 70-48 Land treatment of waterwater at Manueca, Cald., and game, Wathington. Islander I.K. et al., (1977, 187); (R 77-26 Fresh water supply for an Abulaux village. McFadden, Y. et al., (1978, 187); (R 78-26 Fresh water supply for an Abulaux village. McFadden, Y. et al., (1978, 187); (R 78-26 Fresh water supply for an Abulaux village. McFadden, Y. et al., (1978, 187); (R 78-26 Fresh water supply for an Abulaux village. McFadden, Y. et al., (1978, 187); Shar (2004); McFadden, Y. et al., (1978, 1978); Shar (1978,	Chema River Lakes Propert resegrations study—thereeyes summary—blusson, L.A., et al., [1981, 1994] CR 81-18 Vegetation selection and stategement for oscilland flow systems—Palazio, A.J., et al., [1992, p.135-134] Mandemater incoment and plant growth—Palazio, A.J., [1992, p.135-134] Mandemater incoment and plant growth—Palazio, A.J., [1992, 137] Chem. of structures on no summary of infigures—Library, F.H., et al., [1992, 1992, Mandemater applications in Societ economics. McKnin, 1982, et al., [1982, 139] Vegetations in two adjacent times kelekute, members Andala.	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed memberne cooling systems. Schaeler, D., et al., (1977, 1879). Messang somewred steam me with a condensate pump cycle counter. Johnson, P.R., (1977, 2.53-44); 307-957. Remarkating old wood frame buildings with mendemidde-hyde from. Johnson, W., et al., (1977, p.478-48); JOP-958. Infrared thermography of buildings. Muses, R.H., et al., (1977, 1794; Infrared thermography of buildings. Muses, R.H., et al., (1977, 1794; Infrared thermography of buildings. Muses, R.H., et al., (1977, 1794). District thermography of buildings. Muses, R.H., et al., (1977, 1794). Messall, S.J., (1979, p.871-899). MP 1212. Infrared thermography of buildings. a bibliography with absence. Marshall, S.J., (1979, 6-74).
Idea SR 89-31 Ground unter Longs dereloped from surface water and ground water Cacey, K.L., (1973, 717); M. 1114-95 Fapul self-territors of pursary sewage efficient at Foot Deseas, Massachusents. Sameradine, M.R., et al., (1976, 342); CR 76-66 Land treatment of untersiner at Mastacas, Cald., and Quincy, Washington. Islandon IA. et al., (2971 347); Frends unter supply for an Abulan village. McFadden, T. et al., (1978, 1874). Village GCMS aradians of unter in the Mantan regolet. Anderson, D.M., et al., (1978, 98-84); MP 1195 Belliographie on techniques of unter directions in cold regions. Santh, D.W., comp., (1979, 7874). Detection of Astace unter supplier with geoglessical techniques. Astonic, S.A., et al., (1979, 369). CR 79-15	Chesa River Lakes Project reorgentions study—cheere-year summary—lohanon, L.A., et al., [1991, 1994] CR 81-18 Vegetation selection and management for oriented from systems. Palazzo, A.J., et al., [1992, p. 135-134]. Bandenster reconnect and finite growth. Palazzo, A.J., [1991, 219]. Effects of summittions on not systems of integran. SR 82-05 Effects of summittions on not systems of integran. SR 82-05 Effects of summittions on not systems of integran. SR 82-05 Effects of summittions on not systems of integran. SR 82-05 Effects of summittions on Societ ecosystems. McAur., Effects of [1992, 239; a September 1992, p. 1992, p. 1993, p. 1993	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed membrane cooling systems. Schaefer, D., et M., (1977, 1879). Message summered steam one with a condensate pump cycle counter. Johnson, F.R., (1977, 9-58-44), MP 997 Remarking old wood frame buildings with mea-documble-layer from Indiamon, M., et al., (1977, p-878-48), MP 998 Istinated thermography of buildings Munca, R.H., et al., (1977, 179). Interest thermography of buildings Munca, R.H., et al., (1977, 179). Dermal scanning systems for detecting building fact loss, and control of the co
I dep SR 89-31 Ground unter Lengs derefored from unface water and ground water Cacy, K.L., [1973, 73.72] Fugul utilization of primary senspectification in Fost Derea, Manachusetti, Satternoline, M.R., et al., [1976, 167] Land treatment of waterwater at Manicea, Cald., and Quincy, Wathington, Marschin I.K. et al., [1971, 167] Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, 137] SR 78-01 Namy GCMS areaban of unter in the Manicea repolic, Anderson, D.M., et al., [1973, 7-58-82] MP 1195 Bibliographs on techniques of unter distances it cold regions Santh, D.W., comp., [1978, 7-79] Denotion of Astone unter supplies with prophismon techniques. Account, S.A., et al., [1979, 7-79] CR 79-15 Freedwater pool rather-denated error in Almhain may: delta	Chema River Lakes Propert resegrations under thereeyers summary. Inhanon, L.A., et al., [1991, 1994]. CR 81-18 Vegetation selection and examplement for overland flow systems. Palasto, A.J., et al., [1992, p. 135-134]. MP 1311 Wandenster reconnect and plant growth. Palasto, A.J., [1992, 1594]. SR 82-05 iffects of soundations on not summary of integrass. Exhaut, F.H., et al., [1992, 1594]. Wandenster applications in Source economics. McKem, H.E., et al., [1992, 1794]. Represent in the adjacent times habitate, northern Alman, Round, D.A., [1993, p. 1994-164]. Lesind, D.A., [1993, p. 1994-164]. Lesind promits in a cold communities. 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed memberne cooling systems. Schaeler, D., et al., (1977, 1879). Messange somewred steam me with a condensate pump cycle counter. Johnson, P.R., (1977, p. 534-54). MP 957 Remarkating old wood frame buildings with mendemalde-legic from. Johnson, B., et al., (1977, p. 478-643). MP 958 Infrared thermography of buildings. Minex, R.H., et al., (1977, 179). Infrared thermography of buildings. Minex, R.H., et al., (1977, 179). Infrared thermography of buildings. Minex, R.H., et al., (1977, 179). Dermal scanning systems for detecting building best loss. Good, R.A., et al., (1979, p. 871-899). MP 1212 Infrared thermography of buildings. Politography with abstracts. Marshall, 3.1, (1979, 679). SR 79-06. Infrared thermography of buildings. 1977 Count Gentle survey. Marshall, 3.1, (1979, 679). SR 79-06. Infrared thermography of buildings. 1977 Count Gentle survey. Marshall, 3.1, (1979, 679). SR 79-07. Infrared thermography of buildings. 1977 Count Gentle survey. Marshall, 3.1, (1979, 679). SR 79-08.
Ideal SR 89.31 Ideal water Lings dereloyed from uniface water and ground water Carey, K.L., [1973, 7172]. M. 1814-89 Papel udifications of permany senage efficient at Fort Devem, Manachusetta. Satternésie, M.R., et al., [1974, 1872]. Land treatment of water atter at Manacea. Cald, and Quincy, Wathington. Islands: I.K. et al., [1977, 1872]. CR 77-26 Fresh water supply for an Almhaux village. McFadden, Y. et al., [1978, 1872]. SR 78-07 Village GCMS aradous of water in the Manace repolit. Anderson, D.M., et al., [1973, p. 53-02]. MP 1195 Billiographs on techniques of water detection ex cold regions. Santh, D.W., comp., [1979, 7972]. SR 78-10 Detection of Astron water supplies such grophysical techniques. Astrone, S.A., et al., [1979, 1979]. CR 78-15 Freedwater pool radar-detacted error at Almhaus mort defin. Lioux, A., et al., [1979, p. 53-11-65]. MP 1226 Strength of factors of an aforestion of one content and detium.	Chema Roser Lakes Propert resegration study—theresees summary Johnson, L.A., et al., §1951, §594. Vegetation selection and statagement for overfined from systems. Falsato, A.J., et al., §1962, § 135-134. MP 1511 Mandenater treatment and plant growth. Falsato, A.J., §1992, 2594. Effects of symmittions on not statation of integrate. Erhald, F.H., et al., §1902, 2594. Matternet: applications in Societ economics. McKam, H.L., et al., §1902, 2594. Matternet: applications in Societ economics. McKam, ER-12 Matternet: applications in Societ economics. McKam, CR 83-19 Vegetation in two adjacent times labeled, northern Aliala. Monthly J. H., §1914, § 191-104. Memory Societ in a cold environment. 1 × 3 < , §1942, 714-2. The Matternet Societ is preliminated in the Societ. A., et al., §29-17, §194. Memory Societ.	regions. Bennem, F.L., (1977), 1879; SR 77-43. Observation and analysis of processed membrane cooling systems. Schaeler, D., et al., (1977), 489; CR 77-11. Measuring sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977), 435-443; MP 997. Remislating old wood frame buildings with membersalde-leyel from. Tobusson, B., et al., (1977), p.475-443; MP 998. Intraced thermography of buildings. Muncs, R.H., et al., (1977), 179; Intraced thermography of buildings. Muncs, R.H., et al., (1977), 179; Diermal scanning systems for detecting building fact loss. Goot, R.A., et al., (1979), p.877-1209. Membral, S.J., (1979), p.79; Intraced thermography of buildings. In Mincs, M. M., et al., (1979), p.797, 1879. Intraced thermography of buildings. Intraced t
Ideal SR 89-31 Cound unter Longs descripted from surface water and ground water Carey, K.L., [167], 71; y M 111-89. Fagul softmation of general resuspe efficient at Fort Devera, Monachisters is Surfarshire, M.R., et al., [1976, 167], Car 76-68. Land treatment of waterwater at Manteera, Cald., and Quiney, Wathington Balancher I.K. et al., [1977, 167]. Fresh water supply for an Almilan vallage. McFadden, Y. et al., [1978, 189]. Village GC M.S. arabana of water in the Mantin register. Anderson, D.M., et al., [1978, 253-61]. MF 1195 Bibliographs on techniques of a star detection as a cold regions. Santh, D.W., comp., [1979, 78-7]. Detection of Astron water suppliers with graphysical techniques. Astonic, S.A., et al., [1979, 249]. CR 78-15 Freedwater pool radio-densited error as Almilan store delta. Essan, A., et al., [1979, 2 181-167]. MF 1224	Chema River Lakes Propert resegrations under thereeyers summary. Inhanon, L.A., et al., [1991, 1994]. CR 81-18 Vegetation selection and stategement for overfland flow systems. Palaste, A.J., et al., [1992, p. 135-134]. MP 1311 Randemater incoment and plant growth. Palaste, A.J., [1992, 1992, 1994]. Effects of standations on an autorities of integram. Estudy, F.H., et al., [1992, 1994]. Randemater applications in Societ economics. McLain, H.L., et al., [1992, 1994]. Represent in the adjacent times labeled, members Alman, Eonal, D.A., [1992, p. 1994, 1964]. Remark, D.A., [1992, p. 1994, 1964]. Remarks. Lead divining books a preliminary survey. London, A., et al., [2007], 5 by S.R. 7513. Mose Checaration and background discussion is and over soon. Repart, A.W., [1997], p. 1911, [185]. MP 2017.	regions. Bennem, F.L., (1977, 1879). SR 77-03. Observation and analysis of processed membrane cooling systems. Schaeller, D., et al., (1977, 1879). CR 77-11. Measuring sometimed steam use with a condensate pump cycle counter. Johnson, P.R., (1977, p.53-483). MP 957. Remarkating old wood frame buildings with membranderhilde-level from. Tobusson, W., et al., (1977, p.478-483). MP 958. Infrared thermography of buildings. Munca, R.H., et al., (1977, 179). Infrared thermography of buildings. Munca, R.H., et al., (1977, 179). Dermal scanning systems for detecting buildings belt loss. Good, R.A., et al., (1979, p.871-894). MP 1212. Infrared thermography of buildings. Politography with abstracts. Marshall, 3.1, (1979, 679). Infrared thermography of buildings. Politography with abstracts. Marshall, 3.1, (1979, 679). SR 79-03. Infrared thermography of buildings. 1977 Count Guild suvery. Marshall, 3.1, (1979, 679). SR 79-03. Infrared thermography of buildings. 1977 Count Guild suvery. Marshall, 3.1, (1979, 679). SR 79-03. Infrared thermography of buildings. 1977 Count Guild survey. Marshall, 3.1, (1979, 679). SR 79-03. Infrared thermography of buildings. 1977 Count Guild survey. Marshall, 3.1, (1979, 679). SR 79-04. Infrared thermography of buildings. 1977 Count Guild survey. Marshall, 3.1, (1979, 679). SR 79-05. SR 79-06. SR 79-06. SR 79-06. SR 79-07. SR 79-08. SR 79-08. SR 79-09. SR 79-
Ideal SR 89.31 Ground unter Lengs derefored from uniface water and ground water Cacy, K.L., [1973, 73.72]. M 111-89. Fupol utilizations of primary sensing entherm in Foot Derical Manachusetti. Sutternative, M.R., et al., [1976, 167]. Land treptiment of uniformizer to Manacea. Cald., and Quincy, Windington. Marichia I.K. et al., [1977, 167]. Fresh unier supply for in Almhan village. McFadden, Y. et al., [1978, 159]. SR 78-67. Fresh unier supply for in Almhan village. McFadden, Y. et al., [1978, 159]. SR 78-61. Fresh unier supply for in Almhan village. McFadden, Y. et al., [1978, 159]. SR 78-61. Fresh unier supply for in Almhan village. McFadden, Y. et al., [1978, 159]. SR 78-61. Shing GCMS arabins of unier in the Manistr repolit. Anderson, D.M., et al., [1978, p. 58-61]. SR 78-10. Denotion of Astone, S.A., et al., [1979, 169]. Etc. Fresh user pool endors detailed erre in Almhan meet delta Econe, A., et al., [1978, p. 198-106]. MP 1224 Strength of forces of the a function of the content and den unie. Sength of forces of the a function of the demonstrated den unie. Sength of forces of the a function of the content and den unie. Sength of forces of the a function of the Ground and den unit. JMP 1451 Linguisted Romanneng grounds pair from equation. Data.	Chema Roser Lakes Propert resegrations study—thereeyess summary Johnson, L.A., et al., [1991, 1994] Vegetation selection and statagement for overfined flow systems. Falsato, A.J., et al., [1992, p.135-154] MP 1511 Mandenater treatment and plant growth. Falsato, A.J., [1992, 259] Effects of symmittions on not statation of integrate. Erhald, F.H., et al., [1992, 259] Matternate applications in Societ economics. McKam, SR 82-12 Matternate applications in Societ economics. McKam, CR 82-19 Legranium in the adjacent times labeled, northern Africa. Memory 1992, p.1992, p.1994. CR 84-64 Moments Lake demang looks a preliminary survey. Montes, A., et al., p.207, p.197. More Checutation and background discussions in and over some Hogas, A.W., p.1997, p.191-1389. MP 2417 Membris.	regions. Bennem, F.L., (1977, 1879). SR 77-43. Observation and analysis of protected membrane cooling systems. Schaeler, D., et al., (1977, 1879). CR 77-11. Mensioning sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977, 2-53-48), SR 9697. Remislating old wood frame buildings with membranderhylde from. Tobusson, B., et al., (1977, p. 475-48), SR 77-29. Intrared thermography of buildings. Mines, R.H., et al., (1977, 179). Dermal manning systems for detecting building first loss. Got, R.A., et al., (1978, p. 871-89). Dermal manning systems for detecting building first loss. Got, R.A., et al., (1978, p. 871-89). Intrared thermography of buildings. Intrared manning systems for detecting building first loss. Got, R.A., et al., (1978, p. 871-89). Intrared thermography of buildings. Intrared thermography of buildings. Intrared framework of buildings. Intrared Gotte St., (1978, p. 871-89). Interest from the Fort Manuscoph heat discribition systems. Phemography, or al., (1981, 1974). SR 381-14. Fentioners, artifacts of best manuscoph systems. Phemograph. Sol. 1971. Elect. Ions from the central best distribution system.
Ideal SR 89-31 Ground outer Longs dereloyed from surface water and ground water Carey, K.L., (1973, 717). M 111-89 Fayel officiation of general senses tenses are four Devera, Manachemen. Surredine, M.R., et al., (1976, 1973, CR 76-88 Land treatment of water store to Manneau, Cald, and Opiney, Washington. Idealor 12. et al., (1971, 1974) Fresh water supply for an Abidian vollage. McFadden, T. et al., (1972, 1973). Village GCMS arabitus of using in the Mannes regider. Anderson, D.M., et al., (1971, 2974). MR 78-07 MR 78-08 MR 78-07 MR 78-08 MR 78-08 MR 78-08 MR 78-08 MR 78-08 MR 78-08 MR 78-18	Chem River Lakes Propert resegrations study—thereeyan summary—blusson, L.A., et al., [1991, 1994] Vegetation selection and examplement for oscilland flow systems. Palarto, A.J., et al., [1992, p.135-134] Watermater incoment and plant growth. Palarto, A.J., [1992, 127] Edited of simulations on an agrance of integrass. Estand, F.H., et al., [1992, 259] Rantemater applications as Societ economics. McLain, H.L., et al., [1992, 129] Rantemater applications as Societ economics. McLain, H.L., et al., [1992, 129] Repetations in the adjustment interes labeled, northern Alinda Road, D.A., [1992, p.19-164] McRossi growth in a cold environment. 1 \ 1 \ 1, [1984] Heaterman. Stake drawing Sooks: a preliminary survey. London, A., et al., [2017, 639] Home Chestration and background devantion is and over soons. Hopps, A.W., [1997, p.191-138] McRossi. Heatth appears of water resise in California. Reed, S.C., [2017, p. 241-418]	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed membrane cooling systems. Schaeler, D., et al., (1977, 1879). Messang somewred steam me with a condensate pump cycle counter. Johnson, F.R., (1977, 253-183). MP 957 Remarking old wood frame buildings with secolocoulde-byle form. Tobasson, W., et al., (1977, 253-183). MP 958 Infrared thermography of buildings. Musex, R.H., et al., (1977, 179). Infrared thermography of buildings. Musex, R.H., et al., (1977, 179). Dermal scanning systems for detecting building best loss. Good, R.A., et al., (1979, p. 271-289). MP 1212 Infrared thermography of buildings.
Ideal SR 89.31 Geomal mater Lengs derefored from number water and ground water Carry, K.L., [1973, 73.72]. M 181-89. Fupol melliminos of primary senspe efficient in Foot Derea, Manachusetti. Satterndine, M.R., et al., [1976, 167]. Land treptiment of materiality M.R., et al., [1976, 167]. Land treptiment of materiality M.R., et al., [1976, 167]. Land treptiment of materiality M.R., et al., [1976, 167]. Erich water supply for an Almhan village. McFadden, Y. et al., [1978, 159]. Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, 159]. Sing GCMS arabins of mater mitter Memory repolity. Anderson, D.M., et al., [1978, 7.58-61]. MP 1195 Bibliographis on techniques of mater detection in collegeous Santh, D. W., comp., [1979, 759]. Derection of Asteric mater supplies with prophismost techniques. Asterial, 5.4., et al., [1979, 749]. Erectioner: pool radio-detected error in Almhan more definationer, S.A., et al., [1979, 749]. Erectioner: Moscons of an affirmation of the consist and den uncertifications of the consist and den uncertifications. F.H., et al., [1988, p. 1879.179]. Limitative Romanness groundwater from equation. Dals, C.J., et al., [1981, p. 179-514]. Erectionality between the see and unknown mater planes in facets and Tec., A.R., et al., [1982, 57]. CE \$2-15	Chema Roser Lakes Propert resegration study—thereeyear summary Johnson, L.A., et al. (1991) 1994. Vegetation selection and eranagement for overland flow systems. Palazzo, A.J., et al. (1992) 935-1542. Windenster transfers and plant growth. Palazzo, A.J., (1992) 157-25. Windenster transfers and plant growth. Palazzo, A.J., (1992) 157-25. Effects of municipus on on summers of integrats. Lebuch, F.H., et al. (1992) 159-2. Windenster applications in Societ economics. Melkin, H.B., et al. (1992) 159-2. Windenster applications in Societ economics. Melkin, H.B., et al. (1992) 159-2. Windenster applications in Societ economics. Melkin, H.B., et al. (1992) 259-2. Windenster applications in Societ economics. Melkin, M.P. 2004. Resould D.A., (1992) 259-3-64. Windenster Societ and economics of the Societ Allega, A.W., (1992) 259-3-64. Windenster Societ discussions in and over soon Hegin, A.W., (1992) p. 191-1954. Weath. Heath. Heath.	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed membrane cooling systems. Schaeler, D., et al., (1977, 1879). CR 37-11. Measuring sometimed steam use with a condensate pump cycle counter. Johnson, P.R., (1977, 2-58-48); MP 957. Remislating old wood frame buildings with metalemidle-hyde form. Johnson, W., et al., (1977, p.476-48); hyde form. Johnson, W., et al., (1977, p.476-48); SR 77-99. Infrared thermography of buildings. Music, R.H., et al., (1977, 179); Infrared thermography of buildings. Music, R.H., et al., (1977, 179); Bermal scanning systems for detecting building best loss. Good, R.A., et al., (1979, p.871-896). MP 1212. Infrared thermography of buildings. a hollography with absorates. Marshall, 3.3., (1979, 679); SR 79-61. Infrared thermography of buildings. 1977 Count Genel survey. Marshall, 3.3., (1979, 679); SR 79-62. Infrared thermography of buildings. 1977 Count Genel survey. Marshall, 3.3., (1979, 679); SR 79-63. Infrared thermography of buildings. 1977 Count Genel survey. Marshall, 3.3., (1979, 679); SR 79-63. Infrared thermography of buildings. 1977 Count Genel survey. Marshall, 3.3., (1979, 679); SR 79-63. Infrared thermography of buildings. 1977 Count Genel survey. Marshall, 3.3., (1971, 1972). SR 79-64. Infrared thermography of buildings. 1977 Count Genel survey. SR 79-68. Infrared thermography of buildings. 1977 Count Genel survey. SR 79-69. Infrared thermography of buildings. 1977 Count Genel survey. SR 79-69. Infrared thermography of buildings. 1977 Count Genel survey. SR 79-69. Infrared thermography of buildings. 1977 Count Genel survey. SR 79-69. Infrared thermography of buildings. 1979 Count Genel survey. Percent Genel survey.
Ideal SR 89-31 Ground outer Longs dereloyed from surface water and ground water Carey, K.L., (1973, 717). M 111-89 Fayel officiation of general senses tenses are four Devera, Manachemen. Surredine, M.R., et al., (1976, 1973, CR 76-88 Land treatment of water store to Manneau, Cald, and Opiney, Washington. Idealor 12. et al., (1971, 1974) Fresh water supply for an Abidian vollage. McFadden, T. et al., (1972, 1973). Village GCMS arabitus of using in the Mannes regider. Anderson, D.M., et al., (1971, 2974). MR 78-07 MR 78-08 MR 78-07 MR 78-08 MR 78-08 MR 78-08 MR 78-08 MR 78-08 MR 78-08 MR 78-18	Chema River Lakes Propert resegrations under thereeyear summary. Inhanon, L.A., et al., [1991, 1994]. CR 81-18 Vegetation selection and statisperment for overfluid flow systems. Palasto, A.J., et al., [1992, p. 135-134]. MP 1311 Randemiter incidence on the summary of integrate. Letter, A.J., [1992, 1994]. Effects of standardous on the summary of integrate. Letter, A.J., [1992, 1994]. Effects of standardous on the summary of integrate. Letter, A.J., [1992, 1994]. Randemiter applications in Societ ecosystems. McLain, H.L., et al., [1992, 1994]. Reprinted in the adjusted time to behave, northern Alman, Road, D.A., [1992, p. 1994, [64]]. Reprinted in the adjusted time to behave, northern Alman, Road, D.A., [1992, p. 1994, [64]]. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 1994. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 1994. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 1994. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 1994. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary survey. London, A., et al., [2007], p. 2004. Reprinted flowing tooks a preliminary sur	regions. Bennem, F.L., (1977, 1879). SR 77-43. Observation and analysis of processed membrane cooling systems. Schaeler, D., et al., (1977), 48p.; CR 77-11. Measuring sometimed steam use with a condensate pump-cycle counter. Johnson, P.R., (1977, 2.53-48); Merositing old wood frame buildings with membrane benefits for form. Tobusson, B., et al., (1977), p. 476-483; Merositing old wood frame buildings with membranely-lyde form. Tobusson, B., et al., (1977), p. 476-483; Merositing old wood frame buildings. Mines, R.H., et al., (1977, 179); Intraced thermography of buildings. Mines, R.H., et al., (1977, 179); Dermal scanning systems for detecting building first loss. Goot, R.A., et al., (1972, p. 87), 280; Merosit scanning systems for detecting building first loss. Goot, R.A., et al., (1972, p. 87), 280; Merosition Marshall, 3.3., (1979, 67p.; Johns Mershall, 3.3., (1979, 67p.; Johns from the Fort Wannington bent distribution system. Phemography, and sussess of best transmissions systems. Phemography, and sussess of heat transmissions systems. Phemography, 1972, 1973. Merosition from the central best distribution systems. Phemography. Phemography, G., (1982, 1972). Merosition from the central best distribution systems. Phemography. Phemography, G., (1982, 1972). Merosition from the central best distribution systems as fort Wannington. Phemography, G., (1982, 1988-128). MP 2310. Heat and montione absention over automatic various of Assential Steam and montione absention over automatic various of Assential Steam and Merositic advantages.
Ideal SR 89.31 Geomal water Lengs developed from surface water and ground water Cacry, K.L., [1973, 7172] M III-D3 Fapol softensions of pursacy sensor enform at Foot Devera, Mastachusera. Surfershire, M.R., et al., [1976, 1972] Land treatment of waterwater at Masticea, Cald., and Quinty, Wathington. Harnder I.K. et al., [1977, 1974] Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, 1372] Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, 1372] Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, 1372] Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, 1372] Fresh water supply for an Almhan village. McFadden, Y. et al., [1978, p. 58-61] MF 1995 Bibliographs on technoques of water detection at cold regions. Surth, D. W., comp., [1979, 797] Detection of Atence water supplies with grophysical tech- magne. Astonic, S.A., et al., [1979, p. 1974] Fresh sets pool rather detected error at Almhan start defa- konic, A., et al., [1978, p. 191-196] MF 1226 Strength of fisters wit as a function of see contests and firs one scapte. Surface, F.H., et al., [1988, p. 198-119] Redminishly between the set and without water planes as facers and Tace, A.R., et al., [1982, 2092] Explanation of powerdures for determining selected spader parameters. Dals, C.J., [1982, 1969] Exchanation insulation of antogen striteriors as sold.	CR 81-08 Chem Roser Lakes Propert resegration intoly decrepes summary. Inhanos, L.A., et al., §1951, §594. CR 81-18 Vegetation selection and standardiness overfined flow systems. Fallatio, A.J., et al., §1962, § \$15-154. MP 1511 Randewiter incoment and plant growth. Palatio, A.J., §1962, § \$16-154. Ethics of standardines on not summars of integras. Ethics, E.B., et al., §1962, \$295. Ethics of standardiness on not summars of integras. Ethics, \$8, 82-12. Materializer applications in Societ economics. Melani, E.B., et al., §1962, \$25-2. Materializer applications in Societ economics. Melani, \$8, 82-12. Materializer and placeted time to kalonia, northern Alman, MP 2008. Round, D.A., §1962, § \$55-164. Mr 2008. Mention from the north environment. T. § \$1, \$16-16. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Sink drawing looks a preliminary survey. Montan, A., et al., \$20-7. Materialized appears of south reuse in Caldonia. Reed, \$1, \$10-5. Mr 1000. MEAT BMANCE. Heat exchange at the ground surface. Seed, \$2, \$20-8. MEAT BMANCE.	regions. Bennem, F.L., (1977, 1879). SR 77-43. Observation and analysis of processed membrane cooling systems. Schaeler, D., et al., (1977, 1879). CR 77-11. Measuring sometimed steam use with a condensate pump cycle counter. Johnson, P.R., (1977, p.53-483). 309-957. Remailiating old wood frame buildings with membrane pomp-cycle counter. Johnson, B.R., (1977, p.53-483). 309-958. Infrared thermography of buildings. Muncs, R.M., et al., (1977, 179). SR 77-35. SR 77-35. SR 77-35. SR 77-35. SR 77-36. SR 7
Ideal SR 89.31 Geomal mater Leings derefored from number water and ground water Carry, K.L., [1973, 73.72]. M 1818-89. Fupol mellimitions of primary sensing enfluence foot Deress. Manuachusenn. Sutternative, M.R., et al., [1976, 167]. Land treptiment of materialize Milatorea, Cald., and Quinny, Wathington. Ideathor I.K. et al., [1977, 167]. Fresh water supply for an Almham vollage. McFadden, Y. et al., [1978, 159]. MF 78-67. Fresh water supply for an Almham vollage. McFadden, Y. et al., [1978, 159]. MF 78-67. Fresh water supply for an Almham vollage. McFadden, Y. et al., [1978, 159]. MF 78-78. Fresh water supply for an Almham vollage. McFadden, Y. et al., [1978, 159]. MF 1195 Bibliographic on technoques of nater detection et cold regions. Santh, D. W., comp., [1979, 759]. MF 1195 Bibliographic on technoques of nater detection et cold regions. Santh, D. W., comp., [1979, 759]. MF 78-78 Freedwater pool endor-detected error in Almham more delta Losac, A., et al., [1979, 7 193-159]. MF 1224 Strength of facers of in a sintension of our consent mil dix une menfel. Seyles, F. H., et al., [1988, p. 379-119]. MF 1451 Limpanied Bonamiers, groundwater from equation. Daly, C.J., et al., [1981, p. 379-584]. Sankinston of powerdness for determining science aquifer parameters. Daly, C.J., [1982, 209]. CR 82-41 Mathematical translation of nemogen unterscious se sols Selen, H. M., et al., [1983, p. 241-124]. MR 2001. Fresh water supply carries of actoring unterscious se sols Selen, H. M., et al., [1982, p. 241-124]. MR 2001. Fresh water supply control of nemogen unterscious se sols Selen, H. M., et al., [1983, p. 241-124]. MR 2001.	CR 81-08 Chem Roser Lakes Propert resegration study—therefore summary Johnson, L.A., et al., §1951, §594 CR 81-18 Vegetation selection and standard for overfined flow systems. Falsato, A.J., et al., §1952, §135-154. MP 1511 Randwater incomest and plant growth. Falsato, A.J., §1942, §195, §519. Effects of soundation on not systems of integrate. Enhant, F.H., et al., §1942, §594. Effects of soundations on not systems of integrate. Enhant, F.H., et al., §1942, §594. Effects of soundations on not systems of integrate. Enhant, F.H., et al., §1942, §594. Effects of soundations on not systems of integrate. Enhant, F.H., et al., §1942, §594. Effects of soundations on not systems. Methods. Bl., et al., §1942, §594. Effects on two adjacent turbes kabition, northern Almán. Rond, D.A., §1993, §594. Effects on two adjacent turbes kabition, northern Almán. Rond, D.A., §1993, §594. Effects of systems. Soundation. See 7043. Methods. Health sepects of water rease in California. Reed, S.C., §1070, §104. MP 1809 HEAT BALANCE. Heat endouge of the ground surface. Soun, R.J., §1904. All MILAT Constitutes of the statutes. Soundation of the soundation.	regions. Bennem, F.L., (1977), 1879; SR 77-43. Observation and analysis of processed membrane cooling systems. Schaeler, D., et al., (1977), 489.; CR 77-11. Mensioning summerical steam was with a condensate pump cycle counter. Johnson, P.R., (1977), 2.53-481; MP 997. Remislating old wood frame buildings with membeanide-leyel from. Tobusson, B., et al., (1977), p. 276-481; MP 998. Intraced thermography of buildings. Mines, R.H., et al., (1977), 179; Intraced thermography of buildings. Mines, R.H., et al., (1977), 179; Dermal scanning systems for detecting building field loss. Goot, R.A., et al., (1978), p. 271-289; Intraced thermography of buildings. In 2006, p. 287-289. Intraced thermography of buildings. In 2006, R.A., et al., (1978), p. 271-289; Intraced thermography of buildings. In 2007 Count Grant survey. Marchall, S.J., (1978), 679; I sease from the Fort Wanningth best discribation system. Phemography. G., (1978), 479; If this from the Fort Wannington destination systems. Phemography. G., (1978), 479; Mannington. Phemography. G., (1998), 279; Met Issues from the central heat distribution system. Forther, G., (1981), 479; Met and mossinge absention over activities system in Forther, H., (1988), p. 250-250. Met man discounter absention over activities as for Associated there appears the present of heat pages on the Trans-Minka Papeline. Mett pages.
Ideal SR 89.31 Geomal water Lengs descripted from surface water and ground water Cacry, K.L., [1973, 71.72. Papel softensions of pursacy sensor enform at Foot Devera, Manachusera. Surfanding, M.R., et al., [1976, 1972. Land treatment of waterwater at Manteen, Cale, and Quinny, Wathington. Harnder I.K. et al., [1977, 1972. Fresh water supply for an Almilan village. McFadden, Y. et al., [1978, 1372. Fresh water supply for an Almilan village. McFadden, Y. et al., [1978, 1372. Fresh water supply for an Almilan village. McFadden, Y. et al., [1978, 1372. Fresh water supply for an Almilan village. Fresh water supply for an Almilan village. McFadden, Y. et al., [1971, 2 58-61]. MF 1895. MB 1895. MB 1895. MB 1895. Denetion of Atene water supplies with geoglessori bech- magne. Astone, S.A., et al., [1979, 2 58-78-88. Denetion of Atene water supplies with geoglessori bech- magne. Astone, S.A., et al., [1979, 2 58-78-88. Strength of discress sit as a function of the connect suffers and first successful. Linearized Boundaries groundwater from equation. Dais, C.J., et al., [1981, 2 375-584]. Rechausaling between the set and subsects unter planes as facer, A.R., et al., [1982, 2 58, 216. Exhibition of geocediers for determining selected aqueler putameters. Dais, V.J., [1982, 2007. MB 2051. Existence of a fresh-besser model. Gramms, G.L. et al., [1981, 2 489-414]. MB 2051.	Chema Roser Lakes Propert resegrations under the energy summary. Inhanos, L.A., et al., [1992, 1994]. Vegetation selection and standagement for overfisch Line systems. Palazzo, A.J., et al., [1992, p.135-154]. Watersiter treatment and plant growth. Palazzo, A.J., [1992, 1992, 1994]. Watersiter treatment and plant growth. Palazzo, A.J., [1992, 1994]. Effects of symmittions on no symmetry of tartigues. Erback, F.H., et al., [1992, 1994]. Watersiter applications on forest reconnection. McLine, F.H., et al., [1992, 1994]. Watersiter applications on forest reconnection. McLine, F.H., et al., [1992, 1994]. Watersiter applications on forest reconnection. Northern Alman, H.E., et al., [1992, p.191-164]. Watersite growth in a cold communities. 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Cherrysion and studyes of processed membrane souting systems. Schaeler, D., et al., (1977, 1879). CR 27-11. Measuring sommerated steam use with a condensate pump cycle counter. Johnson, P.R., (1977, 2-58-48); MP 957. Remislating old wood frame buildings with mendemidde-hyde form. Johnson, B. at 11, 1777, 2-58-48); MP 958. infrared thermography of buildings. Muncs, R.M., et al., (1977, 1974). SR 27-28. infrared thermography of buildings. Muncs, R.M., et al., (1977, 1974). SR 27-29. Infrared thermography of buildings. Muncs, R.M., et al., (1977, 1974). SR 27-29. SR 27-29. Infrared thermography of buildings. Infrared thermography of buildings. Infrared thermography of buildings. Infrared thermography of buildings. Infrared SR 28-29. Infra
Ideal SR 89.31 Geomal water Leings developed from number water and ground water Cacy, K.L., [1973, 73.72]. M 111-89. Fupol meltrations of primary sensing enthering in Fost Devera, Manachmeters. Sufferabling, M.R., et al., [1976, 1672]. Land treatments of materialists of M.R., et al., [1976, 1672]. Land treatments of materialists of Material Cald, and Quinny, Wathington. Harndon I.K. et al., [1977, 1672]. Fresh water supply for an Almhan village. McFadden, I. et al., [1978, 1392]. Fresh water supply for an Almhan village. McFadden, I. et al., [1978, 1392]. Fresh water supply for an Almhan village. McFadden, I. et al., [1978, 1392]. Fresh water supply for an Almhan village. McFadden, I. et al., [1978, p. 58-62]. MR 78-61. Anderson, D.M., et al., [1978, p. 58-62]. MR 1195 Bibliographs on techniques of mater detection in cold regions. Smith, D. W., comp., [1979, 797]. Detection of Asteric mater supplies and geophysical techniques. Asteria, S.A., et al., [1979, p. 1972]. Evenesh of discorts oft in a function of the content and dra une acids. Seeden, F.H., et al., [1988, p. 187-119]. MR 1451 Intermited Bonanness groundanter from equation. Disk, C.J., et al., [1981, p. 25-584]. Rechnically between the see and unknown mater himses as facers and Teer, A.R., et al., [1982, [1982]]. Exhibition of procedures for determining selected squifer parameters. Disk, C.J., [1982, 1982]. MR 2651 Evilantion of procedures for determining selected squifer field teen of a treatment processor in an administration in the field teen of a treatment processor in an administration of fields. 1870, MR 1657 Inscription of gramment processors in an administration of fields. 1871, MR 1657 Inscription of gramment processors in an administration of fields.	Chesia Roser Lakes Propert resegnation study—therefore summary Johanos, L.A., et al., §1951, §594. Vegetation selection and standard for overfined flow systems. Faluro, A.J., et al., §1952, §15-154. We stand the selection and grant power. MP 1511. Bushesseer incomest and glast growth. Faluro, A.J., §1942, §195-154. MP 1511. Bushesseer incomest and glast growth. Faluro, A.J., §1942, §194	regions. Bennem, F.L., (1977, 1879). Observation and analysis of proceeded membrane confing systems. Schaefer, D., et M., (1977). 1879. CR 27-11. Measuring summerced steam one with a condensate pump-cycle counter. Johnson, P.R., (1977). 2.58-262). MP 997 Remaillating old wood frame buildings with membrane demailded by the form. Indianon, B., et M., (1977). p. 878-263). May 1972. 1879. Intraced thermography of buildings. Muncs, R.M., et M., (1977). 1879. Intraced thermography of buildings. Muncs, R.M., et M., (1977). 1871. District thermography of buildings. Muncs, R.M., et M., (1977). 1871. District thermography of buildings. Muncs, R.M., et M., (1977). 1871. District thermography of buildings. a followgraphy with abstracts. Marshall, 3.3., (1978). 4.74. Intraced thermography of buildings. 1977 Count Guild survey. Marshall, 3.3., (1978). 4.74. Jacket doom the Fort Wanningth bett distribution systems. Phemography. C. G., 41, (1974). 1979. Mannington. Proceedings. G., (1982). 2979. Met Issues. analysis of best manningson systems. Phemography. Phemography. C. G., (1982). 2979. Met Issues. Stom the central best distribution system. Fort. Wannington. Phemography. G., (1982). 2979. Met Issues. Stom the central best distribution systems. Fort. Wannington. Phemography. G., (1982). 2979. MP 2310. Met 1909. Met 1909. Met 1909. Met 210-2. Me
Ideal SR 89.31 Geomal matter Leings descripted from number water and ground water Carry, K.L., [1673, 7137] M. 118-29 Fapol militations of pursuesy sensor enform at Foot Devera, Manachastern. Sutterwine, M.R., et al., [1976, 1673] Land treatment of matterwine at Manners, Calc., and Quency, Washington. Harsdon I.K. et al., [1977, 1674] Fresh water supply for an Almilan village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almilan village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almilan village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almilan village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almilan village. Fresh water supply for an Almilan regolith. Anderson, D.M., et al., [1971, p. 58-61] MP 1195 Bibliographs on technoques of matter detection at resolution. Demonson of Atence water suppliers such geoglesson beth- major. Alterna, S.A., et al., [1979, Phy.; CR 79-15 Freche ster good radies detected enter at Almilan source della Essan, A., et al., [1979, p. 161-164] MP 1226 Strength of description of an almilant source della Essan, A., et al., [1979, p. 161-164] MP 1226 Limentance Boundaries geomatouster flow equation. Disp. C.J., et al., [1971, p. 378-384] MP 1670 Exchanging lettures the are and universe mater planes as facer, A.R., et al., [1982, p. 201-1244] McHernatouste suppliers model. Gramme, G. et al., 201-187, MP 1651 Investigation of grammer processes as a damatory asses of facering. McGan, R., et al., 21848, p. 821-1254. MP 1663 Investigation of grammer processes as a damatory asses of facering. McGan, R., et al., 21848, p. 821-1254. MP 1663	Chema Roser Lakes Propert resegnation study—decrepant summary. Inhanos, L.A., et al., §1951, §59.3. Vegetation selection and statispenest for overland flow systems. Palatos, A.J., et al., §1952, §135-154. We return the selection and statispenest for overland flow systems. Palatos, A.J., et al., §1962, §135-154. MP 1511 Wanderster treatment and plant growth. Palatos, A.J., §1962, §1992, §1992, §1993, §	regions. Bennem, F.L., (1977), 1879; SR 77-43. Observation and analysis of processed membrane anoding spectrum. Schaeler, D., et al., (1977), 489.; CR 77-18. Measuring sometimed steam one with a condensate pump cycle counter. Johnson, P.R., (1977), 458-481; Merositing old wood frame buildings with membrane blade from. Tobusson, B., et al., (1977), 9-478-481; Merositing old wood frame buildings with membranely-lade from. Tobusson, B., et al., (1977), 9-478-481; Merositing old wood frame buildings. Mines, R.H., et al., (1977), 17-38. Barnel thermography of buildings. Mines, R.H., et al., (1977), 17-38. Dermal scanning systems for detecting building best loss. Good, R.A., et al., (1979), 9-71-389; Dermal scanning systems for detecting building best loss. Good, R.A., et al., (1979), 9-71-389; Merod. Marshall, 3-3-, (1979), 6-74; SR 79-39; Losser from the Fort Manuscryte best describation system. Marshall, 3-3-, (1979), 6-74; Losser from the Fort Manuscryte best describation system. Phemerisco, (1981), 18-72; Hannarykin Frederickin, G., (1982), 7-749; Merod. Manuscryte from the control base describation system. Fort Manuscryte. Phemerisco, G., (1981), 18-72; Merod. Phemerisco, G., (1981), 7-76-740; Merod. Merod. Phemerisco, deep automitic seasor. According to the control base of mines and monutice absention over a settimine seasor. According to the control base of the first Alanda Populate. Henry Cal., (1982), 2-74; Company months for two dimensional intensent had onoduc-
Ideal SR 89.31 Geomal water Leings developed from uniface water and ground water Cacy, K.L., [1973, 73.72. M. 111-20. Fugul utilizations of primary sensing enthering in Fost Devera, Manachusera. Sutternatine, M.R., et al., [1976, 1672. Land treatment of waterwater at Manneau, Cald., and Quinny, Wathington. Harnelin I.K. et al., [1977, 1672. Fresh water supply for an Almhan value. McFadden. I. et al., [1978, 1392. Fresh water supply for an Almhan value. McFadden. I. et al., [1978, 1392. Fresh water supply for an Almhan value. Santh, D.W., or al., [1978, p. 58-61]. MP 1195 Bibliographs on techniques of water distances et old regions. Santh, D.W., or al., [1978, p. 58-61]. Detection of Asteric, S.A., et al., [1979, 1979. Detection of Asteric, S.A., et al., [1979, 1979. Freedo stee pool radar-destated erre are Almhan more della Evenc, A., et al., [1978, p. 191-196]. Strength of stoors oft as a function of we concent and dra unic weight. Soyler, F.H., et al., [1980, p. 197-1179]. MP 1226 Strength of stoors oft as a function of section and supplemental stoudances of section and section and section and section and section. Bull, C.J., et al., [1981, p. 215-241]. McLandaday between the sec and univorse water spaces and section. Bull, C.J., et al., [1981, p. 215-221]. Mr 2001 Mr 2001 Mr 2002 Strength of a treatment processors in an advances are of factoring. McGan, R., et al., [1981, p. 711-82]. Calculation of advertice man itemsport in betweencommend. Mr 1662 Calculation of advertice man itemsport in betweencommend.	Chema Roser Lakes Propert resegrations study—therefore summary Johnson, L.A., et al., §1951, §594. CR 81-18 Vegetation selection and standard for overfined flow systems. Fallaton, A.J., et al., §1952, §135-154. MP 1511 Bandwater incomest and plant growth. Fallaton, A.J., §1962, §1972,	regions. Bennem, F.L., (1977, 1879). SR 77-43. Observation and analysis of processed membrane anoding systems. Schaeler, D., et M., (1977), 1899. CR 77-11. Measuring sometimed steam one with a condensate pump-cycle counter. Johnson, P.R., (1977), 2.58-483, MP 957. Remaillaing old wood frame buildings with membrane bedeenfole-lyde from. Tobiasson, W., et al., (1977), p.878-483, MP 958. Infrared thermography of buildings. Mincs, R.H., et al., (1977, 1792). Infrared thermography of buildings. Mincs, R.H., et al., (1977, 1792). Infrared thermography of buildings. Mincs, R.H., et al., (1977, 1792). Dermal scanning systems for detecting building fact loss. Good, R.A., et al., (1970, p.871-1894). Thermal scanning systems for detecting building fact loss. Good, R.A., et al., (1970, p.871-1894). Infrared thermography of buildings. Information Membral, S.J., (1979, 6.7)2. SR 77-29. Infrared thermography of buildings. Infrared Good buildings with absorbance. Membral, S.J., (1970, 6.9)2. SR 78-30. Infrared thermography of buildings. Infrared Good Good Buildings and Good Good Buildings. SR 78-30. Infrared thermography of buildings. Infrared Good Good Buildings and Good Good Buildings. SR 78-30. Infrared thermography of buildings. Infrared Good Good Buildings. SR 78-30. Infrared thermography of buildings. Infrared Good Good Buildings. SR 78-30. Infrared Steam of the control head distribution systems. Phemography. Thermography. G., (1982, 2082, 2082). MP 2100. Heat and monotive absorbant over automatic transcribes. Abort. M.R., (1981, 1892). SR 78-20. Computer models for two dimensional transcrib best conduction. Abort. M.R., (1981, 1892). SR 78-20. Crassillation of distribut bersing systems for pagin deeps. G., (1982, 1792). Phemographic. G., (1982, 1792). Phemographic. G., (1982, 1793). Phemographic. G., (1982, 1793). Phemographic. G., (1982, 1794). Phemographic. G.,
Ideal SR 89-31 Cound outer Lengs developed from uniface water and ground water Carry, K.L., [1673, 7172 M. III-D) Papel utilization of primary tenage efficient at Fort Devera, Mistachusera. Sutterwine, M.R., et al., [1976, 1872] Land treatment of waterwiner at Mistacca, Cald., and Quincy, Watington. Islandar E.K. et al., [1977, 1874] Fresh water supply for an Almian village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almian village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almian village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almian village. McFadden, Y. et al., [1678, 1874] Fresh water supply for an Almian village. McFadden, Y. et al., [1678, 1874] Fresh water supply for a store freedom in coolergous. Smith, D.W., comp., [1979, 7594] Determon of Alexan water supplier such groudwand beth- majors. Astone, S.A., et al., [1979, 7494] Determon of Alexan water supplier such groudwand beth- majors. Astone, S.A., et al., [1979, 7494] Erespit of freeze soft as a function of are consens und dris une usigle. Society, E.H., et al., [1979, 7 89-119] MP 1226 Strength of freeze soft as a function of are consens und dris une usigle. Society, E.H., et al., [1981, 7 89-119] MP 1451 Linearined Boundment promotouser from equation. Dals, C.J., et al., [1981, 7 18-38] MP 1461 Exchanging between the set and unforces unter planes in shores and Tiera, A.R., et al., [1982, 297] Exchanging of promotouse from consens are soft Scient, H.M., et al., [1982, 7 18-124] MP 1661 First teen of a trout-fress model. Gramming association, Dals, C.J., et al., [1981, 7 18-18] MP 1662 Calculation of absenting suma mission loss. Dals, C.J., Procedure of a treatment grown and managed in a bettingground credia. Dals, C.J., [1981, 7 18-18] Procedure of a treatment grown and managed in bettingground credia. Dals, C.J., [1981, 7 18-18] Procedure of a treatment grown and managed in bettingground credia. Dals, C.J., [1981, 7 18-18] Procedure of a treatment grown and	Chema Roser Lakes Propert resegnation study—theretypes summary. Johnson, L.A., et al., [1991, 1994]. Vegetation selection and standardness of overfiling flow systems. Palazzo, A.J., et al., [1992, p.135-154]. Watersteer producers and plant growth. Palazzo, A.J., [1992, 1992, 1993, 1994]. Watersteer producers and plant growth. Palazzo, A.J., [1992, 1992, 1994]. Effects of municipus on on systems of integrate. All Lebest, F.H., et al., [1992, 1992]. Watersteer applications in Societ ecosystems. Melkin, F.H., et al., [1992, 1992]. Watersteer applications in Societ ecosystems. Melkin, H.S., et al., [1992, 1992]. Watersteer applications in Societ ecosystems. Melkin, H.S., et al., [1992, 1992]. Watersteer applications in Societ ecosystems. Melkin, H.S., et al., [1992, p.191-164]. Watersteen in a cold economistics. A. of al., [1992, 1993]. Watersteen and societ economistics. A. of al., [1992, 1993]. Watersteen and background deviations in and over soon Hogae, A.W., [1997, p.191-195]. When the sepects of using rease in California. Reed. S.C., [1998, 1998]. Health impacts of using rease in California. Reed. S.C., [1998, 1998]. Watersteen appears of the societ economistics. Societ, R.F., [1994, APP, 1994]. What BALANCE. Health appears of the ground surface. Societ, R.F., [1994, APP, 1995]. William Calculation regions. Wellow, C., [1998, "Pp. M. 1998]. Consistings of Australian regions. Wellow, C., [1998, "Pp. M. 1998]. Heat balance. Lyposiumate solution to Neumann proborm for soil vortices. Lanzedon, V.J. et al., [2017, p.191]. We rest balance. Lyposiumate solution to Neumann proborm for soil vortices. Lanzedon, V.J. et al., [2017, p.191].	regions. Bennem, F.L., (1977), 1879; SR 77-43. Observation and analysis of processed membrane anoding systems. Schaeler, D., et al., (1977), 489.; CR 77-11. Measuring sometimed steam use with a condensate pump cycle counter. Johnson, P.R., (1977), 2.53-481; Measuring sold wood frame buildings with membrane bridge layer from Tobusson, B., et al., (1977), 9.476-481; Merost from Tobusson, B., et al., (1977), 9.877-99. Infrared thermography of buildings. Muncs, R.H., et al., (1977), 17-1; Dermal scanning systems for detecting building free loss. Goot, R.A., et al., (1972), 9.79.; Merost from the first framework by MP 1212 infrared thermography of buildings. 1977 Count Grand suvery Marshall, 3.3., (1979, 6.79; Johns from the Fort Wanningto best distribution system. Phemiophice, G., et al., (1981, 179); Marshall, 3.3., (1979, 6.79; Januarytin Freelingthoet, G., (1982, 2.79; Merost from the crastral best distribution system. Phemiophice, G., (1981, 1872; Merost from the crastral best distribution system. Phemiophic, G., (1981, 1872; Merost from the crastral best distribution system. Phemiophic, G., (1981, 1872; MP 2100 Heat and montone absention over astrontic via set for Wannings. Phemiophic, G., (1981, 1982). MP 2100 Merost from the for pages on the Trans-Aliaka Popeline Heat and montone absention over astrontic via set. Astrony, all pages and all processes and distribution systems from the for pages on the Trans-Aliaka Popeline Heat and distribution for the to-malarenesses astrontic via set. Astrony, and all pages and all p
Ideal SR 89.31 Geomal water Leings developed from surface water and ground water Cacy, K.L., [1973, 7172. Papel softensions of pursues sensor enforces at Foot Devera, Mastachusera. Surfandine, M.R., et al., [1976, 1972. Land trestment of waterwater at Masticea, Cald., and Quinty, Wathington. Harnder I.K. et al., [1977, 1972. Land trestment of waterwater at Masticea, Cald., and Quinty, Wathington. Harnder I.K. et al., [1977, 1972. Fresh water supply for an Almdan village. McFadden, I. et al., [1978, 1392. Fresh water supply for an Almdan village. McFadden, I. et al., [1978, 1392. Fresh water supply for an Almdan village. Fresh water supply for an almost on the Mantin regolds. Anderson, D.M., et al., [1971, p. 58-61]. MF 1895. Bibliographs on technoques of water detection at cold regions. Sunth, D.W., comp., [1979, 79.2. SR 78-81. Detection of Atence water supplies with geoglessocil technoques. Astonic, S.A., et al., [1979, p. 1972. Fresh water pool rather detected error at Almhain more defa. Evency, A., et al., [1978, p. 191-164]. MF 1226 Strength of favors self as a function of size connects and drs. une surfly. Seeles, F.H., et al., [1988, p. 198-119]. MF 1670. Redministic Seeles, F.A., et al., [1982, 1982. Explanation of powerdness for determining selected squifer putameters. Dals, C.J., [1982, 1982. Explanation of powerdness for determining selected squifer putameters. Dals, C.J., [1982, 1989. Explanation of attentioner model. Gramming and et Incomp. McGan, R., et al., [1981, p. 1981. MF 1663 Exceptions of attentioner smaller treatment in all almosting anne of Incomp. McGan, R., et al., [1981, p. 1981. MF 1663 Exp., et of slow exite sinal treatment on grounds ster quales. SR 1860.	Chem Roser Lakes Propert resegration under therefore summary. Inhance, L.A., et al., §1951, §594. Vegetation selection and statisgement for overland flow systems. Fallatos, A.J., et al., §1952, §135-154. We return selection and statisgement for overland flow systems. Fallatos, A.J., et al., §1962, §135-154. MP 1511 Bandenster reconnect and plant growth. Palatos, A.J., §1962	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed membrane anoding systems. Schaeler, D., et M., (1977, 1879). CR 37-11. Measuring sometimed steam one with a condensate pump cycle counter. Johnson, P.R., (1977, 2.53-181). MP 957. Remaillaing old wood frame buildings with membrane pomp cycle from. Indianoso, W., et al., (1977, 2.53-181). MP 958. Indianot thermography of buildings. White, R.H., et al., (2977, 177). Indianot thermography of buildings. Mines, R.H., et al., (2977, 177). Indianot thermography of buildings. Mines, R.H., et al., (1977, 177). Indianot thermography of buildings. Mines, R.H., et al., (1977, 177). Thermal scanning systems for detecting building fact loss, God, R.A., et al., (1979, p. 871-879). MP 1212. Indianot thermography of buildings. a billinguarshy with abstracts. Marshall, S.J., (1979, 679). SR 77-39. Indianot thermography of buildings. 1977. Count Gental survey. Marshall, S.J., (1979, 679). SR 78-39. Indianot from the Fort Wainsingto 1977. Count Gental survey. Marshall, S.J., (1971, 679). Francylace, G., et al., (1981, 797). SR 38-38. Indianothy and the fort manuscount systems. Phemoglace, G., et al., (1981, 797). Heat losses from the central heat distribution systems. Phemoglace, G., (1982, 79, 1981). Heat and mounter advertion over automatic size. Astron. Phemoglace, G., (1982, 79, 1981). Heat and mounter advertion over automatic size. Astron. Mines. Albert, MR, (1981, 1992). Creations. Albert, MR, (1981, 1992). Creations. Albert, MR, (1981, 1992). Creations. Mines. Phemoglace, G., (1982, 79, 1992). MP 2108. Heat pump. Received of distinct beauting systems for pump design. Phemoglace, G., (1982, 1992). Therefore, G., (1982, 1792). MP 2108. Heat and mounter advertion over automatic size of the formal size of the pump. Albert, MR, (1982). Creations. Albert, MR. (1982)
Ideal SR 89.31 Ideal outer Lings dereisped from unface water and ground water Carp, K.L., [1973, 7172]. M. 1814-09. Papel unfirmines of pursues senage efficient in foot Develop. Manachusetta. Satteradine, M.R., et al., [1974, 1872]. Land treatment of uniterature Missinger. Cald, and Quincy. Wathington: Idealous I.K. et al., [1972, 1872]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1973, 1872]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1974, 1872]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1974, 1872]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1974, 1872]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1974, 1872]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1974, 1974]. Bibliographs on technoques of unier in the Memain regolut. Antenne, D.M., comp., [1979, 7972]. SR 79-10 Detection of Astern unier supplies unit prophysical technoques. Asteone, S.A., et al., [1979, 797]. Freedomer of Astern unier supplies unit prophysical technoques. Events, A., et al., [1979, 7 183-164]. MF 1224. Events, A., et al., [1979, 7 183-164]. MF 1251. Lineamed Boummers, groundanter from equation. Daly, C.J., et al., [1981, p. 379-384]. Referentially between the set and uniform unity planes in footen and extra formation and footen unity planes in footen. Ball, C.J., [1981, p. 379-384]. McChemitaci unidation of antisque unity and unity and planes. Scient, H.M., et al., [1981, p. 21-1214]. MF 1662. Eventiquios of printener powers in an admining some of recovery and an admining some of treatment groundant in an admining some of treatment groundant in an admining some of treatment of admining some of treatment groundant in an admining some of treatment groundant in an admining some of treatment groundant in an admining some of treatment of admining some of treatment groundant in an admining some of treatment of admining some of treatment groundant in an admining some of treatment of admining p	Chema Roser Lakes Propert resegnation study—theretypes summary Johnson, L.A., et al., [1981, 1984]. Vegetation selection and standagement for overfland flow systems. Fallaton, A.J., et al., [1982, p. 835-154]. MP 1511 Mandenater treatment and plant growth. Palaton, A.J., [1982, 279]. Effects of summarism on not systems of integras. Eshade, F.H., et al., [1982, 279]. Mandenater applications in Societ ecosystems. Melant, F.H., et al., [1982, 279]. Mandenater applications in Societ ecosystems. Melant, B.H., et al., [1982, 279]. Mandenater applications in Societ ecosystems. Melant, B.H., et al., [1982, 279]. Melants in the adjustment labelities, methers Afrika. Roud, D.A., [1982, 279]. Melants and the adjustment labelities, methers Afrika. Roud, D.A., [1982, p. 919-164]. Members. Stake dimeny tools a preliminary survey. Monato, A., et al., [2077, 239]. Mese. Checutation and background distances in and our soun Hogan, A.M., [1987, p. 91-138]. Mese. Checutation and background distances in and our some Hogan, A.M., [1987, p. 91-138]. Metalth aspects of unite rease in California. Reed, S.C., [1870, p. 281-48]. Metalth aspects of land resument. Reed, S.C., [1870, 239]. MEAT BALANCE. Heat Balance. Landon, V.J., [1981, p. 98-17]. MF 1894 Pressing and shawing best balance metages approximations. Lanardon, V.J., et al., p. 79, p. 197. MF 1894 Freezing and shawing best balance metages approximations. Lanardon, V.J., [1981, p. 98-17]. MF 1897. MF 1897. MF 1898 Freezing and shawing best balance metages approximations. Lanardon, V.J., [1981, p. 98-17]. MF 1897. MF 1898 Freezing and shawing best balance metages approximations. Lanardon, V.J., [1981, p. 98-17]. MF 1897. MF 1897. MF 1898 Freezing and shawing best balance metages approximations. Lanardon, V.J., [1981, p. 98-17]. MF 1897.	regions. Bennem, F.L., (1977, 1879). SR 77-43. Observation and analysis of processed membrane confing systems. Schaefer, D., et al., (1977, 1879). CR 77-11. Measuring sometimed steam one with a condensate pump cycle counter. Johnson, P.R., (1977, 2-43-48), SR 99-97. Remislating old wood frame buildings with recodernable-level from: Tobusion, B., et al., (1977, 2-43-48), SR 79-98. Intraced thermography of buildings. Mines, R.H., et al., (1977, 179). Intraced thermography of buildings. Mines, R.H., et al., (1977, 179). Dermal scienting systems for detecting building first loss. Goot, R.A., et al., (1979, 2871-289). Dermal scienting systems for detecting building first loss. Goot, R.A., et al., (1979, 2871-289). Dermal scienting systems for detecting building first loss. Goot, R.A., et al., (1979, 2871-289). Intraced thermography of buildings. In 207 Count Genel survey. Marshall, S.J., (1979, 679). Johnst drom the Fort Wannington bent distribution system. Phemography, of the first standard conduction systems. Phemography, and first loss from the central base distribution systems. Phemography, and first loss from the central base distribution systems. Phemography, and the central base distribution systems. Phemography, and the central base distribution systems. Phemography, and the central base distribution systems is bet if minimized. Phemography, C., (1981, 1992). Heat and mostupe absention over assistance was see. Analysis and on the central base distribution systems as bet if minimized of heat pages on the Trans-Minka Papeline. Marshallow. Albert, M.R., (1981, 1992). Memography. G., (1981, 1992). Johnstone of distribution systems for principlene, G., (1981, 1992). Johnstone of distributions systems for principlene, G., (1981, 1992). Johnstone of distributions systems for principlene, G., (1981, 1992). Johnstone of distributions systems for principlene, G., (1981, 1992). Johnstone of distributions systems for principlene, G., (1981, 1992). Johnstone of distributions systems for principlene, G.,
Ideal SR 89.31 Count outer Lengs dereloyed from uniface water and ground unter Carry, K.L., [1673, 7172. M. 181-89.] Papel utilizations of pursuesy tensors efficient at Foot Devera, Manachmenta. Sutterwine, M.R., et al., [1674, 1673.] Land treatment of uniform tax. Manachmenta. Calc., and Quincy, Washington. Handar. E.K. et al., [1071, 1674.] Erich unter supply for an Alman village. McFadden, Y. et al., [1678, 1874.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1874.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1874.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1874.] Fresh unter supply for an Alman village. Fresh unter supply for an Alman village. McFadden, Y. et al., [1971, p. 58-61]. MF 1886. Biddingraphs on techniques of unter detection uncode explosion. Smeth, D.W., comp., [1679, 794]. Detection of Artists unterture at Alman meet defa Economy. Activit., [1679, p. 161-164]. MF 1226. Strength of footers ut as a function of are connects under uncode. Economy. Activit., [1670, p. 161-164]. MF 1226. Strength of footers ut as a function of are connects under uncode. Economy. Activit., p. 181-3442. MF 1226. Rechnishing lettures the are and unforces unter planes in footers and Tare, A.R., et al., [1681, p. p. C.R.2-15]. Exchanged for treatment for are and unforces unter planes in footers and Tare, A.R., et al., [1682, p. p. C.R.2-15]. Exchanged for treatment processes in a shamourg some of forering. McCom., R., et al., [1983, p. 931-124]. MF 1661. First term of a foresthesses under Gramma, G.L., et al., [1984, 274]. MF 1662. Evering these of presented grounds are under shamour and a forest and managen some of forering. McCom., R., et al., [1984, 294]. MF 1663. Evering default. Dals, C.J., [1983, p. 931-1245]. MF 1663. Procedure for extending promote are them have. Eths. C.J., 1884. Prolys upt chievede paper and powerd unter chemistrs. Part. Prolys upt chievede paper and powerd unter chemistrs. Prolys upt	Chema Roser Lakes Propert resegrations under the energy summary. Inhanos, L.A., et al., [1992, 959.] CR 81-18 Vegetation selection and standagement for overland flow systems. Fallatos, A.J., et al., [1992, 913-154.] MP 1511 Bandenater treatment and plant growth. Palatos, A.J., [1992, 1992.] Effects of symmitous on not summary of integration. A.J., [1992, 1992.] Effects of symmitous on not summary of integration. Enduct. F.H., et al., [1992, 1992.] Bandenater applications on forest ecosystems. McLam, H.E., et al., [1992, 1992.] Represent to a fallatory. Major CR 82-12 Bandenater applications on forest ecosystems. McLam, H.E., et al., [1992, 1992.] Represents an in-adjacent turbus labelian, northern Almia. Road, D.A., [1993, p. 1992.] Represents in a cold evantometer. 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed membrane anoding systems. Schaeler, D., et M., (1977, 1989). CR 37-11 Mensioning sometimed steam one with a condensate pump cycle counter. Johnson, P.R., (1977, 2-53-48). MP 957 Remaillaing old wood frame buildings with mendemaldehade from. Johnson, B.R., (1977, p. 478-48). MP 958 Infrared thermography of buildings. Minex, R.H., et al., (1977, 197-48). Infrared thermography of buildings. Minex, R.H., et al., (1977, 197). Infrared thermography of buildings. Minex, R.H., et al., (1971, 197). Thermal scanning systems for detecting building fact loss. Good, R.A., et al., (1979, p. 87-18-9). MP 1212. Infrared thermography of buildings. a bilinguarshy with abstracts. Marshall, S.J., (1979, 67-y). SR 77-39 Infrared thermography of buildings. a bilinguarshy with abstracts. Marshall, S.J., (1979, 67-y). SR 78-30 Losser from the Fort Wainsingto 1977 Count General service Harmography of buildings. 1977 Count General service, Marshall, S.J., (1979, 67-y). SR 78-30 Losser from the Fort Wainsings 1977 Count General service. Thermylace, G., et al., (1981, 79-y). SR 38-18-18 If this from the central heat distribution system. Phemography. Phemography, G., (1982, 79-y). We summinged. Phemography, G., (1982, 79-y). MP 2100 Heat and monature advertion over automatic sea are. Automatic for the central heat distribution systems at Fort Wainsinged. Phemography, G., (1981, 79-y). MP 2100 Heat and monature advertion over automatic sea are. Automatic of heat papers on the Trans-Almida Popelme. Heater C.J., (1981, 79-y). Cranspare models for to ordinary southwas for pump design. Phemography of district beauting systems for pump design. Phemography of district beauting systems for pump design. Phemography of district beauting systems for pump design. Phemography of the pump. Rose that a story of heat pump systems for pump design. Phemography of the pump systems. Phemography of the pump systems. Phemography of the pump systems. Phemography
Ideal SR 89.31 Ideal unter Lings dereisped from unface water and ground water Carp, K.L., [1973, 717; M. 1814.05 Papel unfirmton of pursary senspe efficient in foot Develop. Manachusetta. Satteradine, M.R., et al., [1974, 167; M. 70-68 Land treatment of uniterature Manacea. Cald., and Quincy. Wathington: Ideal in K. et al., [1972, 167; M. 70-68 Land treatment of uniterature Manacea. Cald., and Quincy. Wathington: Ideal in K. et al., [1972, 167; M. 70-68 Land treatment of uniterature at Manacea. Cald., and Quincy. Wathington: Ideal in the et al., [1972, 167; M. 70-68 Fresh unier supply for an Almian village. McFadden, Y. et al., [1973, 187; M. 70-70] Fresh unier supply for an Almian village. McFadden, Y. et al., [1973, 1974, M. 70-70] Fresh unier supply for an Almian village. McFadden, Y. et al., [1974, 1974, M. 70-70] Billiographs on techniques of unier in the production of the entire sound in the manacea. McLean unier suppliers with production techniques. Sanch, D.W., comp., [1973, 79-73] Direction of Alexan unier suppliers with production the forecast and in a function of are consent and dris unit unique. Sanch, A., et al., [1974, 7-197-169]. MF 1224 Extraction of fusions of an a function of are consent and dris unit unique. Sanch, E.M., et al., [1974, 7-197-179]. MF 1451 Linearized Boundaries planthuser from equation. Daly, C.J., et al., [1971, 7-197-179]. MeChamian between the set and unitories unity plants in the fusion of printing of a strending of entire printing of a strending of entire printing of the surface of unity and the surface and a trending of manacear in an admining some of the entire of planthuser of a strending point of catagors in an admining some of the entire of planthuse of printing points of unity and the surface of the entire of the su	Chema Roser Lakes Propert resegration study—therety entitions of blooms, L.A., et al. (1991, 1994) Vegetation selection and stratagement for overfined flow systems. Falsato, A.J., et al. (1992, 913-134) We pertain selection and stratagement for overfined flow systems. Falsato, A.J., et al. (1992, 913-134) Me 1511 Manceuter treatment and glast growth. Falsato, A.J., 1894,	Cherrysion and analysis of processed membrane cooling systems. Schaeler, D., et al., [1977, 1879]. CR 27-11. Measuring sometimed steam one with a condensate pump cycle counter. Johnson, P.R., [1977, 2.58-161]. Measuring sold wood frame buildings with membrane pump cycle counter. Johnson, P.R., [1977, 2.58-161]. MP 997 Remislating old wood frame buildings with membranele-hade from. Johnson, W., et al., [1977, p.476-487]. MP 998 Infrared thermography of buildings. Music, R.H., et al., [2977, 1792]. Infrared thermography of buildings. Music, R.H., et al., [2977, 1792]. Market, S.J., [277, p.871-896]. MP 1.12-infrared thermography of buildings. Philosoprals with assuming systems for detecting building best loss. Good, R.A., et al., [2972, p.871-896]. MP 1.12-infrared thermography of buildings. Philosopraphy with structs. Market, S.J., [2979, 679]. SR 79-80. Infrared thermography of buildings. Philosopraphy with structs. Market, S.J., [2979, 679]. SR 79-80. Infrared thermography of buildings. Philosopraphy with structs. Market, S.J., [2970, 679]. SR 79-80. Infrared thermography of buildings. Philosopraphy with structs. Market, S.J., [2970, 679]. SR 79-80. Infrared thermography of buildings. Philosopraphy with sure and flexible flexible and discribition systems. Phemoglace, G., [1911, 797]. SR 79-80. Heat losses from the central heat distribution systems in Fort. Manusages. Phemoglace, G., [1942, 794, 299]. MP 2100. Heat and monature advantable distribution system in Fort. Manusages. Phemoglace, G., [1943, 294]. SR 79-36. Computer models for two distribution every animals was new. Associate the distribution of distributions of steam pages on the Transaction for GR 83-12. Computer models for two distributions for pages flexible, G., [1943, 294]. MP 2106. Heat pump. Most pages. Philosopraphy of the form of the pages flexible, G., [1943, 294]. MP 2106. Heat pump. Most pages. Philosopraphy of the form of the page flexible, G., [1944, 294]. MP 2106. MP 2107. Heat recovers. Ma building besting. Sectio
Ideal SR 89.31 Count outer Lengs dereloyed from uniface water and ground unter Carry, K.L., [1673, 7172. M. 181-89.] Papel utilization of pursuesy temper efficient at Foot Devera, Manachustern. Sutterwine, M.R., et al., [1976, 1872.] Land treatment of uniform tax. Manachustern. Edited, and Quincy, Washington. Handan E.K. et al., [2077, 1872.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1872.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1872.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1872.] Fresh unter supply for an Alman village. McFadden, Y. et al., [1678, 1872.] Fresh unter supply for an Alman village. Williage GCMS arealway of unter in the Mantan repolity. Anderson, D.M., et al., [1979, 2 58-82]. MF 1889. Determine of Arease unter supplies such geoglysmal techniques of a techniques of a stead-stated errar at Alman unter delta. Essan, A., et al., [1678, 2 161-164]. MF 1224. Strength of discress sit as a function of are connected and as une unified. Sealer, F.H., et al., [1981, 2 887-112]. MF 1224. Linearmed Boundaries grounduster flow equation. Daly, C.J., et al., [1871, 2 378-341]. MF 1226. Releasedly between the set and unificates unter planes in soccas and Tare, A.R., et al., [1982, 2 20-128]. Relationally between the are and unificates unter planes in soccas and Tare, A.R., et al., [1982, 2 20-128]. MR 1651. Estationate of procedures for determining infective apider yeatmeters. Daly, C.J., [1982, 2 21-128]. MF 1661. First term of a trout-lense model. Gramma, Gl., et al., [1981, 2 28-84]. MF 1662. Inscringing of primaries growness in an administry conference in red and Baly, C.J., [1982, 2 21-128]. MF 1663. Procedure for extradisting promote interscions in series of there are a streamines and interscions in series of there are a streamines of possession and the consensus. MR 1662. Prolys unit chlorate pages and possess unter chemistry. Part et. J., et al., [1983, p. 73, 83]. MR 2512. Prolymat chl	Chema Roser Lakes Propert resegrations under summary Johanne, L.A., et al. [1992, 1994] Vegetation selection and statisgement for overland flow systems. Fallaton, A.J., et al. [1992, 9 135-154] Watersiter presented and plant growth. Palaton, A.J., [1992, 1993, 154] Watersiter presented and plant growth. Palaton, A.J., [1992, 1992, 154] Watersiter presented and plant growth. Palaton, A.J., [1992, 159] Effects of symmittions on not summers of integration. Enduct. F.H., et al. [1992, 159] Watersiter applications on forest ecosystems. McAur., E.H., et al. [1992, 159] Vegetation in two adjacent travels kabulato, northern Almia. Road, D.A., [1993, p. 190-190]. MP 7000. Wether growth in a cold evolutional to 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Cherrysion and analysis of processed membrane souting systems. Schaeler, D., et M., (1977), 1879; CR 27-11. Measuring sometimed steam one with a condensate pump-cycle counter. Johnson, P.R., (1977), 2.58-1813. MP 957. Remaillaing old wood frame buildings with membrane pump-lyde from. Indianos, W., et al., (1977), 2.58-1813. MP 958. Indianoed thermography of buildings. Minex, R.H., et al., (1977), 177-181. Indianoed thermography of buildings. Minex, R.H., et al., (1977), 177-181. Indianoed thermography of buildings. Minex, R.H., et al., (1977), 177-181. Thermal scanning systems for detecting building fact loss. Good, R.A., et al., (1978), p. 87-18-18-19. Thermal scanning systems for detecting building fact loss. Good, R.A., et al., (1979), p. 87-18-19. Indianoed thermography of buildings. a billinguarshy with abstracts. Marshall, S.J., (1979, 67-y). Indianoed thermography of buildings. a billinguarshy with abstracts. Marshall, S.J., (1979, 67-y). Indianoed thermography of buildings. 1977. Count Gental survival. Thermyline. Marshall, S.J., (1979, 67-y). Indianoed thermography of buildings. 1977. Count Gental survival. Thermyline. G., et al., (1981, 79-y). Indianoed steamography of buildings. 1977. Count Gental survival. Thermyline. G., et al., (1981, 79-y). If ranson, analysis of bard international systems. Pleamography. Thermyline. G., et al., (1981, 79-y). MP 1980. Heat and monature advertion over automatic system. For Management. Phermyline. G., (1981, 79-y). CR 81-18. Heat mid monature advertion over automatic system as for December 1981. Marshall S.J., (1981, 1992). CR 91-18. Heat mad monature advertion over automatic system as for December 2, 1987. SR 70-26. Computer models for to ordinary assurems for pump decays. Phermyline. G., (1981, 79-y). Indianoed distinct beauting systems for pump decays. Phermyline. G., (1981, 79-y). Thermyline. G., (1981, 79-y). Name of distinct beauting systems for pump decays. Phermyline. G., (1981, 79-y). Name of the pump decays plant a size beaut
Ideal SR 89.31 Geomal water Leings developed from uniface water and ground unter Cacy, K.L., [1973, 73.72] M 111-89. Fupol utilizations of primary sensing enthering in Fost Devera, Manachustern. Suffernishing, M.R., et al., [1976, 1672] Land treatments of uniformize Malacean, Cald., and Quinty, Wathington. Harndon I.K. et al., [1977, 1672] Fresh unter supply for an Almhan village. McFadden, I. et al., [1978, 1392] Fresh unter supply for an Almhan village. McFadden, I. et al., [1978, 1392] Fresh unter supply for an Almhan village. McFadden, I. et al., [1978, 1392] Fresh unter supply for an Almhan village. McFadden, I. et al., [1978, 1392] Fresh unter supply for an Almhan village. Fresh unter supply for an Almhan village. McFadden, D.M., et al., [1978, p. 58-812] MF 1195 Bibliographs on techniques of unter supplies unth prophysical tech- magne. Asterna, S.A., et al., [1979, p. 492] Detection of Astern unter supplies unth prophysical tech- magne. Asterna, S.A., et al., [1979, p. 492] Erectan etc pool endored-destred error in Almhan unter defa- E-water, A., et al., [1978, p. 181-184] Emparated Bonanness etc in a substance unter and dra une supplie. Suplies, B.H., et al., [1988, p. 189-119] Rechnically between the set und unbooks unter himse an factor and Tare, A.R., et al., [1982, 1992]. CE 82-41 Enthermated boundation of untergras unteractions in sola. Selan, H.M., et al., [1982, p. 201-20] MF 2001 Institution of prophysics model. Genome, G.L., et al., [1983, p. 200-212] NP 1657 Institution of allertine mines transport in heterogeneous streka and in the control propersion in the aluminary some of freezing. McGan, R., et al., [1981, p. 78.59] MP 1667 Propulated on extending promotivate from lines. Disk, C.I., [1984, 209, C.F., [1881, p. 78.59] MP 1667 Propulated on extending promotivate from lines. Disk, C.I., [1984, 1987, C.F., [1881, p. 78.59] The publication of allertine mines transport in heterogeneous streke and a treat- freezing in the control of ground unter chemistra.	Chema Roser Lakes Propert resegrations under thereeyers summary. Inhanos, L.A., et al., [1991, 993]. Vegetation selection and standardiness of control flow systems. Fallatos, A.J., et al., [1992, 913-154]. We fill the selection and standardiness of control flow systems. Fallatos, A.J., et al., [1992, 913-154]. Me 1511 Bandenater incomerci and plant growth. Fallatos, A.J., [1992, 259]. Effects of symmittiess on not summars of integras. Enhand, F.H., et al., [1992, 259]. Bandenater applications on Societ ecosystems. Melant, H.L., et al., [1992, 259]. Begrations on two adjacent timetra labelitat, meethers Alman Road, D.A., [1992, p. 151-164]. Bench, D.A., [1992, p. 151-164]. CR 84-64. Headers from the a cold environment. 1. (2.4., [1984, 278]). Benneter. Stake drawing books a prelaminary survey. London, A., et al., [2077, 639]. SR 77-13. Messe. Christians and background discussions in and over times. Hopes, A.W., [1992, p. 151-135]. Messe. Christians and background discussions in and over times. Hopes, A.W., [1992, p. 151-135]. Messe. Christians and background discussions in and over times. Hopes, A.W., [1992, p. 151-135]. Messe. Head's aspects of uniter rease in Caldonia. Reed, S.C., [1993, 259]. MF 1899. HEAT BALANCE: Heat exchange at the pround surface. Ison, R.F., [1994, 259]. MF 1890. MEAT BALANCE: Heat exchange at the pround surface. Ison, R.F., [1994, 259]. MF 1890. Christians of the cold regions of the moretices hemisphere, L. Wilson, C., [1997, 141p]. Christians of the cold regions of the moretices hemisphere, L. Wilson, C., [1997, 141p]. Christians of the cold regions of the moretices hemisphere. Lamadom, V.J., [1997, p. 181]. Proving measurements in Societies and societies. E. et al., [1994, p. 181]. Messemble and measurements on soon. Locales, E. et al., [1994, p. 181]. MF 1890. MF 2807. MF 2807.	regions. Bennem, F.L., (1977, 1879). Observation and analysis of processed membrane anoding systems. Schaeler, D., et M., (1977, 1879). Chromony summered steam one with a condensate pump cycle counter. Johnson, P.R., (1977, 2.53-28). MP 997 Remailing old wood frame buildings with membrane pump cycle from. Indianaen, B., et M., (1977, 2.53-28). MP 998 Introced thermography of buildings. Mines, R.M., et M., (1977, 179). Introced thermography of buildings. Mines, R.M., et M., (1977, 179). Distinct thermography of buildings. Mines, R.M., et M., (1977, 179). Distinct thermography of buildings. Mines, R.M., et M., (1977, 179). Distinct thermography of buildings. a bildings fact loss. Goog, R.A., et M., (1978, 1971, 1879). SR 77-39 Introced thermography of buildings. a bildingships with abstracts. Marshall, 3.5., (1979, 6.7). Johnstein Marshall, 3.5., (1979, 6.7). Johnstein Marshall, 3.5., (1979, 6.7). Johnstein Marshall, 3.5., (1979, 6.7). Johnstein, Marshall, 3.5., (1979, 6.7). MP 1910 Heat boson from the central heat distribution system in Fort Manusamph. Predeplace, G., (1982, 1982, 1982). MP 210. Heat mad montice absented over a potation was set. Astronomy, Albert, M.R., (1981, 1992). MP 210. Heat mad montice absented over a potation was set astronomy, Albert, M.R., (1981, 1992). Computer montice for pages on the Trans-Alaska Poptime Heat Conduction. Albert, M.R., (1981, 1992). Computer montice for a pages on the Trans-Alaska Poptime Memilians, C., (1981, 1992). Johnstein, M.R., (1981, 1992). Computer mo
Ideal St. 1983. Ideal outer Lings dereisped from unface water and ground water Carry, K.L., [1973, 7172]. Mill-1973. Papel unfirmtone of pursues sense efficient in foot Develop. Manachment. Satteradine, M.R., et al., [1976, 1672]. Manachment. Satteradine, M.R., et al., [1976, 1672]. Land treatment of uniterature Manacea. Cald., and Quincy. Wathington: Idealous I.K. et al., [1977, 1672]. Fresh unier supply for an Almham village. McFadden, Y. et al., [1978, 1872]. Satteradine, D.M., et al., [1978, p. 58-61]. MP 1195 Bibliographies on archimogra- of unier in the Manace repolit. Anderson, D.M., et al., [1978, p. 58-61]. MP 1195 Bibliographies on archimogra- of unier dimension world regions. Samth, D.M., comp., [1979, 7572]. Satteradine of Manace unier suppliers soft prophismost techniques. Samth, D.M., comp., [1979, 7572]. MP 1206 Freedowner proof endor-dereited crate in Almham uner della Louis, A., et al., [1979, p. 193-195]. MP 1226 Strength of fusions of in a finite-time of our consent mil dix unit united fusions. Louis, A., et al., [1979, p. 193-195]. MP 1226 Strength of fusions of an a function of our consent mil dix united united weight. Sayles, F.H., et al., [1988, p. 187-119]. MP 1251 Limentified Bouanding prounduster from equation. Dals, C.J., et al., [1981, p. 273-284]. Mathematical transfers the six and unflowers united applier parameters. Dals, C.J., [1982, 1972]. MP 2651 Environmental transfers of anti-open streamonism united applier. Mathematical transfers of anti-open streamonism united applier. July A. 209-145]. Mathematical transfers of anti-open streamonism united applier. July A. 209-145]. Million of promoters providence in an abstinance one of anti-open streamonism united applier. July A. 209-145]. Million of promoters providence in an abstinance of anti-open united applier. July A. 209-145]. Million of promoters providence in an abstinance of anti-open united and article of a promoters. Park et al., [1981, p. 208-18]. Polys united ones of anti-open unit	Chema Roser Lakes Propert resegrations study—therefore summary Johanos, L.A., et al., [1991, 1994] Vegetation selection and statiagement for overfaint flow systems. Falsato, A.J., et al., [1992, p. 135-1354] MP 1511 Mandenater treatment and plant growth. Palsato, A.J., [1992, 2374] Sifferts of summarism on not systems of integras. Erhads, F.H., et al., [1992, 2374] Mandenater replacations in Societ ecosystems. Melant, F.H., et al., [1992, 2374] Mandenater replacations in Societ ecosystems. Melant, F.H., et al., [1992, 2374] Mandenater replacations in Societ ecosystems. Melant, III., et al., [1992, 2374] Mandenater replacations in Societ ecosystems. Melant, III., et al., [1992, 2374] Melant Road, D.A., [1992, p. 1993, 104] Menors in the adjacent times labeled, northern Alman. Road, D.A., [1992, p. 1994, 1994] Menors Stake diment foods a preliminary survey. Montest A., et al., [2007, 2007] Menors in the additional distributes in and out summaria, Mandenater and Societ summaria, Melant, A., et al., [2007, 2007] Menors in the property of state error in California. Reed, S.C., [2007, p. 2014, 439] Meath superity of unite return in California. Reed, S.C., [2007, p. 2014, 439] Meath superity of unite return in California. Reed, S.C., [2007, p. 2014, 439] Meath superity of the prompt surface. Societ, R.J., [2004, MP 1804] Meath superity of the old regions of the morthern hemisphere, I. Melant, C., [2007, 1815] Ment Balance, I. al., [2007, p. 2017] Ment Balance, I. al., [2007, p. 2017] Mere range of Austrician regions. Manden, C., [2004, p. 2018] Percent surmarisment to make holder in outer. J. andren, S.A., [2004, p. 2018] Ment then Ment then Ment and theories best balance error of purchasions, S.M. [2008, p. 2018] Mere than Mentalian, S.J., [2008, p. 2007, p. 2017] Mere and Mentalian S.J., [2008, p. 2007, p. 2017] Mere and Mentalian S.J., [2008, p. 2007, p. 2017] Mere and Mentalian S.J., [2008, p. 2007, p. 2017] Mere and Mentalian S.J., [2008, p. 2007, p. 2017] Mere and Mentalian S.	regions. Bennem, F.L., (1977, 1879). Cherryston and analysis of processed membrane souting system. Schaeler, D., et M., (1977, 1879). Chessioning souncerted steam one with a condensate pump cycle counter. Johnson, P.R., (1977, 243-483). MP 997 Remislating old wood frame buildings with republicable from. Indianon, B., et M., (1977, 243-483). MP 998 Intraced thermography of buildings. Mines, R.H., et M., (1977, 179). Intraced thermography of buildings. Mines, R.H., et M., (1977, 179). Dermal scienting systems for detecting building bent loss. Good, R.A., et M., (1978, p. 271-289). Dermal scienting systems for detecting building bent loss. Good, R.A., et M., (1978, p. 271-289). Intraced thermography of buildings. In 1971 Count Gentl survey. Marshall, S.J., (1978, 1974). Intraced thermography of buildings. In 1971 Count Gentl survey. Marshall, S.J., (1978, 1974). Intraced thermography of buildings. Intraced Gentl survey. Marshall, S.J., (1978, 1974). Intraced thermography of buildings. Intraced Gentl survey. Marshall, S.J., (1978, 1974). Intraced thermography of buildings. International systems. Phemography. G., et M., (1981, 1974). Intraced thermography of buildings. International systems. Phemography. G., (1981, 1974). International form the central head distribution systems. Phemography. G., (1981, 1974). MP 1900 Heat made monstone absention over activation systems in fort. Manuscript. Phemography. G., (1981, 1774). MP 1900 Heat made monstone absention over activation was not. Aubtra, I. (1988, 1774). MP 1900 Heat made monstone absention over activation was not. Aubtra, I. (1988, 1774). MP 1900 Heat made monstone absention over activation was not. Autropasses. G., (1981, 1774). MP 1900 Heat made monstone absention over activation was not. Autropasses. G., (1981, 1774). MP 1901 Heat made monstone absention over activation was not. Autropasses. G., (1981, 1774). MP 1902 Computer models for the contributions. Application of distinct beating systems for propagalence. G., (1981, 1774).

Heat recovery (cont.)	Heat transfer in cold climates. Lunardini, V.J., (1981,	Review of analytical methods for ground thermal regime cal-
Experimental scaling study of an annular flow ice-water heat	731p ₁ MP 1435	culations. Lunardim, V.J., (1985, p 204-257) MP 1922
sink. Stubstad, J.M., et al, [1977, 54p] CR 77-15	Results from a mathematical model of frost heave. Guymon, G.L., et al, [1981, p 2-6] MP 1483	Experiments on thermal convection in snow Powers, D, et
Waste heat recovery for heating purposes. Phetteplace, G, [1978, p.30-33] MP 1256	Phase change around a circular cylinder. Lunardini, V.J.	al, [1985, p.43-47] MP 2006
Design procedures for underground heat sink systems. Stub-	[1981, p 598-600] MP 1507	Heat flow sensors on walls-what can we learn. Flanders,
stad, J M, et al, [1979, 186p. in var. pagns]	Bottom heat transfer to water bodies in winter. O'Neill, K.,	S.N., [1985, p.140-149] MP 2042
SR 79-08	et al, [1981, 8p.] SR 81-18	Measured and expected R-values of 19 building envelopes.
Waste heat utilization through soil heating. McFadden, T.,	Phase change around insulated buried pipes quasi-steady	Flanders, S N, (1985, p 49-57) MP 2115
et al, (1980, p.105-120) MP 1363	method Lunardini, V J., [1981, p.201-207]	Transient two-dimensional phase change. Albert, M.R., et
Heat pumps to recover heat from waste treatment plants	MP 1496	al, [1985, p 229-243] MP 2162
Martel, CJ, et al, [1982, 23p] SR 82-10	Ice segregation in a frozen soil column Guymon, GL, et al, [1981, p 127-140] MP 1534	Confidence in heat flux transducer measurements of build-
Heat recovery from primary effluent using heat pumps Phetteplace, G, et al, (1985, p 199-203) MP 1978	al, (1981, p 127-140) MP 1534 Heat conduction with phase changes. Lunardini, V J,	ings. Flanders, S.N., (1985, p.515-531) MP 2290 Model of freezing front movement. Hromadka, T.V., II, et
Phetteplace, G, et al. (1985, p 199-203) MP 1978 Primary effluent as a heat source for heat pumps. Phette-	(1981, 14p) CR 81-25	al, [1985, 9p] MP 2077
place, G E, et al, 1988, p 141-146; MP 2445	One-dimensional transport from a highly concentrated, trans-	Heat transfer in water over a melting ice sheet. Lunardini,
Heat sinks	fer type source. O'Neill, K., [1982, p 27-36]	V.J., (1986, p.227-236) MP 2033
Design procedures for underground heat sink systems Stub-	MP 1489	Heat transfer characteristics of thermosyphons with inclined
stad, J.M., et al, (1979, 186p in var. pagns 1	On the temperature distribution in an air-ventilated snow lay-	evaporator sections Haynes, F.D., et al, (1986, p 285-
SR 79-08	er. Yen, YC., (1982, 10p.) CR 82-05	292 ₁ MP 2034
Ice heat sinks Part 1. Vertical systems. Lunardini, V.J.,	Theory of thermal control and prevention of ice in rivers and	Heat transfer in water flowing over a horizontal ice sheet.
[1986, 107p] SR 86-14	lakes. Ashton, G.D., [1982, p 131-185] MP 1554	Lunardini, V.J., et al, [1986, 81p] CR 86-03
Ice heat sinks. Part 2. Horizontal systems Lunardini, V.J.,	Freezing of soil with surface convection Lunardini, V J. (1982, p 205-212) MP 1595	Heat distribution research Phetteplace, G, [1986, p 2-3] MP 2150
[1986, 104p] SR 86-26	Ottauquechee River—analysis of freeze-up processes. Cal-	Water-source heat pumps Phetteplace, G, (1986, p 14-
Condensing steam tunnel heat sinks. Lunardini, V.J., (1986, 29p) SR 86-24	kins, D J., et al, [1982, p 2-37] MP 1738	15 ₁ MP 2151
(1986, 29p) SR 86-24 Heat sources	Frost heave model. Hromadka, T.V , II, et al, (1982, p.1-	Natural convection in sloping porous layers Powers, D.J.,
Thermal energy and the environment. Crosby, R.L., et al,	10 ₁ MP 1567	et al, [1986, p.697-710] MP 2158
(1975, 3p. + 2p. figs.) MP 1480	Freezing of semi-infinite medium with initial temperature	Heat transfer in a freezing shaft wall. Liandi, F., (1986,
Waste heat utilization through soil heating. McFadden, T.,	gradient. Lunardini, V J., (1983, p 649-652)	24p. ₃ CR 86-08
et al, (1980, p 105-120) MP 1363	MP 1583	Condensing steam tunnel heat sinks. Lunardini, V.J.,
Primary effluent as a heat source for heat pumps. Phette-	Solution of two-dimensional freezing and thawing problems	(1986, 29p.) SR 86-24
place, G.E., et al. (1988, p.141-146) MP 2445	O'Neill, K., [1983, p 653-658] MP 1584	Roughness and transfer coefficients over snow and sea ice.
Primary effluent as a heat source for heat pumps. Phette-	Approximate phase change solutions for insulated buried cyl- inders Lunardini, V J, [1983, p.25-32] MP 1593	Andreas, E L, (1986, 19p) CR 86-09
place, G.E., et al, [1989, p 12-17] MP 2760	Approximate solution to conduction freezing with density	Bulk transfer coefficients for heat and n omentum over leads and polynyas Andreas, E.L., et al, [1986, p.1875-1883]
Heat transfer	variation Lunardini, V J., [1983, p 43-45] MP 1598	MP 2187
Formation of ice ripples on the underside of river ice covers Ashton, G.D., [1971, 157p] MP 1243	Computer models for two-dimensional transient heat conduc-	Convective heat transfer in water over melting ice sheet.
Ashton, G.D., [1971, 157p] MP 1243 Heat transfer in drill holes in Antarctic ice Yer, YC., et	tion. Albert, M.R., [1983, 66p] CR 83-12	Lunardini, V.J., [1986, p 42-51] MP 2600
al, [1976, 15p] CR 76-12	Predicting lake ice decay Ashton, G D, [1983, 4p]	Heat transfer of a thermosyphon. Zarling, J.P., et al, [1987,
Numerical simulation of air bubbler systems Ashton, GD,	SR 83-19	p.79-84 ₁ MP 2190
[1977, p.765-778] MP 936	Transient heat flow and surface temperatures of a built-up	Model of heat and soil-water flow coupled by soil-water phase
Experimental scaling study of an annular flow ice-water heat	roof. Korhonen, C, [1983, 20p.] SR 83-22	change Hromadka, T.V, II, [1987, 124p]
sink. Stubstad, J.M., et al. [1977, 54p] CR 77-15	Thawing beneath insulated structures on permafrost. Lunar- dini, V J, [1983, p.750-755] MP 1662	SR 87-09 International Symposium on Cold Regions Heat Transfer,
Mathematical model to predict frost heave. Berg, R.L., et al,	Thermal patterns in ice under dynamic loading Fish, A M.,	1987 [1987, 270p] MP 2302
[1977, p.92-109] MP 1131	et al. [1983, p.240-243] MP 1742	Conduction heat transfer with freezing/thawing. Lunardini,
Maintaining buildings in the Arctic. Tobiasson, W., et al.	Freezing in a pipe with turbulent flow. Albert, M.R., et al,	V.J., [1987, p.55-64] MP 2304
(1977, p.244-251) M9 1508	[1983, p 102-112] MP 1893	Measured insulation improvement potential for ten U.S.
Heat transfer over a vertical melting plate. Yen, Y-C., et al, [1977, 12p] CR 77-32	Two-dimensional heat conduction phase change. Albert,	Army buildings. Flanders, S.N., [1987, p.202-220]
Permafrost and active layer on a northern Alaskan road	M.R., et al, (1983, p 85-110) MP 2161	MP 2327
Berg, R.L., et al, (1978, p 615-621) MP 1102	Increased heat flow due to snow compaction the simplistic	Automatic finite element mesh generator Albert, MR, et
Numerical simulation of air bubbler systems. Ashton, G.D.,	approach Colbeck, S.C., [1983, p 227-229]	al, (1987, 27p) CR 87-18
(1978, p.231-238) MP 1618	MP 1693 Fixed mesh finite element solution for cartesian two-dimen-	Heat conduction in a medium with variable properties. Yen, YC, [1987, 18p] CR 87-19
Fundamentals of ice lens formation Takagi, S., [1978,	sional phase change. O'Neill, K., [1983, p.436-441]	Thermai instability and heat transfer characteristics in water-
p.235-242 ₃ MP 1173	MP 1702	/ice systems. Yen, Y-C, [1987, 33p] CR 87-22
Heat and moisture flow in unsaturated soils O'Neill, K,	West antarctic sea ice. Ackley, S.F., [1984, p 88-95]	XYFREZ.4 user's manual. O'Neill, K, [1987, 55p]
(1979, p 304-309) MP 1259	MP 1818	SR 87-28
Design procedures for underground heat sink systems Stub- stad, J.M., et al, (1979, 186p in var. pagns)	Deterioration of floating ice covers. Ashton, G D., (1984,	Heat transfer performance of commercial thermosyphons
SR 7-08	p 26-33 ₁ MP 1676	with inclined evaporator sections Haynes, F.D., et al,
Turbulent heat transfer from a river to its ice cover P ynes,	Two-dimensional model of coupled heat and moisture trans-	(1988, p 275-280 ₁ MP 2320
F.D, et al, (1979, 5p.) CR 79-13	port in frost heaving soils Guymon, G L., et al. (1984, p.91-98) MP 1678	On the application of thermosyphons in cold regions. Zar- ling, J.P., et al, [1988, p.281-286] MP 2321
Accelerated ice growth in rivers Calkins, DJ, (1979, 5p)	Simple model of ice segregation using an analytic function to	Heat conduction with freezing or thawing Lunardini, V.J.,
CR 79-14	model heat and soil-water flow. Hromadka, TV., II, et al,	(1988, 329p) M 88-01
Point source bubbler systems to suppress ice Ashton, GD,	(1984, p 99-104) MP 2104	On the effect of the 4 C density maximum on melang heat
(1979, 12p) CR 79-12	Aerosol growth in a cold environment. Yen, Y-C., [1984,	transfer. Yen, YC, [1988, p 362-367] MP 2382
Snow accumulation, distribution, melt, and runoff. Colbeck, S.C., et al., £1979, 7 465-4681 MP 1233	21p ₁ CR 84-06	Phase change heat transfer program for microcomputers
Application of heat pipes on the Trans-Alaska Pipeline	Designing for frost heave conditions Crory, F.E., et al. (1984, p 22-44) MP 1705	Buzzell, G M., et al. [1988, p 645-650] MP 2383
Heuer, C E . (1979, 27p) SR 79-26	(1984, p 22-44) MP 1705 Freezing of a semi-infinite medium with initial temperature	Primary effluent as a heat source for heat pumps Phette- place, G E., et al. (1988, p 141-146) MP 2445
Dynamic thermodynamic sea ice model Hibler, W D, III,	gradient Lunardini, V.J., (1984, p.103-106)	place, G E., et al. (1988, p 141-146) MP 2445 Effect of variable thermal properties on freezing with an un-
(1979, p 815-846) MP 1247	MP 1740	frozen water content Lunardini, V J., (1988, p.1127-
Turbulent heat flux from Arctic leads. Andreas, E.L., et al.	Frazil ice dynamics. Daly, S.F., [1984, 46p] M 84-01	1132 ₁ MP 2370
(1979, p.5 ² -91) MP 1340	Modeling two-dimensional freezing Albert, MR., 1984,	Thermosyphon for horizontal applications DenHartog.
Point source bubbler systems to suppress ice Ashton, GD,	45p) CR 84-10	S.L., (1988, p 319-321) MP 2444
(1979, p 93-100) MP 1326	Ice cover melting in a shallow river Calkins, D.J., [1984,	Flow developers for melting ice-experimental results Ash-
Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) CR 79-30	p 255-265 ₁ MP 1763	ton, G D., (1989, p 151-160) MP 2465
Mathematical model to correlate frost heave of pavements	Role of heat and water transport in frost heaving of porous	Freezing and to awing of soils in cylindrical coordinates.
Berg, R L, et al, (1980, 49p) CR 80-10	soils Nakano, Y, et al. (1984, p.93-102) MP 1842	Lunardini, V J., (1989, p.185-208) MP 2594
Documentation for a two-level dynamic thermodynamic sea	Dynamics of frazil ice formation Daly, S.F., et al., [1984, p 161-172] MP 1829	International Symposium on Cold Regions Heat Transfer, 1989, 11989, 314p 1 MP 2636
ice model Hibler, W D , III, [1980, 35p] SR 80-08	Status of numerical models for heat and mass transfer in frost-	Cold regions heat transfer. Cheng, K C, et al. (1989, p 1-
Frost heave model based upon heat and water flux. Guy-	susceptible soils. Berg, R.L., (1984, p 67-71)	25 ₁ MP 2637
mon, G L, et al. (1980, p 253-262) MP 1333	MP 1851	Review of , are conduction with freezing Lunardini, V J.,
Adsorption force theory of frost heaving Takagi, S., (1980,	Frazil ice formation. Ettema, R., et al. [1984, 44p]	(1989, p ±7-32) MP 2638
p.57-81; MP 1334	CR 84-18	Heat transfer from water flowing through a chilled-bed open
Thermodynamics of snow metamorphism due to variations in	Ice bands in turbulent pipe flow Ashton, G.D., [1984,	channel Richmond, P.W., et al. (1989, p.51-58)
curvature Colbeck, S.C., [1980, p 291-301] MP 1368	7p1 MP 2087	MP 2649
Free convection heat transfer characteristics in a melt water	Heat and moisture transfer in frost-heaving soils Guymon, G.L., et al. (1984, p 336-343) MP 1765	Primary effluent as a heat source for heat pumps Phette- place, G E, et al. (1989, p 12-17; MP 2760
layer Yen, Y-C, (1980, p 550-556) MP 1311	lee deterioration Ashton, G.D., (1984, p.31-38)	Environment of wintertime leads and polynyas Andreas.
Heat and mass transfer from freely falling drops at low tem-	MP 1791	E.L., (1989, p 273-288) MP 2689
peratures Zarling, J.P., [1980, 14p] CR 80-18	Laboratory tests and analysis of thermosyphons with inclined	Thermal stabilization of permafrost with thermosyphons
Phase change around a circular pipe. Lunardini, V.J.	evaporator sections Zarling, J.P., et al. (1985, p.31-37)	Zarling, J.P., et al., [1990, p.323-328] MP 2583
(1980, 18p) CR 80-27	MP 1853	Heat transfer coefficient
Thermal diffusivity of frozen soil Haynes, FD, et al,	Thermal convection in snow Powers, D.J., et al. (1985,	Heat transfer between water jets and ice blocks Yen, YC.,
(1980, 30p.) SR 80-38 Estimation of heat and mass fluxes over Arctic leads. An	Partial carGentum of a then cattlement and all Comments	(1976, p 299-307) MP 882
Estimation of heat and mass fluxes over Arctic leads. Andreas, E L., [1980, p 2057-2063] MP 1410	Partial verification of a thaw settlement model Cuymon, G.L. et al. (1985, p 18-25) MP-1924	International Symposium on Cold Regions Heat Transfer, 1989, §1989, 314p.; MP 2636
	miner and december of many	17071 (1707) 1117)

Heat transmission	Climatology of rime accretion in the Green and White Moun-	Hydraulic model study of Port Huron ice control structure
Long distance heat transmission with steam and hot water. Aamot, H.W.C., et al. (1976, 39p) MP 938	on the micrometeorology of surface hoar growth on snow in	Calkins, D.J., et al, [1982, 59p] CR 82-3 Structure to form an ice cover on river rapids in winter Per
Heat transmission with steam and hot water. Aamot, H.W.C., et al, 1978, p.17-23, MP 1956	mountainous area. Colbeck, S.C., [1988, p.1-12] MP 2359	ham, R.E., (1986, p 439-450) MP 212 Corps of engineers seek ice solutions Frankenstein, G.E
Heat loss from the central heat distribution system, Fort	Houses	[1987, p.5-7] MP 221
Wainwright. Phetieplace, G., [1982, 20p.] MP 1980 Simplified design procedures for heat transmission system	Post occupancy evaluation of a planned community in Arctic Canada. Bechtel, R.B., et al. (1980, 27p.) SR 80-06	Floating debris control, a literature review Perham, R E (1987, 22p + 41p. of append.) Perham, R E MP 225
piping. Phetteplace, G., [1985, p.451-456] MP 1979	Post occupancy evaluation for communities in hot or cold regions Bechtel, R B., et al. (1980, 57p) SR 80-29	Working group on ice forces 3rd state-of-the-art repor
Simple design procedure for heat transmission system piping. Phetteplace, G., [1985, p 1748-1752] MP 1942	In-situ assessment of two retrofit insulations Flanders, S.N.,	Sanderson, T.J.O., ed. (1987, 221p) SR 87-1 Data acquisition for refrigerated physical model Zufel
HEATING Utilities on permanent snowfields Mellor, M., (1969,	(1986, p.32-44) MP 2172 Human factors	J.E., (1987, p.338-341) MP 235 Preliminary study of scour under an ice jam. Wuebben, J.L.
42p. ₁ M III-A2d	Notes on conducting the behavior setting survey by interview	[1988, p 177-192] MP 247
Heating Management of power plant waste heat in cold regions. As-	method. Ledbetter, C.B., (1976, 33p.) SR 76-14 Computer modeling of terrain modifications in the arctic and	Assessment of hydraulic structures in a stream after season ice run. Calkins, D J, et al. (1989, 12p) MP 274
mot, H.W.C., [1975, p 22-24] MP 942	subarctic. Outcalt, SI, et al, [1977, p 24-32] MP 971	Analysis of a short pulse radar survey of revetments along th
Utility distribution systems in Sweden, Finland, Norway and England. Aamot, H.W.C., et al, [1976, 121p]	Small communities result in greater satisfaction. Ledbetter,	Mississippi River. Arcone, S A, (1989, 20p) MP 269
SR 76-16 Energy conservation in buildings Ledbetter, C B, [1976,	C.B., [1977, 15p.] SR 77-36 Construction equipment problems and procedures: Alaska	Hydraulics Mechanics and hydraulics of river ice jams Tatinclaux, J C
8p) SR 76-17	pipeline project. Hanamoto, B., [1978, 14p] SR 78-11	et al. (1976, 97p) MP 106
Ice engineering complex adopts heat pump energy system. Aamot, H.W C., [1977, p.25-26] MP 893	Bibliography of permafrost soils and vegetation in the USSR	Conference on Computer and Physical Modeling in Hydrau lic Engineering, 1980. Ashton, G.D., ed., (1980, 492p)
Computer derived heat requirements for buildings in cold	Andrews, M., (1978, 175p) SR 78-19 Human-induced thermokarst at old drill sites in northern	MP 132
regions Bennett, F.L., (1977, 113p) SR 77-03 Ice engineering facility heated with a central heat pump sys-	Alaska. Lawson, D.E., et al, [1978, p.16-23] MP 1254	Rational design of overland flow systems. Martel, C.J., et a (1980, p.114-121) MP 140
tem. Aamot, H.W.C, et al, 1977, 4p.; MP 939 Waste heat recovery for building heating. Sector, P.W.,	Tundra recovery since 1949 near Fish Creek, Alaska Law-	Measurement of the shear stress on the underside of simulate ice covers Calkins, D J., et al. (1980, 11p)
(1977, 24p) SR 77-11	son, D E., et al, [1978, 81p] CR 78-28 Communication in the work place an ecological perspective.	CR 80-2
Solving problems of ice-blocked drainage facilities Carey, K.L., 1977, 17p ₃ SR 77-25	Ledbetter, C.B, [1979, 19p] SR 79-03	Traveling wave solution to the problem of simultaneous flor of water and air through homogeneous porous media
Temporary protection of winter construction. Bennett, F L.,	Physical and thermal disturbance and protection of perma- frost Brown, J., et al. [1979, 42p.] SR 79-05	Nakano, Y., [1981, p.57-64] MP 141
[1977, 41p] SR 77-39 Waste heat recovery for heating purposes Phetteplace, G,	Surface disturbance and protection during economic development of the North Brown, J, et al. (1981, 88p.)	Soil hydraulic conductivity and moisture retention feature: Ingersoll, J. (1981, 11p) SR 81-0
[1978, p.30-33] MP 1256	MP 1467	Hydraulic characteristics of the Deer Creek Lake land treatment site during wastewater application. Abele, G., et a
Deicing a satellite communication antenna. Hanamoto, B., et al, [1980, 14p.] SR 80-18	Disturbance and recovery of arctic Alaskan tundra terrain. Walker, D.A., et al, [1987, 63p.] CR 87-11	(1981, 37p) CR 81-0
Waste heat utilization through soil heating. McFadden, T, et al, [1980, p.105-120] MP 1363	is advanced technology "the gateway to irresponsibility".	Data acquisition in USACRREL's flume facility. Daly, S.F et al, [1985, p.1053-1058] MP 208
Transient analysis of heat transmission systems. Phette-	Zufelt, J.E., (1989, p 434-437) MP 2529 Human factors engineering	Hydraulic conductivity and unfrozen water content of froze
place, G., (1981, 53p) CR 81-24 Heat loss from the central heat distribution system, Fort	Temporary environment. Cold regions habitability Bech-	Ice cover effect on river flow Ashton, G.D., [1990, 24p]
Wainwright. Phetteplace, G, (1982, 20p) MP 1980	tel, R.B., et al. [1976, 162p] SR 76-10 Guidelines for architectural programming of office settings.	SR 90-0 Hydrocarbons
Heating enclosed wastewater treatment facilities with heat pumps. Martel, C J., et al, [1982, p.262-280]	Ledbetter, C.B., (1977, 14p) SR 77-05 Buildings and utilities in very cold regions, overview and re-	Fate of crude and refined oils in North Slope soils Sexstone
MP 1976 Heat losses from the central heat distribution system at Fort	search needs. Tobiasson, W, [1988, p 4-11] MP 2552	A, et al, (1978, p.339-347) MP 118 Halocarbons in water using headspace gas chromatography
Wainwright. Phetteplace, G., (1982, p.308-328) MP 2310	HUMIDITY MF 2552	Leggett, D.C., (1981, 13p) SR 81-2
Heating and cooling method for measuring thermal conduc-	Climatology of the cold regions of the northern hemisphere, II. Wilson, C., [1969, 158p] M I-A3b	Hydrodynamics Moving boundary problems in the hydrodynamics of porou
tivity. McGaw, R, [1984 8p] MP 1891 Water-source heat pumps. Phetteplace, G., [1986, p 14-	Humidity	media. Nakano, Y., [1978, p.125-134] MP 134 Remote sensing data for water masses in Delaware Bay an
15 ₁ MP 2151	Effects of volume averaging on spectra measured with a hygrometer. Andreas, E.L., (1981, p 467-475)	agacent wetlands. Ackleson, S.G., et al, [1985, p.1123-
Simulation of district heating systems for piping design Phetteplace, G., [1989, 27p] MP 2746	MP 1728 Surface meteorology US/USSR Weddell Polynya Expedition,	1129; MP 190 Controlled river ice cover breakup; part 2 Theory an
Optimal sizing of district heating pipes Phetieplace, G, [1989, 25p] MP 2747	1981. Andreas, E L, et al, (1983, 32p) SR 83-14	numerical model studies. Ferrick, M.G., et al., 1986, p.293-305, MP 239
International Symposium on Cold Regions Heat Transfer,	New method for measuring the snow-surface temperature. Andreas, E.L., (1984, p 161-169) MP 1867	Hydrogen
1989. [1989, 314p] MP 2636 Reference guide for building diagnostics equipment and tech-	Spectra and cospectra of atmospheric turbulence over snow.	Method for measuring enriched levels of deuterium in so water. Oliphant, J.L., et al., [1982, 12p] SR 82-2
niques. McKenna, C M., et al, (1989, 64p) SR 89-27	Humidity and temperature measurements obtained from an	Hydrogen peroxide
Height finding	unmanned aerial vehicle. Ballard, H. et al, [1987, p 35-45] MP 2293	UV radiational effects on. Martian regolith water. Nadeat P.H., (1977, 89p) MP 107
Height variation along sea ice pressure ridges Hibler, W.D., lil, et al., [1975, p.191-199] MP 848	Spectral measurements in a disturbed boundary layer over	Hydrologic cycle
Helicopters	snow. Andreas, E.L., [1987, p 1912-1939] MP 2254 Kolmogorov Constants for temperature, humidity, and refrac-	Seasonal regime and hydrological significance of stream in ings in central Alaska Kane, D.L., et al. (1973, p.528)
Interaction of a surface wave with a dielectric slab discon- tinuity. Arcone, S.A., et al, 1978, 10p.; CR 78-08	tive index spectra. Andreas, E.L., (1988, p. 2399-2406) MP 2437	540 ₁ MP 102 Hydrology
Laboratory experiments on icing of rotating blades Ackley, S.F., et al, [1979, p 85-92] MP 1236	Three-wavelength scintillation measurement of turbulent heat	Spray application of waste-water effluent in a cold climate
Computer modeling of atmospheric ice accretion Ackley,	fluxes Andreas, E.L., [1990, p 74-77] MP 2696 Hummocks	Cassell, E.A., et al, (1980, p 620-626) MP 140 Cold Regions Science and Technology Bibliography Cum
S.F., et al, (1979, 36p) CR 79-04 lee adhesion tests on coatings subjected to rain erosion	Growth and flowering of tussocks in northcentral Alaska Haugen, R K, et al, [1984, p.10-11] MP 1950	mings, N H, (1981, p.73-75) MP 137 Introduction to abiotic components in tundra Brown, J
Minsk, L.D., (1980, 14p) SR 80-28	Hydraulic fill	(1981, p 79) MP 143
Helicopter snow obscuration sub-test Ebersole, JF, (1984, p 359-376) MP 2094	Construction and performance of the Hess creek earth fill dam, Livengood, Alaska. Simoni, O.W., (1973, p. 23-34)	Sediment load and channel characteristics in subarctic uplan catchments. Slaughter, C W, et al. (1981, p 39-48)
Self-shedding of accreted ice from high-speed rotors. ltaga- ki, K., [1987, p 95-100] MP 2278	MP 859	MP 151
High pressure tests	Hydraulic jets Cutting ice with high pressure water jets Mellor, M., et al.	Evaluation of procedures for determining selected aquife parameters Daly, C.J., [1982, 104p] CR 82-4
Lock wall deicing with high velocity water jet at Soo Locks, Mi. Calkins, D.J., et al. (1977, p 23-35) MP 973	(1973, 22p.) MP 1001 Heat transfer between water jets and ice blocks. Yen, YC.,	Tailwater flow conditions Ferrick, M.G., et al. 1983, 31p.; CR 83-0
Icebreaking by gas blasting. Mellor, M., [1984, p 93-102]	(1976, p.299-307) MP 882	Hydrologic forecasting using Landsat data. Merry, CJ, e
MP 1827	Hydraulic structures lee forces on model structures Zabilansky, LJ, et al.	al, (1983, p.159-168) MP 169 Hydrologic modeling from Landsat land cover date
Canol Pipeline Project: a historical review. Ueda, H.T., et al. §1977, 32p.	[1975, p 400-407] MP 863	McKim, H.L., et al. (1984, 19p) SR 84-0
Overview of existing land treatment systems Iskandar, I.K.,	Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed. (1975, 627p) MP 845	Hydrologic aspects of ice jams Calkins, D J, [1986, p 603- 009] MP 211
(1978, p 193-200) MP 1150 History of snow-cover research. Colbeck, S.C., (1987,	Passage of ice at hydraulic structures. Calkins, D.J. et al. [1976, p 1726-1736] MP 966	Interfacing geographic data with real-time hydrologic fore casting models Eagle, T.C., et al. (1989, p. 857-861)
p 60-65 ₁ MP 2316	Hydraulic model investigation of drifting snow. Wuebben,	MP 252
Cold regions heat transfer. Cheng, K.C., et al. [1989, p.1-25] MP 2637	J.L., (1978, 29p) CR 78-16 Undersea pipelines and cables in polar waters Mellor, M.,	Hydrolysis Ice surface hydrolysis of disopropylfluorophosphate (DFP)
Hoarfrost Dielectric properties of dislocation-free see. Itagaki, K.,	(1978, 34p.) CR 78-22 Working group on ice forces on structures Carstens, T. ed.	Leggett, DC, (1987, p.809-815) MP 245 Hygrometers
(1978, p 207-217) MP 1171	(1980, 146p) SR 80-26	Effects of volume averaging on spectra measured with a hy
Communication tower using in the New England region Mulherin, N, et al. (1986, 7p) MP 2109	Hydraulic model study of a water intake under frazil ice conditions Tantillo, T J., (1981, 11p) CR 81-03	grometer Andreas, E.L., (1981, p 467-475) MP 172
Rime meteorology in the Green Mountains. Ryerson, C.C. 11987, 46p 3 CR 87-01	Foundations of structures in polar waters Chamberlain, E.J., (1981, 16p.) SR 81-25	New method for measuring the snow-surface temperature Andreas, E.L., [1984, p.161-169] MP 186
()	(1.1011 -0A)	randoms with from histarias!

Ice	Ice adhesion	Modeling hydrologic impacts of winter navigation Daly,
Photomacrography of artifacts in transparent materials.	Seeking low ice adhesion. Sayward, J.M., [1979, 83p]	S F., et al, [1981, p.1073-1080] MP 1445
Marshall, S.J., [1976, 31p] CR 76-40 Dynamics of snow and ice masses. Colbeck, S.C., ed,	SR 79-11	Ice control arrangement for winter navigation. Perham,
[1980, 468p.] MP 1297	Ice adhesion tests on coatings subjected to rain erosion. Minsk, L.D., [1980, 14p] SR 80-28	R.E., [1981, p.1096-1103] MP 1449 Force distribution in a fragmented ice cover. Daly, S.F., et
Ice accretion	Adhesion of ice to polymers and other surfaces Itagaki, K.,	al, (1982, p 374-387) MP 1531
Ice accumulation on ocean structures. Minsk, L.D., (1977, 42p.) CR 77-17	(1983, p 241-252) MP 1580	Force measurements and analysis of river ice break up.
ice accretion on ships Itagaki, K., [1977, 22p]	Mechanisms for ice bonding in wet snow accretions on power lines Colbeck, S.C., et al, [1983, p.25-30] MP 1633	Deck, D.S., (1982, p 303-336) MP 1739 Ice sheet retention structures. Perham, R.E., (1983, 33p.)
SR 77-27	Implications of surface energy in ice adhesion Itagaki, K.,	CR 83-30
Numerical simulation of atmospheric ice accretion. Ackley,	[1983, p 41-48] MP 1672	Navigation ice booms on the St. Marys River. Perham, R.E.,
S.F., et al, (1979, p 44-52) MP 1235 Laboratory experiments on icing of rotating blades. Ackley,	Uplifting forces exerted by adfrozen are on marine piles Christensen, FT, et al. (1985, p 529-542) MP 1905	(1984, 12p) CR 84-04 Force distribution in a fragmented ice cover. Stewart, D.M.,
S.F., et al, (1979, p 85-92) MP 1236	Modelling trash rack freezeup by frazil ice Daly, S.F.,	et al, (1984, 16p.) CR 84-07
Computer modeling of atmospheric ice accretion. Ackley,	(1987, p 101-106) MP 2305	Performance of the Allegheny River ice control structure,
S.F., et al, [1979, 36p] CR 79-04 Icing on structures. Minsk, L.D., [1980, 18p]	Evaluation of shear strength of freshwater ice adhered to icephobic coatings Mulherin, N D., (1990, p 149-154)	1983. Deck, D.S., et al, [1984, 15p.] SR 84-13
CR 80-31	MP 2578	Controlling river ice to alleviate ice jam flooding Deck, D.S., [1984, p.524-528] MP 1795
Tests of frazil collector lines to assist ice cover formation	Ice air interface	Ice sheet retention structures. Perham, R.E., [1984, p.339-
Perham, R E, (1981, p 442-448) MP 1488	Air-ice-ocean interaction in Arctic marginal ice zones. Wad-	348 ₁ MP 1832
Computer modeling of time-dependent rime icing in the at- mosphere Lozowski, E.P., et al, [1983, 74p]	hams, P., ed, [1981, 20p] SR 81-19 Configuration of ice in frozen media. Colbeck, S C, [1982,	Controlling river ice to alleviate ice jam flooding Deck, D.S., 1984, p 69-76; MP 1985
CR 83-02	p.116-123 ₃ MP 1512	Determining the effectiveness of a navigable ice boom Per-
Atmospheric scing of structures Minsk, L.D., ed, [1983, 366p.] SR 83-17	Marginal Ice Zone Experiment, Fram Strait/Greenland Sea,	ham, R.E., (1985, 28p) SR 85-17
Field measurements of combined icing and wind loads on	1984 Johannessen, O.M., ed, (1983, 47p) SR 83-12	Upper Delaware River see control—a case study. Zufelt,
wires. Govoni, JW, et al, [1983, p 205-215]	Marginal ice zones: a description of air-ice-ocean interactive	J.E., et al. (1986, p.760-770) MP 2005 Modeling ice restraint forces in an ice boom Perham, R.E.,
MP 1637	processes, models and planned experiments Johannessen.	(1988, p.198-206) MP 2596
Self-shedding of accreted ice from high-speed rotors. Itaga- ki, K., (1983, p.1-6) MP 1719	O.M., et al, [1984, p.133-145] MP 1673 Modeling the marginal ice zone Hibler, W.D., III, ed,	Imjin River ice boom. Perham, R.E. (1988, 102.)
Mechanical ice release from high-speed rotors Itagaki, K.,	[1984, 99p] SR 84-07	SR 88-22
(1983, 8p ₁ CR 83-26	On the role of ice interaction in marginal ice zone dynamics.	Ice bottom surface Formation of ice ripples on the underside of river ice covers.
Assessment of ice accretion on offshore structures Minsk, L.D., 1984, 12p., SR 84-04	Leppăranta, M., et al, [1984, p 23-29] MP 1781 Atmosphere subgroup discussions. Andreas, E.L., [1984,	Ashton, G.D., [1971, 157p] MP 1243
Atmospheric icing on sea structures. Makkonen, L., [1984,	p 97-98 ₁ MP 2603	Some characteristics of grounded floebergs near Prudhoe Bay,
92pj M 84-02	Air-ice ocean interaction in Arctic marginal ice zones:	Alaska. Kovacs, A., et al, [1976, p 169-172] MP 1118
Combined icing and wind loads on a simulated power line test	MIZEX-West Wadhams, P, ed, [1985, 119p] SR 85-06	Grounded floebergs near Prudhoe Bay, Alaska. Kovacs, A.,
span. Govoni, J.W, et al, (1984, p 173-182) MP 2114	Ice dynamics Hibler, W.D., III, [1986, p.577-640]	et al, (1976, 10p) CR 76-34
Arctic thermal design. Lunardini, V.J., [1985, p.70-75]	MP 2211	Analysis of velocity profiles under ice in shallow streams.
MP 2167	Theory for scalar roughness and transfer coefficients over snow and ice Andreas, E.L., 1987, p 159-1841	Calkins, D.J., et al, [1981, p. 94-111] MP 1397 Pooling of oil under sea ice. Kovacs, A., et al, [1981, p. 912-
Ice accretion under natural and laboratory conditions. Itaga- ki, K., et al. [1985, p 225-228] MP 2009	MP 2195	9?2 ₁ MP 1459
Measurement of icing on offshore structures. Minsk, L.D.,	Comment on "Atmospheric boundary layer modification in	Electromagnetic subsurface measurements Dean, A M, Jr.,
[1985, p 287-292] MP 2010	the marginal ice zone" by T J Bennett, Jr. and K. Hunkins Andreas, E L., [1987, p 3965-3969] MP 2394	[1981, 19p] SR 81-23 Ice flow leading to the deep core hole at Dye 3, Greenland.
Ice accretion measurement on a wire at Mt Washington McComber, P., et al, [1985, p 34-43] MP 2173	Coupled air-ice-ocean models. Hibler, W.D., III, [1987,	Whillans, I M, et al, (1984, p.185-190) MP 1824
Transfer of meteorological data from mountain-top sites	p 131-137; MP 2412	Measuring multi-year sea ice thickness using impulse radar.
Govoni, J.W., et al. (1986, 6p) MP 2107	Estimating turbulent surface heat fluxes over polar, marine	Kovacs, A., et al, (1985, p 55-67) MP 1916
Icing and wind loading on a simulated power line. Govoni,	surfaces Andreas, E L., (1988, p 65-68) MP 2448 Thin ice growth Ashton, G.D., (1989, p 564-566)	Electromagnetic properties of multi-year sea ice Morey, R.M., et al, (1985, p.151-167) MP 1902
J.W., et al. (1986, p.23-27) MP 2206 lce detector measurements compared to meteorological data	MP 2657	Laboratory studies of acoustic scattering from the underside
Tucker, W.B., et al, [1987, p.31-37] MP 2277	Year of Bowen ratios over the frozen Beaufort Sea Andreas.	of sca ice Jezek, K.C., et al, [1985, p 87-91]
Self-shedding of accreted ice from high-speed rotors. Itaga-	E L., [1989, p 12,721-12,724] MP 2508 Comments on "A physical bound on the Bowen ratio". An-	MP 1912 Electromagnetic measurements of multi-year sea ice using
ki, K., [1987, p 95-100] MP 2278 Ice accretion and aerodynamic loading of transmission lines.	dreas, E.L., [1989, p.1252-1254] MP 2560	impulse radar Kovacs, A, et al, (1985, 26p)
Egelhofer, K.Z., et al. (1987, p 103-109) MP 2279	Ice bearing capacity	CR 85-13
Climatology of rime accretion in the Green and White Moun-	Failure of an ice bridge. DenHartog, S.L. et al., [1976, 13p.] CR 76-29	Electromagnetic measurements of sea ice Kovacs, A, et al. (1986, p 67-93) MP 2020
Intake design for the conditions Ashton, GD, (1988,	Concentrated loads on a floating ice sheet Nevel, DE,	Analysis of acoustical features of laboratory grown sea ice.
p.107-138 ₁ MP 2518	(1977, p 237-245) MP 1062	Stanton, T K., et al, (1986, p 1486-1494) MP 2222
Atmospheric icing and broadcast antenna reflections. Ryer-	Ice blasting	Flow developers for melting ice—experimental results. Ashton, G.D., [1989, p 151-160] MP 2465
son, C.C., (1988, 13p) CR 88-11 Thickness distribution of accreted ice grown on rotor blades	Icebreaking concepts Mellor, M, [1980, 18p] SR 80-02	Concurrent remote sensing of arctic sea ice from submarine
Itagaki, K., et al, [1988, p 152-156] MP 2523	Breaking ice with explosives Mellor, M., [1982, 64p.]	and aircraft Wadhams, P, et al, (1989, 20p)
Atmospheric icing climatologies of two New England moun-	CR 82-40	MP 2697 High frequency acoustical properties of saline ice Jezek,
tains. Ryerson, C.C., [1988, p 1261-1281] MP 2669 Density of natural ice accretions related to nondimensional	Protection of offshore arctic structures by explosives. Mellor, M., (1983, p 310-322) MP 1605	K.C., et al. (1989, p 9-23) MP 2686
icing parameters Jones, K.F., [1990, p 477-496]	Icebreaking by gas blasting Mellor, M , [1984, p 93-102]	Radar surveying of the bottom surface of ice covers Arcon-,
MP 2705	MP 1827	S A., et al. (1990, p.30-39) MP 2766 ICE BREAKING
Atmospheric using rates with elevation on northern New England mountains, U.S.A. Ryerson, C.C., [1990, p. 90-97]	Revised guidelines for blasting floating ice. Mellor, M. (1986, 37p) SR 86-10	Ice pressure on engineering structures Michel, B., (1970,
MP 2589	Blasting and blast effects in cold regions Part 2 underwater	71p; M III-Bib
Ice acoustics	explosions Mellor, M., [1986, 56p] SR 86-16	Ice breaking Cutting ice with high pressure water jets Mellor, M, et al.
Ultrasonic investigation on ice cores from Antarctica Kohnen, H, et al, [1979, 16p] CR 79-10	Deviation of guidelines for blasting floating ice Mellor, M., (1987, p 193-206) MP 2247	Cutting ice with high pressure water jets Mellor, M, et al. [1973, 22p] MP 1001
Ultrasonic investigation on ice cores from Antarctica	Tactical bridging during winter 1986 Korean bridging exer-	Ice forces on vertical piles Nevel, D E, et al, [1977, 9p]
Kohnen, H. et al. (1979, p 4865-4874) MP 1239	cise. Coutermarsh, B.A., [1987, 23p.] SR 87-13	CR 77-10
Investigation of the acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C. et al. (1981,	Blasting and blast effects in cold regions Part 3, explosions in ground materials Mellor, M., [1989, 62p]	Icebreaker simulation Nevel, D E, [1977, 9p] CR 77-16
19pj CR 81-06	SR 89-15	Investigation of ice clogged channels in the St. Marys River
Acoustic emission and deformation response of finite ice	Ice booms	Mellor, M., et al. (1978, 73p) MP 1170
plates Xirouchakis, P.C., et al., [1981, p.385-394] MP 1455	Application of ice engineering and research to Great Lakes problems. Freitag, D.R., (1972, p 131-138)	Icebreaking concepts Mellor, M., [1980, 18p] SR 80-02
Acoustic emission and deformation of ice plates Xiroucha-	MP 1615	Ice characteristics in Whitefish Bay and St. Marys River in
kis, P.C., et al. (1982, p 129-139) MP 1589 Acoustic emissions from polycrystalline ice St Lawrence.	Forces on an ice boom in the Beauharnois Canal Perham, R E, et al. [1975, p 397-407] MP 858	winter Vance, G P., [1980, 27p] SR 80-32
W F., et al. (1982, p.183-199) MP 1524	R E, et al. (1975, p. 397-407) MP 858 Passage of ice at hydraulic structures Calkins, D J., et al.	Vibrations caused by ship traffic on an ice-covered waterway. Haynes, F.D., et al. (1981, 27p.) CR 81-05
Acoustic emissions from polycrystalline ice. St Lawrence,	(1976, p.1726-1736) MP 966	Breaking ice with explosives. Mellor, M., (1982, 64p)
W.F., et al., (1982, 15p.) CR 82-21	Arching of two block sizes of model ice floes. Calkins, D.J.	CR 82-40
Polycrystalline ice creep in relation to applied stresses Cole, D.M., (1983, p 614-621) MP 1582	ct al. [1976, 11p] CR 76-42 Force estimate and field measurements of the St Marys River	Protection of offshore arctic structures by explosives Mellor, M., (1983, p 310-322) MP 1605
Laboratory studies of acoustic scattering from the underside	ice booms Perham, R.E., [1977, 26p.] CR 77-04	Navigation ice booms on the St. Marys River Perham, R.E.,
of sea ice. Jezek, K.C., et al. (1985, p. 87-91) MP 1912	Some economic benefits of ice booms Perham, R.E.,	(1984, 12p) CR 84-04
Analysis of acoustical features of laboratory grown sea ace	[1977, p 570-591] MP 959 Ice and ship effects on the St. Marys River ice booms Per-	Tetroclary IC et al. (1984 p. 627-638. MP 1716
Stanton, T K, et al. (1986, p 1486-1494) MP 2222	ham, R E . (19'8, p 222-230) MP 1617	Tatinclaux, J.C., et al., (1984, p. 627-638) MP 1716 Operation of the U.S. Combat Support Boat (USCSBMK 1)
High frequency acoustical properties of saline ice Jerek, K.C., et al, (1989, p.9-23) MP 2686	Righting momen in a rectangular ice boom timber or pon-	on an ice-covered waterway Stubstad. J. et al, [1984,
Acoustics and morphology of undeformed sea ice. Jezek,	toon Perham, R.E., (1978, p. 273-289) MP 1136 Performance of the St. Marys River ice booms, 1976-77	28p j SR 84-05 feebreaking by gas blasting Mellor, M., [1984, p 93-102]
K.C., et al, (1990, p 67-75) MP 2730	Perham. R.E., [1978, 13p] CR 78-24	MP 1827

Workshop on Ice Penetration Technology, Hanover, NH,	Penetration of floating ice sheets with cylindrical indentors	Clearing ice-clogged shipping channels Vance, GP, (1980, 13p.)
June 12-13, 1984, 1984, 345p SR 84-33 Mechanics of ice cover breakthrough. Kerr, A.D., 1984,	Sodhi, D.S., et al., [1989, p.104] MP 2688 Ice composition	Hyperbolic reflections on Beaufort Sea seismic records
p.245-262 ₁ MP 1997 Surfacing submarines through ice. Assur, A., [1984, p.309-	Vanadium and other elements in Greenland ice cores. Herron, M.M., et al. (1976, 4p.) CR 76-24	Neave, K G., et al, (1981, 16p) CR 81-02 Hydraulic model study of a water intake under frazil ice con-
318 ₁ MP 1998	Changes in the composition of atmospheric precipitation.	ditions Tantillo, T.J., [1981, 11p] CR 81-03 Summer conditions in the Prudhoe Bay area, 1953-75 Cox
Propulsion tests in level ice on a model of a 140-ft WTGB icebreaker. Tatinclaux, J.C., (1985, 13p) CR 85-04	Cragin, J.H., et al, [1977, p 617-631] MP 1079 Vanadium and other elements in Greenland ice cores. Her-	GFN, ct al, [1981, p.799-808] MP 1457
Level ice breaking by a simple wedge. Tatinclaux, J.C., [1985, 46p.] CR 85-22	ron, M.M., et al. ('977, p.98-102) MP 1092 Stable isotope profile through the Ross Ice Shelf at Little	Sea ice piling at Fairway Rock, Bering Strait, Alaska Kovacs, A, et al, [1981, p.985-1000] MP 1460
Some effects of friction on ice forces against vertical struc-	America V, Antarctica Dansgaard, W, et al. (1977,	Ice distribution and winter ocean circulation, Kachemak Bay Alaska. Gatto, L.W., [1981, 43p] CR 81-22
Ice floe distribution in the wake of a simple wedge Tatin-	Subsurface measurements of the Ross Ice Shelf, McMurdo	River ice suppression by side channel discharge of warm wa
claux, J.C., [1986, p 622-629] MP 2038 Design and model testing of a river ice prow. Tatinclaux,	Sound, Antarctica. Kovacs, A, et al, [1977, p.146-148] MP 1013	ter. Ashton, G.D., [1982, p.65-80] MP 1528 lee distribution and water circulation, Kachemak Bay, Alaska
J.C., [1986, p 137-150] MP 2132 Development of a river ice-prow. Part? Tatinclaux, J.C.,	Subsurface measurements of McMurdo Ice Shelf Gow, A.J. et al, [1979, p 79-80] MP 1338	Gatto, L.W., (1982, p 421-435) MP 1569
(1988, p 44-52) MP 2497	Nitrogenous chemical composition of antarctic ice and snow.	Understanding the Arctic sea floor for engineering purposes [1982, 141p] SR 83-25
Fracture experiments on freshwater and urea model ice. Bentley, D.L, et al. (1988, 152p) MP 2502	Parker, B C, et al, (1981, p 79-81) MP 1541 Physical properties of the ice cover of the Greenland Sea	Bering Strait sea ice and the Fairway Rock icefoot. Kovacs A., et al, [1982, 40p.] CR 82-31
Ice breakup Ice-cratering experiments Blair Lake, Alaska Kurtz, M K,	Weeks, W.F., (1982, 27p) SR 82-28 Physical, chemical and biological properties of winter sea ice	Observations of pack ice properties in the Weddell Sea
et al. (1966, Various pagings) MP 1034	in the Weddell Sea Clarke, D.B., et al. (1982, p. 107-	Atmospheric boundary layer measurements in the Weddel
Yukon River breakup 1976 Johnson, P., et al. (1977, p.592-596) MP 960	109 ₁ MP 1609 Chemical fractionation of brine in the McMurdo Ice Shelf	Sea Andreas, E.L., (1982, p.113-115) MP 1610 Sea ice state during the Weddell Sea Expedition. Ackley
Ice breakup on the Chena River 1975 and 1976. McFadden, T., et al, [1977, 44p] CR 77-14	Cragin, J H., et al. [1983, 16p.] CR 83-06 Morphology and ecology of diatoms in sea ice from the Wed-	SF, et al, (1983, 6p. + 59p) SR 83. Offshore mechanics and Arctic engineering, symposium
Ice decay patterns on a lake, a river and coastal bay in Canada.	dell Sea. Clarke, D.B., et al, [1984, 41p] CR 84-05	1983. (1983, 813p) MP 158
Sea ice and ice algae relationships in the Weddell Sea. Ack-	Sea ice and biological activity in the Antarctic Clarke, DB, et al. (1984, p.2087-2095) MP 1701	Lake water intakes under using conditions Dean, A.M., Jr. (1983, 7p.) CR 83-1
ley, S.F., et al. [1978, p 70-71] MP 1203 Ice forces on the Yukon River bridge—1978 breakup John-	Baseline acidity of ancient precipitation from the South Pole Cragin, J H., et al. (1984, 7p.) CR 84-15	Landsat-4 thematic mapper (TM) for cold environments Gervin, J.C., et al, (1983, p. 179-186) MP 165
son, P.R., et al., [1979, 40p] MP 1304 Break-up dates for the Yukon River; Pt.1 Rampart to White-	Structure of ice in the central part of the Ross Ice Shelf,	Spaceborne SAR and sea ice a status report. Weeks, W.F.
horse, 1896-1978. Stephens, C.A., et al. [1979, c50]	Antarctica. Zotikov, I.A., et al. (1985, p 39-44) MP 2110	[1983, p 113-115] MP 222: lce jams in shallow rivers with floodplain flow. Calkins, D.J.
leaves; MP 1317 Break-up dates for the Yukon River, Pt 2 Alakanuk to Tana-	Physical properties of the sea ice cover. Weeks, WF, [1986, p 87-102] MP 2047	1983, p 538-548 ₃ MP 164 Science program for an imaging radar receiving station is
na, 1883-1978 Stephens, C.A., et al, 1979, c50 leaves; MP 1318	Crystal structure of Fram Strait sea ice. Gow, A J., et al.	Alaska Weller, G., et al, [1983, 45p] MP 188
Modeling of ice in rivers Ashton, G.D., [1979, p.14/1-	Chemical fractionation of brine in McMurdo Ice Shelf Cra-	Marginal ice zones a description of air-ice-ocean interactive processes, models and planned experiments. Johannessen
Break-up of the Yukon River at the Haul Road Bridge: 1979	gin, J.H, et al. (1986, p. 307-313) MP 2239 On the profile properties of undeformed first-year sea ice	O M, et al. (1984, p.133-146) MP 167. Model tests on two models of WTGB 140-foot icebreaker
Stephens, C.A., et al. (1979, 22p + Figs.) MP 1315 Forecasting ice formation and breakup on Lake Champlain	Cox, G.F N., et al, [1986, p.257-330] MP 2199	Tatinclaux, J.C., [1984, 17p] CR 84-0.
Bates, R.E., et al. (1979, 21p) CR 79-26 Freshwater ice growth, motion, and decay Ashton, G D,	Low temperature effects on organophosphonates Britton, K.B., [1986, 47 refs.] SR 86-38	Offshore mechanics and Arctic engineering symposium 1984, (1984, 3 vols) MP 167.
[1980, p.261-304] MP 1299	Physical properties of estuatine ice in Great Bay, New Hamp- shire. Meese, D.A., et al. (1987, p. 833-840)	lce observation program on the semisubmersible drilling ves sel SEDCO 708 Minsk, L.D., (1984, 14p)
lce formation and breakup on Lake Champlain Bates, R.E., (1980, p 125-143) MP 1429	MP 2251 Baseline acidity of South Pole precipitation Cragin, J.H., et	SR 84-0
Ice jams and meteore ogical data for three winters, Ottauque- chee River, Vt. Bates, R.E., et al., [1981, 27p]	al, [1987, p 789-792] MP 2275	East Greenland Sea ice variability in large-scale model simulations. Walsh, J.E., et al. (1984, p.9-14) MP 177
CR 81-01 Ice force measurement on the Yukon River bridge. McFad-	Evaporation of chemical agents from ice and snow Leggett, D.C., (1988, 10p.) CR 88-03	On the decay and retreat of the ice cover in the summer M12 Maykut, G.A., (1984, p 15-22) MP 178
den, T., et al. (1981, p.749-777) MP 1396	Mechanical properties of multi-year sea ice Richter-Menge, J.A., et al., [1988, 27p] CR 88-05	On the role of ice interaction in marginal ice zone dynamics
Breakup of solid ice covers due to rapid water level variations. Billfalk, L., [1982, 17p] CR 82-03	Chemical and structural properties of sea ice in the southern	Drag coefficient across the Antarctic marginal ice zone. An
Field investigations of a hanging ice dam. Beltaos, S, et al., [1982, p.475-488] MP 1533	Beaufort Sea. Meese, D.A., [1989, 294p] MP 2656 Chemical and structural properties of sea ice in the southern	dreas, E.L., et al. (1984, p 63-71) MP 178 Mechanism for floe clustering in the marginal ice zone Lep
Force measurements and analysis of river ice break up.	Beaufort Sea Meese, D.A., [1989, 134p] CR 89-25 Dominion Range ice core characteristics, Antarctica	păranta, M., et al. [1984, p 73-76] MP 178
Deck, D.S., [1982, p. 303-336] MP 1739 Unsteady river flow beneath an ice cover. Ferrick, M.G., et	Mayewski, P.A., et al. (1990, p.11-16) MP 2707	Ice-related flood frequency analysis application of analytics estimates. Gerard, R, et al. [1984, p 85-101]
al, (1983, p 254-260) MP 2079 lce jam research needs Gerard, R., (1984, p.181-193)	Physical properties of brackish ice, Bay of Bothnia Weeks, WF, et al. (1990, p 5-15) MP 2725	MP 171 Model simulation of 20 years of northern hemisphere sea-ic
MP 1813 Analysis of rapidly varying flow in ice-covered rivers Fer-	Chemical and structural properties of sea ice in the southern Beaufort Sea. Meese, D.A., [1990, p. 32-35]	fluctuations. Walsh, J.E. et al, [1984, p 170-176] MP 176
rick, M.G., (1984, p.359-368) MP 1833	MP 2728	Modeling intake peformance under frazil ice condition
lce regime reconnaissance, Yukon River, Yukon Gerard, R., et al, [1984, p 1059-1073] MP 2406	Ice compression Application of ice engineering and research to Great Lakes	Dean, A.M., Jr., [1984, p.559-563] MP 179 lee regime reconnaissance, Yukon River, Yukon. Gerare
Mathematical modeling of river ice processes Shen, H.T., (1984, p.554-558) MP 1973	problems Freitag, D.R., [1972, p.131-138] MP 1615	R, et al. (1984, p 1059-1073) MP 240 Reservoir bank erosion caused by ice Gatto, LW, (1984)
Hudson River ice management. Ferrick, M.G., et al., (1985,	Measuring the uniaxial compressive strength of ice Haynes, F.D., et al. (1977, p 213-223) MP 1027	p 203-214 ₁ MP 178
Construction and calibration of the Ottauquechee River mod-	Ice conditions	MIZEX 83 mesoscale sea ice dynamics: initial analysis H bler, W.D. III, et al. [1984, p.19-28] MP 181
el Gooch, G. [1985, 10p] SR 85-13 Cazenovia Creek Model data acquisition system Bennett,	Ice dynamics, Canadian Archipelago and adjacent Arctic ba- sin Ramseier, RO, et al. [1975, p.853-877]	MIZEX 84 mesoscale sea ice dynamics post operations re port Hibler, W.D., III, et al., [1984, p.66-69]
B M., et al, (1985, p 1424-1429) MP 2090 Controlled river ice cover breakup, part 1 Hudson River field	MP 1585 Statistical variations in Arctic sea ice ridging and deformation	MP 125 Offshore Mechanics and Arctic Engineering Symposium, 4tl
experiments Ferrick, M.G. et al. (1986, p 281-291)	rates Hibler, W.D., III, (1975, p. 11-116) MP 850	1985 (1985, 2 vols) MP 210
MP 2391 Controlled river ice cover breakup, part 2 Theory and	Winter thermal structure and ice conditions on Lake Champlain, Vermont Bates, R.E., 1976, 22p.; CR 76-13	Unified degree-day method for riverice cover thickness simulation Shen, HT, et al. (1985, p 54-62) MP 206
numerical model studies Ferrick, M.G., et al. (1986, p.293-305) MP 2392	Dynamics of near-shore ice Weeks, W.F. et al. (1976, p. 267-275) MP 922	Propulsion tests in level ice on a model of a 140-ft WTG icebreaker Tatinclaux, J.C. (1985, 13p) CR 85-0
Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont. Ferrick, M.G., et al. (1987, p. 163-	Sea ice conditions in the Arctic Weeks, W.F., 11976.	Kadiuk ice stress measurement program Johnson, J B, et a
177) MP 2400	p 173-205; MP 910 Remote sensing of fizzil and brash ice in the St Lawrence	(1985, p.88-100) MP 189 Ice conditions on the Ohio and Illinois rivers, 1972-198
Dynamic ice breakup on the Connecticut River, VT Ferrick, M G, et al. (1988, 16p) CR 88-01	River. Dean, A.M., Jr., (1977, 19p.) CR 77-08 Remote sensing of accumulated frazil and brash ice Dean,	Gatto, I. W., (1985, p.856-861) MP 191 Hudson River ice management Ferrick, M.G., et al., (1985)
Development of a dynamic tie breakup control method for the Connecticut River near Windsor, Vermont Ferrick.	A M. Jr. (1977, p 693-704) MP 934	p 96-110 ₁ MP 217
M G., et al. (1988, p 221-233) MP 2510	Report of the ITTC panel on testing in ice, 1978 Franken- stein, G.E., et al. [1978, p.157-179] MP 1140	Upper Delaware River ice control a case study Zufel JE, et al. [1986, p.760-770] MP 200
Elements of floating-debris control systems Perham, R.E., (1988, 54p. + appends) Perham, R.E., MP 2453	Break-up dates for the Yukon River, Pt 1 Rampart to White- horse, 1896-1978 Stephens, C.A., et al. (1979, c50	Offshore Mechanics and Arctic Ingineering Symposium, 5t 1986, (1986, 4 vols) MP 203
Dynamic ice breakup control for the Connecticut River near Windsor, Vermont. Ferrick, M.G., et al. (1988, p. 245)	leaves) MP 1317	Remote sensing of the Arctic seas. Weeks, WF, et a
258; MP 2449 Assessment of hydraulic structures in a stream after seasonal	Overview on the seasonal sea are zone Weeks, W.F., et al. (1979, p. 320-337) Weeks, W.F. at al. MP 1320	[1986, p.59-64] MP 211 Ice problems associated with rivers and reservoirs Benso
ice run Calkins, DJ, et al. (1989, 12p] MP 2744	Winter thermal structure, ice conditions and climate of Lake Champlain Bates, R. E., 1980, 26p.; CR 80-02	C, et al. (1986, p. 70-98) MP 215 Design and model testing of a river ice prow Tatinclau
Framework for control of dynamic ice breakup by river regu- lation. Ferrick, M.G., et al. (1989, 14p.) CR 89-12	Ice laboratory facilities for solving ice problems Franken-	JC, [1986, p 137-150] MP 213
Framework for control of dynamic ice breakup by river regu- lation. Ferrick, M.G., et al. (1989, p. 79-92)	stein, G.E. (1980, p.93-103) MP 1301 Continuum sea ice model for a global climate model. I ing.	Ice atlas, 1984-1985 Ohio River, Allegheny River, Monogahela River Gatto, L.W., et al., [1986, 185p]
MD 2517	C H at al .1080 n 187-196. MP 1622	SR 86-2

Ice conditions (cont.)	Performance of the Allegheny River ice control structure,	Army research could reduce dangers posed by sea ice Tuck-
River ice mapping with Landsat and video imagery. Gatto, L.W, et al, [1987, p.352-363] MP 2273	1983. Deck, D.S, et al, (1984, 15p) SR 84-13. Controlling river ice to alleviate ice jam flooding. Deck,	er, W.B., [1984, p.20-24] MP 2168 Baseline acidity of ancient precipitation from the South Pole.
Alaska synthetic aperture radar (SAR) facility project Car-	D S., (1984, p 524-528) MP 1795	Cragin, J.H., et al, (1984, 7p) CR 84-15
sey, F., et al, (1987, p 593-596) MP 2408 Analysis of 112 years of ice conditions observed on the Ohio	Methods of ice control for winter navigation in inland waters Frankenstein, G.E., et al. [1984, p.329-337] MP 1831	Sea ice properties. Tucker, W.B., et al, (1984, p.82-83) MP 2136
River at Cincinnati Daly, S.F., et al, [1987, p.70-79]	Ice sheet retention structures. Perham, R.E., [1984, p 339-	Ice drilling technology. Holdsworth, G, ed, [1984, 142p.]
MP 2260 Ice atlas 1985-86 of five rivers of the USA. Gatto, LW, et	348 ₁ MP 1832 Controlling river ice to alleviate ice jam flooding Deck,	SR 84-34 fee drilling and coring systems—a retrospective view Sell-
al, (1987, 367p.) SR 87-20	D.S., (1984, p 69-76) MP 1885	mann, P.V., et al., [1984, p.125-127] MP 1999 System for mounting end caps on ice specimens Cole,
DOD floating ice problems Cox, G.F.N., (1987, p.151-154) MP 2414	Cold facts of ice jams: case studies of mitigation methods. Calkins, D J, (1984, p.39-47) MP 1793	D M, et al, [1985, p.362-365] MP 2016
Arctic construction working group report Marvin, E.L., et al, [1987, p.311-314] MP 2426	Polyethylene glycol as an ice control coating Itagaki, K.,	Structure of ice in the central part of the Ross Ice Shelf, Antarctica. Zotikov, I.A., et al., [1985, p.39-44]
Ice conditions along the Ohio River, 1972-1985. Gatto,	(1984, 11p) CR 84-28 Survey of ice problem areas in navigable waterways. Zufelt,	MP 2110
L.W., [1988, 162p] SR 88-01 Evaluation of an operational ice forecasting model during	J., et al., [1985, 32p] SR 85-02 Ice jam flood prevention measures, Lamoille River, Hardwick	Chemical fractionation of brine in McMurdo Ice Shelf. Cragin, J.H., et al., [1986, p. 307-313] MP 2239
summer. Tucker, W.B , et al, [1988, p.159-174]	VT. Calkins, D.J., [1985, p.149-168] MP 1940	Sea-ice investigations during the Winter Weddell Sea Project.
MP 2347 Ice conditions along the Allegheny and Monongahela Rivers	Cazenovia Creek Model data acquisition system. Bennett, B M., et al, [1985, p.1424-1429] MP 2090	Ackley, S.F., et al, [1987, p.88-89] MP 2491 Chemical and structural properties of sea ice in the southern
Gatto, L.W., (1988, 106p.) SR 88-06	Upper Delaware River ice control-a case study. Zufelt,	Beaufort Sea Meese, D.A., 1989, 294p; MP 2656 US global ice core research program West Antarctica and
Inventory of ice problem sites and remedial ice control struc- tures. Perham, R.E., [1988, 9p] SR 88-07	JE, et al, (1986, p.760-770) MP 2005 Snow and ice prevention in the United States Minsk, L.D.	beyond. Grootes, P.M., et al, [1989, 32p] MP 2709
Ice cover distribution in Vermont and New Hampshire Atlan-	(1986, p 37-42) MP 1874	Dominion Range ice core characteristics, Antarctica. Mayewski, P.A., et al, [1990, p.11-16] MP 2707
tic salmon rearing streams Calkins, D.J., et al., (1988, p.85-96) MP 2473	Evolution of frazil ice in rivers and streams: research and control. Daly, S.F., [1987, p 11-16] MP 2303	Chemical and structural properties of sea ice in the southern
Computer-generated graphics of river ice conditions Bilel- lo, M.A, et al, (1988, p 211-219) MP 2509	Dynamic ice breakup on the Connecticut River, VT. Fer-	Beaufort Sea. Meese, D.A., [1990, p.32-35] MP 2728
Rebuilding infrastructure for pleasure boating Wortley,	rick, M.G., et al., [1988, 10p] CR 88-01 Intake design for ice conditions. Ashton, G.D., [1988,	Ice coring drills
C.A., et al, [1989, p.188-201] MP 2466 Ice conditions along Illinois Waterway, 1972-1985 Gatto,	p.107-138 ₁ MP 2518	General considerations for drill system design Mellor, M., et al, [1976, p.77-111] MP 856
L.W., [1989, 112p.] CR 89-20	Inventory of ice problem sites and remedial ice control struc- tures Perham, R.E., (1988, 9p.) SR 88-07	USA CRREL shallow drill. Rand, J.H., (1976, p.133-137)
Wave-induced bergy bit motion near a floating platform Mak, L.M., et al, [1990, p 205-215] MP 2580	Development of a river ice prow Tatinclaux, JC, et al. [1988, 26p] CR 88-09	MP 873 Ross Ice Shelf Project drilling, October-December 1976.
Ice (construction material)	[1988, 26p] CR 88-09 High-flow air-screen bubbler systems to control ice in locks.	Rand, J.H., 1977, p.150-1521 Mr 1061 Core drilling through Ross ice Shelf. Zotikov, I A. et al.
Engineering properties of sea ice. Schwarz, J., et al, [1977, p 499-531] MP 1065	Rand, J.H., [1988, p 34-43] MP 2496	(1979, p 63-64) MP 1337
Role of research in developing surface protection measures	Development of a river ice-prow. Part 2. Tatinclaux, J.C., (1988, p 44-52) MP 2497	Danish deep drill, progress report: February-March 1979. Rand, J H, (1980, 37p) SR 80-03
for the Arctic Slope of Alaska Johnson, PR, [1978, p.202-205] MP 1068	Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont. Ferrick,	South Pole ice core drilling, 1981-1982. Kuivinen, K.C., et
ICE CONTROL	M.G, et al, (1988, p 221-233) MP 2510	al, (1982, p 89-91) MP 1621 Ice drilling technology Holdsworth, G., ed, (1984, 142p.)
Snow removal and ice control Mellor, M., [1965, 37p] M III-A3b	Ice control in river harbors and fleeting areas Perham, R.E., (1988, 7p) SR 88-12	SR 84-34
Ice control	Dynamic ice breakup control for the Connecticut River near	Ice-coring augers for shallow depth sampling. Fland, J.H., et al. (1985, 22p.) CR 85-21
Use of explosives in removing ice jams Frankenstein, G.E., et al. (1970, 10p.) MP 1021	Windsor, Vermont. Ferrick, M.G., et al., [1988, p.245-258] MP 2449	Ice cover
Application of ice engineering and research to Great Lakes problems Freitag, D.R., [1972, p 131-138]	Unconventional power sources for ice control at locks and dams Nakato, T., et al. [1989, p.107-126]	Environmental analyses in the Kootenai River region, Montana. McKim, H.L., et al. (1976, 53p) SR 76-13
MP 1615	MP 2572	Water resources by satellite McKim, H.L., [1978, p 164- 169] MP 1090
Icings developed from surface water and ground water	Freezeup dynamics of a frazil ice screen. Axelson, K.D., [1990, 8p] SR 90-04	Towing ships through ice-clogged channels by warping and
Carey, R.L., (1973, 7101 M. 111-103		
Carey, K.L., [1973, 71p] M III-D3 Numerical simulation of air bubbler systems Ashton, G.D.,	Salmon River ice jam control studies interim report Axel-	kedging. Mellor, M, [1979, 21p] CR 79-21
Numerical simulation of air bubbler systems Ashton, G.D., (1977, p.765-778) Ashton, G.D., MP 936		kedging. Mellor, M., [1979, 21p.] CR 79-21 Winter surveys of the upper Susitna River, Alaska. Bilello, M.A., [1980, 30p.] SR 80-19
Numerical simulation of air bubbler systems (1977, p.765-778) MP 936 Some economic benefits of ice booms (1977, p.570-591) Perham, R.E., MP 959	Salmon River ice jam control studies interim report Axelson, K.D., et al. (1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard,	kedging. Mellor, M, (1979, 21p.) CR 79-21 Winter surveys of the upper Susitna River, Alaska. Bilello,
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms Perham, R.E.	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et	kedging. Mellor, M., [1979, 21p.] CR 79-21 Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] SR 80-19 Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] SR 81-23 Explosive obscuration sub-test results at the SNOW-TWO
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p) Storm drainage design considerations in cold regions	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.] SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997	kedging. Mellor, M., [1979, 21p.] CR 79-21. Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M. Jr., (1981, 19p.) SR 81-23 Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p 347-354) MP 1872
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p) Storm drainage design considerations in cold regions Lobacz, E.F. et al, (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Per-	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism [1972, p.139-141] LeMasurier, W.E., MP 998	kedgang. Mellor, M., [1979, 21p.] CR 79-21 Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] SR 80-19 Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] SR 81-23 Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872 Structure to form an ice cover on river rapids in winter. Per-
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms Perham, R.E., (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) MP 1617	Salmon River ice jam control studies interim report Axelson, K.D., et al., (1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., (1971, p 17-22) MP 998 Oxygen isotope profiles through ice sheets Johnson, S.J., et al., (1972, p 429-434) MP 997 Byrd Land quaterrary volcanism LeMasurier, W.E.,	kedging. Mellor, M., [1979, 21p.] CR 79-21 Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] SR 80-19 Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] SR 81-23 Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R E., [1986, p. 439-450, Microcomputer-based image-processing system Perovich,
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p) Storm drainage design considerations in cold regions Lobacz, E.F. et al, (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Ashton, G.D., MP 936 Perham, R.E., (1978, p.222-230) MP 1618	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byrd Land quaterrary volcanism LeMasurier, W.E., [1972, p.139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores Her-	kedgang. Mellor, M., (1979, 21p.) Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., (1980, 30p.) Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., (1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R.E., (1986, p.439-450) Microcomputer-based image-processing system D.K., et al., (1988, p.249-252) MP 2385
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Loe and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p. 222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice renioval in the United	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.] SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism LeMasurier, W.E., [1972, p.139-141] MP 994 Polar ice-core storage facility Langway, C. C., Jr., [1976, p.71-75] MP 874	kedging. Mellor, M., (1979, 21p.) Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., (1980, 30p.) Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., (1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R. E., (1986, p.439-450) Microcomputer-based image-processing system D.K., et al., (1988, p.249-252) Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p.9357-9567) MP 2761
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p) Storm drainage design considerations in cold regions Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.212-22) MP 1618 Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.212-22) MP 199 Noncorrosive methods of ice control. Minsk, L.D., (1979,	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22) Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-141] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, p.7] Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p 617-631] MP 1079	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p. 439-450] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p. 9557-9567] Ice cover effect. Antarctic sea ice dynamics and its possible climatic effects.
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., MP 1618 Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.212-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents Ashton, G.D., MP 1988	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byrd Land quaternary volcanism LeMasurier, WE., [1972, p.139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] WP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation.	kedgang. Mellor, M., (1979, 21p.) Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., (1980, 30p.) Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., (1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R.E., (1986, p. 439-450) Microcomputer-based image-processing system D.K., et al., (1988, p. 249-252) Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., (1976, p. 53-76) MP 1378
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al, (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice removal in the United States Minsk, L.D., (1978, p.212-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents (1979, 23p.) CR 79-30	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.] SR 90-06 Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p. 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p. 429-434] Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p. 139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p. 71-75] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p. 617-631] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p. 98-102] Dating annual layers of Greenland ice Langway, C.C., Jr., 1979, Dating annual layers of Greenland ice Langway, C.C., Jr.,	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on river rapids in winter. Perham, R. E., (1986, p. 439-450, MP 1872.] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] MP 2385. Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76) MP 1378. Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.)
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., (1978, p.231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.212-22) Noncotrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents Ashtion, G.D., (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p.222-237, MP 1398	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-144] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-03] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-03] MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.302-306] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, [1977]]	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R.E., [1986, p.439-450, MP 2128 Microcomputer-based image-processing system Perovich, D.K., (1990, p.957-9557, MP 2385 Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p.9557-9567, MP 2761 Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76), MP 1378 Suppression of ice fog from cooling ponds. McFadden, T.,
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al, (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice removal in the United States Minsk, L.D., (1978, p.21-22) MP 1618 Current research on snow and ice removal in the United States Minsk, L.D., (1978, p.21-22) MP 1629 Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p.227-237) MF 1398 Snow and ice control on railroads, highways and airports	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p. 17-22) Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p. 429-434] Byrd Land quaterrary volcanism (1972, p. 139-141) Polar ice-core storage facility Langway, C.C., Jr., (1976, p. 71-75) Vanadium and other elements in Greenland ice cores Herron, M.M., et al., (1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., (1977, p. 81-102) Vanadium and other elements in Greenland ice cores Herron, M.M., et al., (1977, p. 81-102) Dating annual layers of Greenland ice ct al., (1977, p. 302-306) Aerosols in Greenland snow and ice. Kumaii, M., (1977, p. 341-350)	kedging. Mellor, M., [1979, 21p.] Redging. Mellor, M., [1979, 21p.] River surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R.E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p.9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p.53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403] Tubulent heat transfer from a river to its ice cover Haynes,
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p. 222-230) Numerical simulation of air bubbler systems (1978, p. 231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p. 21-22) Np 1618 Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p. 21-22) MP 1699 Noncorrosive methods of ice control. Minsk, L.D., (1979, p. 133-162) Suppression of river ice by thermal effluents Ashton, G.D., MP 1686 After 1088 Ashton, G.D., MP 1088 Souperssion of river ice by thermal effluents Ashton, G.D., (1979, 23p.) CR 79-30 Harmessing frazil ice Perham, R.E., (1981, p.227-237), MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly,	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-141] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-03] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-03] MP 1092 Dating annual layers of Greenland ice cores Herron, M.M., et al., [1977, p.89-102] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] MP 1072 Primary productivity in sea ice of the Weddell region. Ackley, S.F., et al., [1978, 179] CR 78-19	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on river rapids in winter. Perham, R.E., [1986, p. 439-450] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system Perovich, D.K., [1990, p. 9557-9567, MP 2385] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p. 9557-9567, MP 2761] Ice cover effect. Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76, MP 1378] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403] Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.) Analysis sof velocity profiles under ice in shallow streams
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., (1978, p.21-22) MP 1618 Current research on snow and ice removal in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, 1979, 1979) Harmessing frazil ice Perham, R.E., (1981, p.277-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447	Salmon River tee jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byrd Land quaterrary volcanism LeMasurier, W.E., [1972, p.139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p 617-631] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p 98-102] Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.98-102] Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.93-306] MP 1092 Action of the productivity in sea ice of the Weddell region Ack-	kedgang. Mellor, M., (1979, 21p.) Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., (1980, 30p.) Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., (1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R. E., (1986, p. 439-450) Microcomputer-based image-processing system D.K., et al., (1988, p. 249-252) Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9357-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., (1976, p. 53-76) Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., (1978, p. 393-403) Turbulent heat transfer from a river to its ice cover F.D., et al., (1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., (1981, p. 94-111) MP 1397
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F. et al. (1978, p. 474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p. 222-230) Numerical simulation of air bubbler systems (1978, p. 231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p. 212-22) Nnocorrosive methods of ice control. Minsk, L.D., (1979, p. 133-162) Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p. 227-237), MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p. 671-706) Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p. 1073-1080) MP 1445 Ice control at navigation locks. Hanamoto, B., (1981, p. 1088-1095) MP 1448	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22) MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p.429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-141] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-03] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1092 Dating annual layers of Greenland ice cores Herron, M.M., et al., [1977, p.89-102] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] MP 1072 Primary productivity in sea ice of the Weddell region Ackley, SF, et al., [1978, 179] CR 78-19 Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] MP 1002 Ultrasonic investigation on ice cores from Antarctica.	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., (1986, p. 439-450) Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76) Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Effects of ice on coal movement via the inland waterways. Lunardim, V.J., et al., [1981, p.94-111] SR 81-13
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in Cobacc, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., (1978, p.21-22) MP 1618 Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, 193-162) Suppression of river ice by thermal effluents (1979, 23p.) Harmessing frazil ice Perham, R.E., (1981, p. 227-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p. 671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p. 1073-1080) MP 1445 Ice control at navigation locks. Hanamoto, B., (1981, p. 1981)	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-144] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p 617-631] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.302-306] MP 1094 Acrosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] MP 1725 Primary productivity in sea ice of the Weddell region Ackley, S.F., et al., [1978, 17p] Ultrasonic measurements on deep ice cores from Antarctica, Gow, A.J., et al., [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica, Kohnen, H., et al., [1979, 16p] Stratified debris in Antarctic ice cores	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p. 439-450] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Muebben, J.L., et al., (1978, p. 393-403) Turbulent heat transfer from a river to its ice cover F.D., et al., (1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] MP 1397 Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, 72p.) SR 81-13 Application of HEC-2 for ice-covered waterways. Calkins,
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F. et al., (1978, 1974-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p.227-237), MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706), MP 1445 Ice control at navigation locks. Hanamoto, B., (1981, p.1098-1103) NP 1448 Ice control arrangement for winter navigation Daly, S.F., et al. (1981, p.1073-11080) R.F., (1981, p.1096-1103) MP 1448 Ice control irrangement for winter navigation R.E., (1981, p.1096-1103) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., MP 1449 Port Huron ice control model studies. Calkins, D.J., et al.,	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22) MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-141] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-03] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1092 Dating annual layers of Greenland ice cores Horron, M.M., et al., [1977, p.89-102] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] MP 1072 Primary productivity in sea ice of the Weddell region Ackley, SF, et al., [1978, p.48-50] MP 1202 Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, 16p.) CR 78-10 Stratified debris in Antarctic ice cores Gow, A.J., et al., [1979, p.185-192] MP 1272	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on river rapids in winter. Perham, R.E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p.9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403] Tubulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Celkins, D.J., et al., [1982, p.241-248] MP 1575 Reservoir bank erosion caused and influenced by ice cover.
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions (1978, p.212-230) Numerical simulation of air bubbler systems (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice renioval in the United States (1978, p.231-238) Current research on snow and ice renioval in the United States (1978, p.212-220) Noncorrosive methods of ice control. (1978, p.21-22) Name (1979, 23p.) Suppression of river ice by thermal effluents (1979, 23p.) Harmessing frazil ice (1978, p.21-22) MP 1398 Snow and ice control on railroads, highways and airports (1979, 23p.) Snow and ice control on railroads, highways and airports (1978, p.1088-1095) Lee control at navigation locks. Hanamoto, (1981, p.1088-1095) Lee control at rangement for winter navigation (1981, p.1088-1095) Lee control at rangement for winter navigation (1981, p.1088-1095) Lee control at rangement for winter navigation (1981, p.1083-1035) MP 1448 Port Huton ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress	Salmon River tee jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 998 Byrd Land quaterrary volcanism Lemasurier, W.E., (1972, p.139-144] MP 994 Polar ice-core storage facility Langway, C.C., Jr., (1976, p.71-75) MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., (1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., (1977, p 617-631) MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., (1977, p.88-102) MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., (1977, p.88-102) MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., (1977, p.302-306) MP 1092 Primary productivity in sea ice of the Weddell region Ackley, S.F., et al., (1978, p.185-50) MP 1202 Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., (1978, p.165) Stratified debris in Antarctic ice cores Gow, A.J., et al., (1979, p.167) Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., (1979, p.4865-4874) MP 1239	kedgang. Mellor, M., (1979, 21p.) Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., (1980, 30p.) Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., (1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R.E., (1986, p. 439-450) Microcomputer-based image-processing system D.K., et al., (1988, p. 249-252) Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567) Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., (1976, p. 53-76) MP 1378 Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., (1978, p. 393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., (1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., (1981, 72p.) Effects of ice on coal movement via the inland waterways. Lunardim, V.J., et al., (1981, 72p.) Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., (1982, 241-248) Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., (1982, 26p.) SR 82-31
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions in Cold regions of the problems of	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22) Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byrd Land quaterrary volcanism [1972, p.139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.98-102] When the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.98-102] Dating annual layers of Greenland ice cores Herron, M.M., et al., [1977, p.98-102] Aerosols in Greenland snow and ice. Kumai, M., [1977, p.302-306] Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] Primary productivity in sea ice of the Weddell region Ackley, S.F., et al., [1978, 17p] Ultrasonic investigation on ice cores from Antarctica. Gow, A.J., et al., [1979, 16p] Stratified debris in Antarctic ice cores Gow, A.J., et al., [1979, 16p] Stratified debris in Antarctic ice cores Gow, A.J., et al., [1979, 16p] Stratified debris in Antarctic ice cores Gow, A.J., et al., [1979, 16p] Stratified debris in Antarctic ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1232 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1239 20-yr cycle in Greenland ice core records MP 1202 10-yr cycle in Greenland ice core records	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p. 439-450] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p. 9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., (1978, p. 393-403) Tubulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, p. 241-248] Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., [1982, 26p.] Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., [1983, 19p.] SR 83-01
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al., (1978, p. 474-489) MP 1088 Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p. 222-230) MP 1618 Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p. 211-22) MP 1199 Noncorrosive methods of ice control. Minsk, L.D., (1979, p. 133-162) Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p. 227-237), MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) Ice control at navigation locks. Hanamoto, B., (1981, p.1088-1095) Ice control at rangement for winter navigation R.E., (1981, p.106-1103) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodhi, D.S., et al., (1982, 27p.) Theory of thermal control and prevention of ice in rivers and	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-144] MP 997 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-631] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.810-2] MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.302-306] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] MP 1094 Primary productivity in sea ice of the Weddell region. Ackiey, S.F., et al., [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] Gw, A.J., et al., [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, 16p.) Gw, A.J., et al., [1979, 16p.) Gr, 21 al., [1979, p.185-192] Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, 16p.) Gw, A.J., et al., [1979, 16p.] Gw, A.J., et a	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., (1986, p. 439-450) Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252) Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252) Microcomputer-based image-processing system O.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system MP 2128 Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76) Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., (1978, p. 393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., (1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., (1981, p.94-111) Effects of ice on coal movement via the inland waterways. Lunardim, V.J., et al., (1981, p.94-111) Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., (1982, p. 241-248) MP 1375 Reservoir bank crossion caused and influenced by ice cover. Gatto, L.W., (1982, 26p.) Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., (1983, 19p.) Unsteady river flow beneath an ice cover. Fernek, M.G., et al., (1983, p. 254-260) MP 2079
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions (1978, p.21-22) Storm drainage design considerations in cold regions (1978, p.21-22) Storm drainage design considerations in cold regions (1978, p.21-22) MP 1088 Ice and ship effects on the St. Marys River ice booms (1978, p.21-236) Numerical simulation of air bubbler systems (1978, p. 231-238) Current research on snow and ice renioval in the United States (1978, p. 21-22) Noncorrosive methods of ice control. (1979, 23p.) Harmessing frazil ice (1978, p. 21-22) Harmessing frazil ice (1978, p. 21-22) MP 1265 Suppression of river ice by thermal effluents (1979, 23p.) Harmessing frazil ice (1978, p. 21-22) MP 1398 Snow and ice control on railroads, highways and airports (1978, p. 21-23) MP 1398 Snow and ice control on railroads, highways and airports (1978, p. 21-23) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F. et al. (1981, p. 1073-1080) p. 1088-1095) Ice control arrangement for winter navigation R. (1981, p. 1096-1103) Port Huton ice control model studies. Calkins, D.J. et al. (1982, p. 361-373) Model study of Port Huton ice control structure, wind stress simulation Sodhi, D.S., et al. (1982, 27p.) CR 82-09	Salmon River tee jam control studies interim report Axelson, K.D., et al., [1990, 8p.) Recores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byd Land quaternary volcanism Lemssurier, W.E., (1972, p.139-144] Polar ice-core storage facility Langway, C.C., Jr., (1976, p.71-75) MP 374 Vanadium and other elements in Greenland ice cores Cragin, J.H., et al., (1976, 4p.) Cragin, J.H., et al., (1977, p.517-631) MP 1079 Vanadium and other elements in Greenland ice cores Langway, C.C., Jr., et al., (1977, p.58-102) MP 1079 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., (1977, p.38-102) MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., (1977, p.38-102) MP 1094 Aerosols in Greenland snow and ice. Kumai, M., (1977, p.341-350) MP 1094 Primary productivity in sea ice of the Weddell region Ackiey, S.F., et al., (1978, p.48-50) MP 1202 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., (1979, 16p.) Stratified debris in Antarctic ice cores Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records MP 1092 Subsurface measurements of McMurdo lce Shelf Gow,	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on niver rapids in winter. Perham, R. E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p.9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p.53-76] MP 2761 Ice and navigation related sedimentation. Microcomputer sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p.53-76] MP 1378 Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p.393-403] Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1981, 72p.] SR 81-13 Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, 26p.] Using the DWOPER routing model to simulate river flow with ice Daly, S.F., et al., [1983, 19p.] SR 83-01 Unsteady river flow beneath an ice cover Ferrick, M.G., et al., [1983, p.254-260] Bank recession of Corps of Engineers reservoirs
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions Lobacz, E.F., et al., 1978, p. 474-489. MP 1088 Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p. 222-230) MP 1618 Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p. 21-22) MP 1199 Noncorrosive methods of ice control. Minsk, L.D., (1979, p. 133-162) Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) Car 79-30 Hamessing frazil ice Perham, R.E., (1981, p. 227-237), MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1445 Ice control at navigation locks. Hanamoto, B., (1981, p.1088-1095) Ice control at navigation locks. Hanamoto, B., (1981, p.1088-1095) Ice control at rangement for winter navigation Daly, S.F., et al., (1981, p.1073-1086) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodhi, D.S., et al., (1982, 27p.) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) MP 1554 Force measurements and analysis of river ice beak up Deck, D.S., (1982, p.303-336) MP 1739	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-144] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-631] WP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1092 Dating annual layers of Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] Primary productivity in sea ice of the Weddell region Ackley, S.F., et al., [1978, p.48-50] Ultrasonic investigation on ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.486-5-4874] MP 1273 20-yr cycle in Greenland ice core records Hibler, W.D. III. et al., [1979, p.486-5-4874] MP 1239 Subsurface measurements of McMurdo loc Shelf Gow, A.J., et al., [1979, p.79-80] MP 1338	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on river rapids in winter. Perham, R.E., [1986, p. 439-450]. Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252]. MP 2138. Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567). MP 2365. Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567). MP 1378. Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.). CR 76-43. Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403]. Turbulent heat transfer from a river to its ice cover. Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111]. MP 1397. Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, p.94-111]. SR 81-13. Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, p.241-248]. SR 81-13. Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, 26p.]. SR 83-10. Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1983, 195]. SR 83-01. Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1983, 193p.). SR 83-01. Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1981, 1983, 195p.]. SR 83-01. Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1981, 1983, 195p.]. SR 83-01. Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1981, 1983, 195p.]. SR 83-01. Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1984, 1984, 988-95]. West antarctic sea ice. Ackley, S.F., [1984, p.88-95].
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions (1978, p.212-230) Numerical simulation of air bubbler systems (1978, p.222-230) Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice renioval in the United States (1978, p.231-238) Current research on snow and ice renioval in the United States (1978, p.212-22) Noncorrosive methods of ice control. (1978, p.21-22) Namerical simulation of air bubbler systems (1979, p.133-162) Suppression of river ice by thermal effluents (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p.227-237) MP 1398 Snow and ice control on railroads, highways and airports (1979, 23p.) Snow and ice control on railroads, highways and airports (1981, p.1073-1080) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) Lee control at navigation locks. Hanamoto, B., (1981, p.1088-1095) Lee control arrangement for winter navigation R.E., (1981, p.1073-1080) RP 1448 Lee control arrangement for winter navigation R.E., (1981, p.1076-1103) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodhi, D.S., et al., (1982, 27p.) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.303-336) MP 1739 Optimizing deceing chemical application rates (1982, 55p.) CR 82-18	Salmon River tee jam control studies interim report Axelson, K.D., et al., [1990, 8p.) Recores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byd Land quaternary volcanism Lemssurier, W.E., (1972, p.139-144] Polar ice-core storage facility Langway, C.C., Jr., (1976, p.71-75) MP 374 Vanadium and other elements in Greenland ice cores Cragin, J.H., et al., (1976, 4p.) Cragin, J.H., et al., (1977, p.517-631) MP 1079 Vanadium and other elements in Greenland ice cores Langway, C.C., Jr., et al., (1977, p.58-102) MP 1079 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., (1977, p.38-102) MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., (1977, p.38-102) MP 1094 Aerosols in Greenland snow and ice. Kumai, M., (1977, p.341-350) MP 1094 Primary productivity in sea ice of the Weddell region Ackiey, S.F., et al., (1978, p.48-50) MP 1202 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., (1979, 16p.) Stratified debris in Antarctic ice cores Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records Kohnen, H., et al., (1979, p.4865-4874) MP 1239 20-yr cycle in Greenland ice core records MP 1092 Subsurface measurements of McMurdo lce Shelf Gow,	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p.9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p.53-76] MP 1378 Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Muebben, J.L., et al., (1978, p.393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] MP 1397 Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, 72p.] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, p.241-248] Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., (1982, 26p.) Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., [1981, 1993, 1993, 1983-91] Unsteady river flow beneath an ice cover Ferrick, M.G., et al., (1983, 1923), 1973 SR 83-01 West antarctic sea ice. Ackley, S.F., (1984, p.88-95), MP 1818
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L. (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D. (1978, p.231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents Ashton, G.D. (1979, 23p) Hamessing frazil ice Perham, R.E., (1981, p.277-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1445 Ice control arrangement for winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1445 Ice control arrangement for winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1445 Ice control arrangement for winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1445 Ice control arrangement for winter navigation R.E., (1981, p.1086-1103) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodh, D.S., et al., (1982, 27p.) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) MP 1554 Force measurements and analysis of river ice break up Deck, D.S., (1982, p.303-336) MP 1739 Optimizing deicing chemical application rates (Insection of the control structure (Insection of the control of structure (Insection of the control	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p.429-434] Byd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p.81-631] WP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1092 Dating annual layers of Greenland ice cores Herron, M.M., et al., [1977, p.81-02] MP 1092 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] Primary productivity in sea ice of the Weddell region Ackley, S.F., et al., [1978, p.48-50] Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, 16p.] Stratified debris in Antarctic ice cores Gow, A.J., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.79-86) MP 1318 Antifereze-thermodriling, central Ross Ice Shelf. Zotikov. I.A., (1979, 12p.) Danish deep drill, progress report February-March 1979	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872] Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p. 439-450] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p. 9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403] Tubulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, p. 241-248] Reservoir bank crosion caused and influenced by ice cover. Gatto, L.W., [1982, 26p.] Unsteady river flow beneath an ice cover Ferrick, M.G., et al., [1983, p. 254-260) Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., [1983, 103p.] West antarctic sea ice. Ackley, S.F., [1984, p.88-95]
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions (1978, p.212-230) MP 1088 Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., (1978, p.212-221) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) Car 79-30 Harnessing frazil ice Perham, R.E., (1981, p.227-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1448 Ice control at navigation locks. Hanamoto, B., (1981, p.1088-1095) Ice control at arrangement for winter navigation R.E., (1981, p.1073-1080) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodhi, D.S., et al., (1982, 27p.) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) MP 1398 Optimizing decing chemical application rates (1982, 55p.) CR 82-18 How effective are icephobic coatings Minsk, L.D., CR 82-34 How effective are icephobic coatings Minsk, L.D., CR 82-34 How effective are icephobic coatings Minsk, L.D., 1983, Horself and coatings Minsk, L.D., CR 82-34 How effective are icephobic coatings	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 998 Daygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] MP 997 Byrd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-144] MP 994 Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p 617-631] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.88-102] MP 1092 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.302-306] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] MP 1725 Primary productivity in sea ice of the Weddell region Ackley, S.F., et al., [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] MP 1202 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.165-192] Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1239 20-yr cycle in Greenland ice core records from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1239 20-yr cycle in Greenland ice core records from Antarctica. Kohnen, H., et al., [1979, p.4865-4874] MP 1239 20-yr cycle in Greenland ice core records from Antarctica. Kohnen, H., et al., [1979, p.79-80] Antiferce-thermodrilling, central Ross lee Shelf. Zotikov. I.A., [1979, 1297, p.79-80] Antiferce-thermodrilling, central Ross lee Shelf. Zotikov. I.A., [1979, 1297, p.79-80] Antiferce-thermodrilling, central Ross lee Shelf. Zotikov. I.A., [1979, 1297, p.79-80] Time-priority studies of deep ice cores Gow, A.J., et al., [1979, p.79-80] T	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p. 439-450) Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252) Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252) Microcomputer-based image-processing system O.K., et al., [1988, p. 249-252) Microcomputer-based image-processing system MP 2188 Light reflection and transimission by sea ice covers. Perovich, D.K., (1990, p. 9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76) Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., [1978, p. 393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1981, 29p.] Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., [1983, 19p.] SR 81-13 Unsteady river flow beneath an ice cover Ferrick, M.G., et al., [1983, 19p.] SR 83-30 West antarctic sea ice. Ackley, S.F., [1984, p.88-95] MP 1818 Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway Stubstad, J., et al., [1984, 58, 78, 84-05] SR 84-05
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L. (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D. (1978, p.231-238) Current research on snow and ice renioval in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents (1979, 23p.) Hamessing frazil ice Perham, R.E., (1981, p.277-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) Le control at navigation locks. Hanamoto, B., (1981, p.1083-1095) Ice control arrangement for winter navigation Daly, S.F., et al., (1981, p.1073-1080) Re et al., (1981, p.1073-1080) Re 1448 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodhi, D.S., et al., (1982, 77p.) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) Potential control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) MP 1530 MP 1530 MP 1530 MP 1534 Force measurements and analysis of river ice break up Deck, D.S., (1982, p. 303-336) Optimizing deteng chemical application rates (R. 22-29) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) MP 1535 MP 1536 MP 1536 MP 1537 MP 1539	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p. 17-22) MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p. 429-434] Byd Land quaterrary volcanism Lemasurier, W.E., [1972, p. 139-141] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p. 917-631] Wanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p. 98-102] Dating annual layers of Greenland ice cores Herron, M.M., et al., [1977, p. 98-102] MP 1092 Dating annual layers of Greenland ice. Ct al., [1977, p. 302-306) MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p. 341-350) MP 1725 Primary productivity in sea ice of the Weddell region Ackley, SF, et al., [1978, p. 48-50) Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., [1978, p. 48-50) Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p. 196) Stratified debris in Antarctic ice cores Kohnen, H., et al., [1979, p. 14865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p. 14865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p. 14865-4874] MP 1272 Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p. 14865-4874] MP 1319 Subsurface measurements of McMurdo lee Shelf Gow, A.J., et al., [1979, p. 179-80) MP 1318 Antifeceze-thermodrilling, central Ross lee Shelf. Zotikov. i.A., [1979, 129) Danish deep drill, progress report February-March 1979 Rand, J.H., [1980, 37p] Time-priority studies of deep ice cores Gow, A.J., et al., [1979, A.], 1980, MP 1308	kedgang. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on niver rapids in winter. Perham, R.E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Light reflection and transmission by sea ice covers. Petovich, D.K., [1990, p.9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p.53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Muebben, J.L., et al., [1978, p. 393-403] Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow sitemas Calkins, D.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, p.241-248] Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., [1982, 26p.] Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., [1983, 19p.] S.R. 81-13 Operation of the U.S. Combat Support Boat (USCBMK 1) on an ice-covered waterway Substad, J., et al., [1984, 28p.] Nittogen removal in wastewater ponds. Reed, S.C., [1984, 28p.] Nittogen removal in wastewater ponds. Reed, S.C., [1984, 28p.]
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions (1978, p.212-230) Np 1617 Numerical simulation of air bubbler systems (1978, p.231-238) Current research on snow and ice renioval in the United States (1978, p.212-230) Noncorrosive methods of ice control. (1978, p.21-22) Noncorrosive methods of ice control. (1979, 23p.) Current research on snow and ice renioval in the United States (1978, p.21-22) Noncorrosive methods of ice control. (1979, 23p.) Carey, (1979, 23p.) Carey, (1979, 23p.) Harnessing frazil ice Perham, R.E., (1981, p.227-237) MP 1398 Snow and ice control on railroads, highways and airports (1981, p.1073-1080) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1448 Cie control at navigation locks. Hanamoto, B., (1981, p.1088-1095) Ice control at rangement for winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1448 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodhi, D.S., et al., (1982, 27p.) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) MP 1536 Poptimizing decing chemical application rates (1982, 25p.) Hydraulic model study of Port Huron ice control structure calkins, D.J., et al., (1982, 25p.) Hydraulic model study of Port Huron ice control structure Calkins, D.J., et al., (1982, 59p.) CR 82-18 Hydraulic model study of Port Huron ice control structure Calkins, D.J., et al., (1982, 59p.) Hydraulic model study of Port Huron ice control structure Calkins, D.J., et al., (1982, 59p.) CR 82-18 Hydraulic model study of Port Huron ice control structure Calkins, D.J., et al., (1982, 59p	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) Respondent to the state of the week of	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on river rapids in winter. Perham, R.E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Microcomputer-based image-processing system MP 2128 Microcomputer-based image-processing system MP 2138 Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p.9557-9567) Ide cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., (1978, p. 393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., (1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., (1981, p.94-111) Effects of ice on coal imovement via the inland waterways. Lunardini, V.J., et al., (1981, p.94-111) Effects of ice on coal imovement via the inland waterways. Lunardini, V.J., et al., (1981, p.94-111) SR 81-13 Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., (1982, 26p.) Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., (1983, 19p.) SR 83-01 Unsteady river flow beneath an ice cover Ferrick, M.G., et al., (1983, 103p.) West antarctic sea ice. Ackley, S.F., (1984, p.88-95) West antarctic sea ice. Ackley, S.F., (1984, p.88-95) West antarctic sea ice. Ackley, S.F., (1984, p.88-95) West antarctic sea i
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., (1978, p.231-238) Current research on snow and ice removal in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents (1979, 23p.) Hamessing frazil ice Perham, R.E., (1981, p.277-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F. et al., (1981, p.1073-1080) MP 1445 Ice control at navigation locks. Hanamoto, B. (1981, p.1088-1095) Ice control arrangement for winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1449 Port Huron ice control model studies. Calkins, D.J., et al., (1981, p.1093-1085) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) Force measurements and analysis of river ice break up Deck, D.S., (1982, p.303-336) Optimizing deicing chemical application rates (1982, 55p.) Hydraulic model study of Port Huron ice control structure, Calkins, D.J., et al., (1983, p.993-95) MP 1634 Methods of ice control. Frankenstein, G.E., et al., (1983, p.904-215) Lee sheet retention structures Perham, R.E., MP 1530 MP 1634 MP 1639 MP 1639 MP 1639 MP 1639 MP 1639 MP 1639 MP 1634 Methods of ice control. Frankenstein, G.E., et al., (1983, p.904-215) Lee sheet retention structures Perham, R.E., (1983, 1983, 1983, 1984) MP 1649 M	Salmon River tee jam control studies interim report. Axelson, K.D., et al., [1990, 8p.) Recores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets. Johnsen, S.J., et al., [1972, p 429-434] Byrd Land quaterrary volcanism. LeMasurier, W.E., [1972, p.139-141] Polar ice-core storage facility. Langway, C.C., Jr., [1976, p.71-75] Vanadium and other elements in Greenland ice cores. Herron, M.M., et al., [1976, 4p.) CR 76-24 Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p 617-631] Palang annual layers of Greenland ice. Langway, C.C., Jr., et al., [1977, p.98-102] Dating annual layers of Greenland ice. Kumai, M., (1977, p 341-350) Arcosols in Greenland snow and ice. Kumai, M., (1977, p 341-350, MP 1094 Aerosols in Greenland snow and ice. Kumai, M., (1977, p 341-350, MP 125 Primary productivity in sea ice of the Weddell region. Ackley, S.F., et al., [1978, 179] Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., [1978, 179] Stratified debris in Antarctic ice cores. Gow, A.J., et al., [1979, p 1979] Stratified debris in Antarctic ice cores. Gow, A.J., et al., [1979, p 1979, p.4865-4874] 20-yr cycle in Greenland ice core records. Hibler, W.D. III. et al., [1979, p 481-483] Subsurface measurements of McMurdo Ice Shelf. Gow, A.J., et al., [1979, p.79-80] Antifreeze-thermodrilling, central Ross Ice Shelf. Zoitkov, I.A., [1979, 129] Danish deep drill, progress report. February-March. 1979, Rand, J.H., [1980, 37p] Sauth Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al., [1980, 37p] Sauth Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al., [1980, 37p] South Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al., [1980, 37p] South Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al., [1980, 37p] South Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al., [1980, 37p] South Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al.,	kedging. Mellor, M., (1979, 21p.) Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., (1980, 30p.) Electromagnetic subsurface measurements. Dean, A.M., Jr., (1981, 19p.) Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., (1984, p. 347-354) MP 1872 Structure to form an ice cover on river rapids in winter. Perham, R. E., (1986, p.439-450) Microcomputer-based image-processing system D.K., et al., (1988, p.249-252) Light reflection and transmission by sea ice covers. Perovich, D.K., (1990, p.9557-9567) Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., (1976, p.53-76) MP 1378 Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Muebben, J.L., et al., (1978, p. 393-403) MP 1133 Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., (1979, 5p.) Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., (1981, p.94-111) MP 1397 Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., (1981, p.94-111) MP 1397 Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., (1981, p.94-111) MP 1397 Effects of ice on coal movement via the inland waterways. Calkins, D.J., et al., (1982, p.241-248) MP 1575 Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., (1982, 26p.) Uinsteady river flow beneath an ice cover Ferrick, M.G., et al., (1983, p.254-260) Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) West antarctic sea ice. Ackley, S.F., (1984, p.88-95) MP 1818 Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Substad, J., et al., (1984, p.38-95) Nitrogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Nitrogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Seffect of ice cover on hydropower production Yapa, P.D.
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in Lobacz, E.F., et al., (1978, p.474-489) Ice and ship effects on the St. Marys River ice booms Perham, R.E., (1978, p.222-230) Numerical simulation of air bubbler systems Ashton, G.D., (1978, p.231-238) Current research on snow and ice removal in the United States Minsk, L.D., (1978, p.21-22) Noncorrosive methods of ice control. Minsk, L.D., (1979, p.133-162) Suppression of river ice by thermal effluents Ashton, G.D., (1979, 23p.) Hamessing frazil ice Perham, R.E., (1981, p.227-237) MP 1398 Snow and ice control on railroads, highways and airports Minsk, L.D., et al., (1981, p.671-706) MP 1447 Modeling hydrologic impacts of winter navigation Daly, S.F., et al., (1981, p.1073-1080) MP 1445 Ice control at navigation locks. Hanamoto, B., (1981, p.1088-1095) MP 1446 Port Huron ice control model studies. Calkins, D.J., et al., (1982, p.361-373) Model study of Port Huron ice control structure, wind stress simulation Sodh, D.S., et al., (1982, 27p.) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p.131-185) Profective are incephobic coatings of river ice break up Deck, D.S., (1982, p.303-336) MP 1530 MP 1634 MP 1642 Ne ference control study of Port Huron ice control structure calkins, D.J., et al., (1982, 59p.) MP 1634 MP 1635 MP 1636 MP 1636 MP 1637 MP 1636 MP 1637 MP 1636 MP 1637 MP 1638 MP 1634	Salmon River ice jam control studies interim report Axelson, K.D., et al., [1990, 8p.) SR 90-06 Ice cores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] MP 998 Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., [1972, p 429-434] Byd Land quaterrary volcanism Lemasurier, W.E., [1972, p.139-144] Polar ice-core storage facility Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores Gragin, J.H., et al., [1976, p.9.) Cragin, J.H., et al., [1977, p.81-631] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-631] MP 1079 Vanadium and other elements in Greenland ice cores Herron, M.M., et al., [1977, p.81-631] MP 1079 Dating annual layers of Greenland ice Langway, C.C., Jr., et al., [1977, p.302-306] MP 1092 Dating annual layers of Greenland ice. Kumai, M., [1977, p.341-350] Primary productivity in sea ice of the Weddell region AD, J., et al., [1978, p.48-50] Ultrasonic investigation on ice cores from Antarctica. Gow, A.J., et al., [1978, p.48-50] Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, p.485-54874] Oxygele in Greenland ice core records Kohnen, H., et al., [1979, p.485-54874] Dy p.185-192; Ultrasonic investigation on ice cores Kohnen, H., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores Kohnen, H., et al., [1979, p.4865-4874] MP 1272 Ultrasonic investigation on ice cores Gow, A.J., et al., [1979, p.79-80] MP 1338 Antifreeze-thermodrilling, central Ross Ice Shelf. Gow, A.J., et al., [1979, p.79-80] Antifreeze-thermodrilling, central Ross Ice Shelf. Conton, M.P. 130 Danish deep drill, progress report February-March 1979 Rand, J.H., et al., [1981, 1982 Ner 130 Suburlace measurements of deep ice cores Gow, A.J., et al., [1980, 37p] Time-prinority studies of deep ice cores Gow, A.J., et al., [1980, 37p] Antifreeze-thermodrilling, central Ross Ice Shelf. Called, 1979, p.79-	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on niver rapids in winter. Perham, R.E., [1986, p.439-450] Microcomputer-based image-processing system D.K., et al., [1988, p.249-252] Light reflection and transmission by sea ice covers. Perovich, D.K., [1990, p.9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Ice and navigation related sedimentation. Wuebben, J.L., et al., (1978, p. 393-403) Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Effects of ice on coal movement via the inland waterways. Lunardini, V.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1982, p. 241-248] Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., (1982, 26p.) Unsteady river flow beneath an ice cover Ferrick, M.G., et al., (1983, p. 254-260) Bank recession of Corps of Engineers reservoirs Gatto, L.W., et al., (1983, 103p.) West antarctic sea ice. Ackley, S.F., (1984, p. 88-95) West antarctic sea ice. Ackley, S.F., (1984, p. 88-95) NP 1818 Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway Substad, J., et al., (1984, 28p.) Sittogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Sittogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Sittogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Sittogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Sittogen removal in wastewater ponds. Reed, S.C., (1984, 28p.) Sitto
Numerical simulation of air bubbler systems (1977, p.765-778) Some economic benefits of ice booms (1977, p.570-591) Solving problems of ice-blocked drainage facilities. Carey, K.L., (1977, 17p.) Storm drainage design considerations in cold regions (1978, p.71-25) Storm drainage design considerations in cold regions (1978, p.71-25) Storm drainage design considerations in cold regions (1978, p.71-25) Storm drainage design considerations in cold regions (1978, p.71-25) MP 1088 Ice and ship effects on the St. Marys River ice booms (1978, p. 231-238) Current research on snow and ice renioval in the United States (1978, p. 21-22) Noncorrosive methods of ice control. (1978, p. 21-22) Namessing frazil ice (1978, p. 21-22) Harmessing frazil ice (1978, p. 21-22) Harmessing frazil ice (1978, p. 21-22) MP 1265 Suppression of river ice by thermal effluents (1979, 23p.) Harmessing frazil ice (1978, p. 21-22) MP 1398 Snow and ice control on railroads, highways and airports (1978, p. 21-23) MP 1398 Snow and ice control on railroads, highways and airports (1978, p. 21-23) MP 1447 Modeling hydrologic impacts of winiter navigation Daly, S.F. et al. (1981, p. 1073-1080) MP 1445 Ice control arrangement for winiter navigation Daly, p. 1088-1095) Ice control arrangement for winiter navigation (1981, p. 1086-1103) Pot Huron ice control model studies. (21kins, D.J. et al. (1982, 27p.) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G. D. (1982, p. 131-185) Force measurements and analysis of river ice break up Deck, D.S., (1982, p. 303-336) Optimizing decing chemical application rates (1982, 1982, 55p.) GR 82-09 Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G. (1982, p. 303-336) Optimizing decing chemical application rates (1982, 1982, 1993-95) MP 1534 How effective are icephobic coatings (1982, 1983, 1993-95) MP 1639 CR 82-09 Theory of thermal control Frankenstein, G. E., et al., (1983, p. 204-215) EC 82-34 How effective are icephobic coa	Salmon River tee jam control studies interim report. Axelson, K.D., et al., [1990, 8p.) Recores Greenland climate changes shown by ice core. Dansgaard, W., et al., [1971, p 17-22] Oxygen isotope profiles through ice sheets. Johnsen, S.J., et al., [1972, p 429-434] MP 998 Byrd Land quaternary volcanism. LeMasurier, W.E., [1972, p.139-141] Polar ice-core storage facility. Langway, C.C., Jr., [1976, p.71-75] MP 874 Vanadium and other elements in Greenland ice cores. Herron, M.M., et al., [1976, 4p.) Changes in the composition of atmospheric precipitation. Cragin, J.H., et al., [1977, p 617-631] MP 1079 Vanadium and other elements in Greenland ice cores. Herron, M.M., et al., [1977, p.98-102] Dating annual layers of Greenland ice. Langway, C.C., Jr., et al., [1977, p.98-202] MP 1092 Dating annual layers of Greenland ice. Kumai, M., [1977, p.341-350] MP 1094 Aerosols in Greenland snow and ice. Kumai, M., [1977, p.341-350] Primary productivity in sea ice of the Weddell region. Ackley, S.F., et al., [1978, 179] Ultrasonic measurements on deep ice cores from Antarctica. Gow, A.J., et al., [1978, 179] Ultrasonic investigation on ice cores from Antarctica. Kohnen, H., et al., [1979, 169] Stratified debris in Antarctic ice cores. Gow, A.J., et al., [1979, p.8465-4874] Oxygen in the core of the cores from Antarctica. Kohnen, H., et al., [1979, p.8465-4874] MP 1239 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., [1979, p.79-80) Antifereze-thermodrilling, central Ross Ice Shelf. Gow, A.J., et al., [1979, p.79-80) Antifereze-thermodrilling, central Ross Ice Shelf. Gow, A.J., et al., [1979, p.79-80] Salt Hibler, W.D., III., 1980, 37p.) Salt Robot Pole ice core drilling, central Ross Ice Shelf. Zoitkov, I.A., [1979, 129) Danish deep drill, progress report. February-March. 1979, Rand, J.H., [1880, 37p.] Salt Robot Pole ice core drilling, 1981-1982 Kuivinen, K.C., et al., [1982, 1989-91] Chemical fractionation of brine in the McMurdo Ice Shelf. Cragin, J.H., et al., [1983, 169	kedging. Mellor, M., [1979, 21p.] Winter surveys of the upper Susitina River, Alaska. Bilello, M.A., [1980, 30p.] Electromagnetic subsurface measurements. Dean, A.M. Jr., [1981, 19p.] Explosive obscuration sub-test results at the SNOW-TWO field experiment. Ebersole, J.F., et al., [1984, p. 347-354, MP 1872.] Structure to form an ice cover on river rapids in winter. Perham, R. E., [1986, p. 439-450] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system O.K., et al., [1988, p. 249-252] Microcomputer-based image-processing system D.K., et al., [1990, p. 9557-9567] Ice cover effect Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p. 53-76] Suppression of ice fog from cooling ponds. McFadden, T., (1976, 78p.) Candon avigation related sedimentation. Wiebben, J.L., et al., [1978, p. 393-403) Turbulent heat transfer from a river to its ice cover. F.D., et al., [1979, 3p.] Analysis of velocity profiles under ice in shallow streams Calkins, D.J., et al., [1981, p.94-111] Perfects of ice on coal movement via the inland waterways. Lunardim, V.J., et al., [1981, p.94-111] Application of HEC-2 for ice-covered waterways. Calkins, D.J., et al., [1981, 22p.] Reservoir bank erosion caused and influenced by ice cover. Gatto, L.W., [1982, 26p.] Using the DWOPER routing model to simulate river flows with ice Daly, S.F., et al., [1983, 19p.] SR 83-30 West antarctic sea ice. Ackley, S.F., [1984, p.88-95] West antarctic sea ice. Ackley, S.F., [1984, p.88-95] Nittogen removal in wastewater ponds. Reed, S.C., [1984, 26p.] Calcin, M.G., [1984, p.359-368] Effect of ice cover on hydropower production of the S. Calkins, 26p.] Call, [1984, p.231-224] MP 1876

Surfacing submarines through ice. Assur, A., [1984, p 309-318] MP 1998	Second Workshop on the Penetration Technology, 1986. I [1986, 659p.] SR 86-30	ce-c
Erosion of northern reservoir shores Lawson, D.E., 1985,	Variability of Arctic sea ice drafts. Tucker, WB, et al.	Mod
198p ₁ M 85-01 Winter tire tests. 1980-81. Blaisdell, G.L., et al., [1985,	[1986, p 237-256] MP 2198 On the profile properties of undeformed first year sea ice	Hi Brea
p 135-151; MP 2045 Heat transfer in water flowing over a horizontal ice sheet.	Cox. G.F.N., et al, [1986, p 257-330] MP 2199	Bil
Lunardini, V.J., et al, (1986, 81p) CR 26-03	al, [1987, p.133-137] MP 2192	Perfe Ha
Effects of water and ice on the scattering of diffuse refluctors Jezek, K.C., et al. [1986, p 259-269] MP 2664	Numerical simulation of first-year sea ice Cox, GFN, et al, [1988, p 12,449-12,460] MP 2404	effec Sou
Laboratory study of flow in an ice-covered sand bed channel.	Flexural properties of freshwater ice sheets. Gow, A.J., et al.	
Wuebben, J.L., [1986, p 3-14] MP 2123 Morphology, hydraulics and sediment transport of an ice-	ICE COVER THICKNESS	Num W.
covered river. Lawson, D.E., et al, [1986, 37p] CR 86-11	Antarctic ice sheet Mellor, M, (1961, 50p) M I-B1 F Greenland ice sheet. Bader, H, (1961, 18p) M I-B2	Prop Hu
DOD floating ice problems Cox, G.F.N, [1987, p.151- 154] MP 2414	Ice cover thickness	Colla
Seismic and acoustic wave propagation working group report.	Salinity variations in sea ice. Cox, G.F.N, et al. [1974, p.109-122] MP 1023	19 ₎ ce p
Albert, D.G, et al, [1987, p.253-255] MP 2419 Estimating Cn square over snow and sea ice from meteorolog-	Remote sensing program required for the AIDJEX model. Weeks, W.F., et al, (1974, p 22-44) MP 1040	me
ical quantities Andreas, E.L., 1988, p.258-2671 MP 2440	Stability of Antarctic ice. Westman, J., [1975, p.159]	akc
Estimating Cn square over snow and sea ice from meteorolog-	Remote sensing plan for the AIDJEX main experiment	Chan
ical data. Andreas, E L., (1988, p 481-495) MP 2393	Weeks, W.F., et al. (1975, p 21-48) MP 862	K (Depe
Effects of an ice cover on flow in a movable bed channel Wuebben, J L., (1988, p 137-146) MP 2499	Ackley, S F., et al, [1976, 25p] CR 76-18	and
Antitank obstacles for winter use Richmond, P.W., (1988,	Sea ice properties and geometry. Weeks, W.F., [1976, p 137-171] MP 918	p3 Ontl
11p 1 SR 88-19 Using the Ground Emplaced Mine Scattering System in win-	Ra far imagery of ice covered North Slope lakes. Weeks, WF, et al. (1977, p 129-136) MP 923 li	Leg ce ja
ter. Richmond, P.W., et al. (1988, 13p) SR 88-27	Remote sensing of accumulated frazil and brash ice. Dean,	Bel
Assessment of hydraulic structures in a stream after seasonal ice run. Calkins, D.J., et al., [1989, 12p.] MP 2744	Sea ice thickness profiling and under-ice oil entrapment.	Com
High frequency acoustical properties of saline ice. Jezek, K.C., et al, [1989, p 9-23] MP 2686	Kovacs, A., [1977, p.547-550] MP 940	itruc
Cavitating fluid sea ice model. Flato, G.M., et al. (1990, p 239-242) MP 2738	Bilello, M.A., (1977, p.120-127) MP 569 Decay patterns of land-fast sea ice in Canada and Alaska.	reg
Ice cover effect on river flow. Ashton, G.D., (1990, 24p)	Bilello, M.A., (1977, p.1-10) MP 1161 S	hop
ICE COVER STRENGTH	Iceberg thickness profiling using an impulse radar. Kovacs, A., (1977, p.140-142) MP 1012	35 ₁ Sete
Mechanical properties of sea icc Weeks, W.F., e. al. (1967, 80p.) M II-C3	Subsurface measurements of the Ross Ice Shelf, McMurdo Sound, Antarctica Kovacs, A, et al, 1977, p 146-1481	mo
Ice cover strength	MP 1013	Janii Iati
Failure of an ice bridge. DenHartog, S.L., et al. (1976, 13p ₁) CR 76-29		Vum
Force estimate and field measurements of the St Marys River ice booms Perham, R E, 1977, 26p CR 77-04	MP 1014 Delineation and engineering characteristics of permafrost S	Hit
Laboratory investigation of the mechanics and hydraulics of	beneath the Beaufort Sea Sellmann, P.V., et al. (1977,	Sod Sod
river ice jams Tatinclaux, J C., et al, (1977, 45p.) CR 77-09	Iceberg thickness and crack detection. Kovacs, A., 1978,	Ko
lce cover forces on structures Kerr, A D, (1978, p 123- 134) MP 879	p.131-145; MP 1128 N leeberg thickness profiling. Kovacs, A. (1978, p.766-774)	muli Ulid
Ice thickness-tensile stress relationship for load-bearing ice	Physical measurement of ice jams 1976-77 field season.	486 lect
Johnson, P.R., (1980, 11p.) SR 80-09 Evaluation of ice-covered water crossings Dean, A.M., Jr.,	Wuebben, J.L., et al. (1978, 19p) SR 78-03	R.N
(1980, p.443-453) MP 1348 Ice characteristics in Whitefish Bay and St. Marys River in	Kovacs, A., [1978, p 59-62] MP 1126	loic Ler
winter. Vance, G P., [1980, 27p] SR 80-32	Profiles of pressure ridges and ice islands in the Beaufort Sea Hinatiuk, J., et al. (1978, p. 519-532) MP 1187 li	mpu
den, T., et al. [198!, p 749-777] MP 1396	Dynamics of near-shore ice. Kovacs, A., et al, (1978, p 11-	icet hort
On the buckling force of floating ice plates. Kerr, A.D., (1981, 7p.) CR 81-09	Remote detection of water under ice-covered lakes on the	bra
Flow velocity profiles in ice-covered shallow streams. Cal-	North Slope of Alaska. Kovacs, A. (1978, p.448-458) Mi' 12:4 E	lect
In-situ measurements of the mechanical properties of ice	Characteristics of ice on two Vermont rivers Deck, D.S., (1978, 30p.) SR 78-30 V	(19 arıa
Tatinclaux, J.C. (1982, p 326-334) MP 1555 Flexural strength and elastic modulus of ice Tatinclaux,	Laboratory experiments on icing of rotating blades Ackley,	(19
J.C., ct al. (1982, p.37-47) MP 1568	Accelerated ice growth in rivers Calkins, D I., [1979, 5p]	orta p 5
fee properties in the Greenland and Barents Seas during summer. Overgaard, S., et al. (1983, p 142-164)	Dynamic thermodynamic sea ice model Hibler, W.D., III,	alıb: D J
MP 2062 Model tests on two models of WTGB 140-foot icebreaker		ca-id Act
Tatinclaux, J C, (1984, 17p) CR 84-03 Deterioration of floating ice covers Ashton, G D, (1984,	Stephens, C.A., et al. [1979, 22p + Figs.] MP 1315 A	Inpo
p 26-33 ₁ MP 1676	Dynamics of near-shore icc. Kovacs, A. et al. [1979, p.181-207] MP 1291 P	er. orta
Variation of ice strength within and between multi-year pres- sure ridges in the Beaufort Sea. Weeks, WF, (1984,		p 51 Jeas
p 134-139; MP 1680 Model tests in ice of a Canadian Coast Guard R-class ice-	Icebreaking concepts. Mellor, M., (1980, 18p.)	Sod
breaker. Tatinclaux, J C. (1984, 24p) SR 84-06 Ice deterioration Ashton, G D. (1984, p 31-38)	Evaluation of ice deflectors on the USCG icebreaker Polar	(19
MP 1791	Performance of the USCGC Katmai Bay teebreaker Vance,	sub dus
Workshop on Ice Penetration Technology, Hanover, NH, June 12-13, 1984 (1984, 345p) SR 84-33	G.P., (1980, 28p) CR 80-08	ce th
Shopper's guide to ice penetration Mellor, M., [1984, p.1-35] MP 1992	fast sea ice in Canada and Alaska Bilello, M.A., 1980,	Ant
Penetration of shaped charges into ice Mellor, M., 1984, p. 137-148 ₁ MP 1995	Sea ice growth, drift, and decay Hibler, W.D., III, 1980. Se	p I d ea ic
Mechanics of ice cover breakthrough Kerr, A.D., [1984.	The state of the s	191) Urbo
p 245-262; MP 1997 Deterioration of floating ice covers Ashton, G D., (1985.		yme
p 177-182 ₁ MP 2122	winter Vance, GP, (1980, 27p) SR 80-32 E	lect
Ice penetration tests Garcia, N.B., et al. (1985, p.223-236) MP 2014		Kov relin
In-ice calibration tests for an elongate, uniaxial brass ice stress sensor. Johnson, J.B., (1985, p. 506-510) MP 1966	Method for measuring brash ice thickness with impulse radar	fraz 156
fce cover research present state and future needs Kerr. A.D. et al. (1986, p 384-399) MP 2004	Pooling of oil under sea ice Kovacs, A , et al., [1981, p. 912-	ume
Crushing of ice sheet against rigid cylindrical structures	Morphology of sea ice pressure ridge sails. Tucker, W.B. et Ir	al. (mj:n
Sodhi, D.S., et al. (1986, p.1-12) MP 2018	al. (1981, p.1-12) MP 1465	

-covered North Slope lakes observed by radar Weeks, V.F. et al. (1981, 17p) Odeling pressure ridge buildup on the geophysical scale fibler, W.D. 111, (1982, p 141-152) MP 1590 akup of solid ice covers due to rapid water level variations illfalk, L., [1982, 17p.] CR 82-03 formance of a point source bubbler under thick ice laynes, F.D., et al. (1982, p.111-124) MP 1529 laynes, F.D., et al. (1700, p. 117-10); ects of conductivity on high-resolution impulse radar ounding. Morey, R.M., et al. (1982, 12p) CR 82-42 merical simulation of the Weddell Sea pack ice. Hibler, V.D., III, et al., [1983, p 2873-2887] MP 1592 perties of urea-doped ice in the CRREL test basin. CR 83-49 CR 83-49 lapsible restraint for measuring tapes Ucda, H.T., MP 2335 properties in the Greenland and Barents Seas during sum-er Overgaard, S., et al. (1983, p.142-164) ke ice decay Ashton, G D, [1983, p.83-86] MP 1684 MP 2062 anges in the Ross Ice Shelf dynamic condition Jezek, C., (1984, p. 409-416) MP 2058 pen sense of crushing specific energy on the aspect ratio d the structure velocity Sodhi, D.S., et al, (1984, 26-2-374). the role of ice interaction in marginal ice zone dynamics eppäranta, M., et al. (1984, p 23-29) MP 1781 jams in shallow rivers with floodplain flow Discussion cltaos, S., (1984, p. 370-371), MP 1798 mputer simulation of ice cover formation in the Upper St awrence River Shen, H.T., et al., (1984, p. 227-245) incture of first-year pressure ridge sails in the Prudhoe Bay gion. Tucker, WB, et al. (1984, p 115-135) MP 1837 pper's guide to ice penetration. Mellor, M., (1984, p.1termining the characteristic length of floating ice sheets by loving loads Sodhi, DS, et al. (1985, p 155-159), MP 1855 fied degree-day method for river see cover thickness simu-tion Shen, H.T., et al., (1985, p.54-62) MP 2065 merical modeling of sea see dynamics and see thickness sibler, W.D., 111, (1985, 50p.) et ice forces on a conica structure an experimental study dhi, D.S., et al. [1985, p 46-54] MP 1915 odni, D.S. et al. (1985, p.46-34) MP 1915 asuring multi-year sea ice thickness using impulse radar. iovacs, A., et al. (1985, p.55-67) MP 1916 merical simulation of Northern Hemisphere sea ice varia-tity, 1951-1980 Walsh, J.E., et al. (1985, p.4847-MP 1882 title and the separation of multi-year sea are Morey.
M., et al., [1985, p.151-167]
MP 1902
e of plast. "ce interaction in marginal see zone dynamics epparanta, M., et al., [1985, p.11,809-11,909]
MP 1544 ulse radar sounding of level first-year sea ice from an ebreaker Martinson, CR., (1985, 9p.) SR 85-21 rt-pulse radar investigations of freshwater ree sheets and ash ice. Arcone, S.A., et al., [1986, 10p]

CR 86-06 Ltromagnetic properties of sea ice Kovacs, A., et al, 986, p.57 133 MP 2197 MP 2198 Tucker, W B., et al, 986, p.22 -256 MP 2198 980, p.23 -236; MP 2198
sable hot water ice Juil Tucker, WB, et al., [1986, MP 2202
MP 2202 549-564 MP 2202
birsting HEC-2 in a shallow, ice-covered river Calkins, SR 86-34
i.ec investigations during the Winter Weddell Sea Project ckley, S F, et al., [1987, p.88-89]
borne electromagnetic sensing of sea ice thickness Beck, A, et al., [1987, 77p]
table hot-water ice drill Tucker, W,B, et al., [1987, 57-64]
MP 2236 sautement of characteristic length of floating tee sheets
dlh, D S. (1987, n p (Ch.7))
MP 2480
source river-ice thickness profiles
Arcone, S A, et al,
987, p.330-340)
MP 2312 borne electromagnetic sounding of sea ice thickness and ib-ice bathymetry Kovacs, A., et al., (1987, p. 289-311) MP 2332 thickness distribution across the Atlantic sector of the ntarctic Ocean in midwinter. Viadhams, P. et al., 1987, 14,535-14,552₁ MP 2314 MP 2314 ice thickness and sub-ice bathymetry. Kovacs, A et al. 987, 40p; 987, 40p j
sorne measurement of sea ice thickness and subice bathmetry Kovac., A, et al, [1988, p.111-120]
MP 2345 tromagnetic measurements of a second-year sea ice floe ovacs. A et al. [1988, p.121-136] MP 2346 avacs, A et al. (1988, p.121-130) iminary results of an experiment using a 16 ft x 50 ft long perial collector line array Perham R E. (1988, p. 139 MP 2474 nerical simulation of first-year sea ice Cox. G.F.N., et [1988, p.12,449-12,460] MP 2404 [1988, p 12,449-12,460] n River ice boom — Perham, R.E. [1988, 10p] SR 88-22

Ice cover thickness (cont.) Using the Ground Emplaced Mine Scattering System in win-	F
ter Richmond, P.W., et al., [1988, 1-7] SR 88-27 Thin ice growth. Ashton, G.D., [1989, p. 564-566]	S
MP 2657 Fracture toughness of columnar freshwater ice. Bentley,	N
D L, et al, [1989, p. 7-20] MP 2545 Concurrent remote sensing of arctic sea ice from submarine and aircraft Wadhams, P, et al, [1989, 20p]	ħ
MP 2697	
River-ice mounds on Alaska's North Slope Arcone, S.A., et al., (1989, p.288-290) MP 2563	(
Penetration of floating ice sheets with cylindrical indentors Sodhi, D.S., et al. (1989, p. 104) MP 2688 Sea ice thickness n easurement Kovacs, A., et al. (1989,	5
p.394-424) MP 2693 lee strength estimates from submarine topsounder data	S
DiMarco R., et a), (1989, p 425-426) MP 2691 Development of an airborne sea ice thickness measurement	F
system and field test results Kovacs, A, et al. (1989, 77p) CR 89-19	E
Algorithm for e traction of ice-thickness data from short pulse radar signals Rick, L, et al. [1990, p 137-145] MP 2698	
Measurement of sea ice thickness using electromagnetic induction Holladay, JS, et al. (1990, p.309-315)	1
MP 2590 Snow cover effects on antarctic sea ice thickness Ackley,	E
SF., et al. [1990, p 16-21] MP 2726 Airborne sea ice thickness sounding Kovacs, A, et al.	S
(1990, p.225-229) MP 2737 Sea ice thickness versus impulse radar time-of-flight data	Ice
Kovacs, A, et al1990, p 91-98; MP 2704 Padar surveying of the bottom surface of ice covers S A., et al. (1990, p 30-39) MP 2766	
Sea ice in the polar regions Gow, A J, et al. [1990, p 47-122] MP 2750	I.
Ice cracks Investigation of ice forces on vertical structures Hirayama,	s
K., et al, [1974, 153p] MP 1041 Misgivings on is, static imbalance as a mechanism for sea ice	c
cracking Ackiey, S.F., et al. (1976, p. 85-94) MP 1379	V
Iceberg thickness and crack detection Kovacs, A., 1978, p.131-145, MP 1128 Mechanical properties of polygraphiling ice. Mallor M.	Ice
Mechanical properties of polycrystalline ice Mellor, M., (1980, p.217-245) MP 1302 Bending and buckling of a wedge on an elastic foundation	Č
Nevel, D.E., [1980, p 278-288] MP 1303 Fracture behavior of ice in Charpy impact testing Itagaki,	ι
K, et al. (1980, 13p) CR 80-13 Acoustic emission and deformation response of finite ice	Ice C
plates. Xirouchakis, P.C., et al. [1981, p 123-133] MP 1436 Acoustic emission and deformation response of f lite ice	i
piates Airouchakis, P.C., et al., [1981, p. 385-394] MP 1455	C
Study on the tensile strength of ice as a function of grain size Currier, J.H., et al, [1983, 38p] CR 83-14	I
Influence of grain size on the ductility of ice. Cole, D.M., (1984, p.150-157) MP 1686 Experimental determination of buckling loads of cracked ice	Т
sheets Sodhi, D.S. et al. (1984, p.183-186) MP 1687	F
Dependence of crushing specific energy on the aspect ratio and the structure velocity Sodhi, D.S., et al., (1984, p. 363-374) MP 1708	Ċ
Grain growth and the creep behavior of ice Cole, D M.	D
[1985, p.187-189] MP 1862 Theory of microfracture healing in ice Colbeck, S.C., [1986, p.89-95] MP 2146	fe
Fracture toughness of model ice Dempsey, J.P. et al. (1986, p.365-376) MP 2125	T
Effect of grain size on the internal fracturing of polycrystalline ice. Cole, D.M. (1986, 71p.) CR 86-05	C
Small-scale projectile penetration in saline ice cleb, D.M. ct al. [1986, p.415-438] MP 2201	C
Crack nucleation in polycrystalline ice Cole, D.M., (1988 p.79-87) MP 2325	S
Fracture toughness of urea model ice Bentley, D. L., et al. (1988, p. 289-297) MP 2348 Verification tests of the surface integral method for calculat-	V
ing structural ice loads Johnson, J.B., et al., [1988, p. 449- 456] MP 2353	N
Fracture of S2 columnar freshwater ice floating double can- tilever beam tests Bentley, D.L., et al. (1988, p. 152-	Ice A
Fracture toughness of columnar freshwater ice D.L., et al. (1989, p. 7-20) MP 2493 Bentley, MP 2545	lo
ICE CREEP Mechanical properties of sea ice Weeks, W.F., et al., [1967,	l' Ice
80p ₁ M II-C3 Ice creep	N
Mechanics of ice Glen JW, (1975, 43p.) M 11-C2b Creep theory for a floating ice sheet Nevel D E, (1976,	Ice G
98p ₁ SR 76-04 Geodetic positions of borchole sites in Greenland Mock, SJ, [1976, 7p ₁ CR 76-41	P
Rheology of ice. Fish, A.M., (1978-196p) MP 1988 Creep rupture at depth in a cold ice sheet Colbeck, S.C., et	C E
al, [1978, p.733] MP 1168	•

Polycrystalline ice mechanics. Hooke, R.L., et al. (1979, 16p.) MP 120
Some promising trends in ice mechanics. Assur, A., (1980, p 1-15) MP 1300
Mechanical properties of polycrystalline ice. Mellor, M.
(1980, p. 217-245) MP 1302 Mechanical properties of polycrystalline ice. Hooke, R. L., e
al, (1980, p 263-275) MP 1328
p 41-53; MP 137
MP 1532
Polycrystalline ice creep in relation to applied stresses Cole D.M., [1983, p 614-621] MP 1582
Stress/strain/time relations for ice under uniaxial compres sion. Mellor, M., et al. (1983, p.207-230) MP 158
Stress measurements in ice Cox, GFN., et al., 1983, 31p., CR 83-23
Relationship between creep at 1 strength behavior of ice a failure Cole, D.M., (198 2) 189-197, MP 1681
Effect of stress application rate on the creep behavior of poly-
crystalline ice Cole, D M, [1983, p.454-459] MP 1671
Influence of grain size on the ductility of ice. Cole, D M [1984, p 150-157] MP 1686
Grain growth and the creep behavior of ice. Cole, D M (1985, p 187-189) MP 1862
Evaluation of the rheological properties of columnar ridge sea ice. Brown, R.L., et al. (1986, p. 55-66) MP 2177
Shape of creep curves in frozen soils and polycrystalline ice Fish, A.M., [1987, p 623-629] MP 2329
e crossings
Height variation along sea ice pressure ridges III, et al. (1975, p 191-199) MP 848
lee thickness-tensile stress relationship for load-bearing ice. Johnson, P R., 1980, 11p SR 80-09
Evaluation of ice-covered water crossings Dean, A.M., Jr., (1980, p 443-453) MP 1348
Snow in the construction of ice bridges Coutermarsh, B A et al. (1985, 12p) SR 85-18
Contribution of snow to ice bridges Coutermarsh, BA, et
Winter bridging exercise on thick ice Fi & McCoy, Wiscon-
sin, 1988 Coutermarsh, B A . (1990 24p) SR 90-10
e crystal formation Compressed air seeding of supercooler fog Hicks, J.R.,
Compressed air seeding of supercooler fog Hicks, J.R. (1976, 9p) SR 70-09 Use of compressed air for supercooled 1. (dispersal Wein-
stein, A.I., et al. (1976, p. 1226-1231) MP 1614 e crystal growth
Crystal alignments in the fast ice of Arc. Alaska Weeks, W.F., et al. [1979, 21p] CR 79-22
introduction to the basic thermodynamics of cold capillary systems Colbeck, S.C., (1981, 9p.) SR 81-06
Configuration of ice in frozen media Colbeck, S.C., [1982, p. 116-123] MP 1512
ce crystal morphology and growth rates at low supersatura-
p 2677-2682 ₁ Colbeck, SC, (1983, p 2677-2682 ₁ MP 1537
Theory of metamorphism of dry snow Colbect., S.C., (1983, p.5475-5482) MP 1603
Frazil ice. Daly. S.F. (1983, p.218-223) MP 2078
Frazil ice dynamics Daly, S.F., (1984, 46p.) M 84-01 Comments on "Theory of metamorphism of dry snow" by
S C Colbeck Sommerfeld, R A . (1984, p 4/63-4-65) Mr 1800
Daly, S.F., et al., 1984, p.161-1721 MP 1829
ce crystal growth in subcooled NaCl solutions Sullivan, J.M., Jr., et al. (1985, p. 527-532) MP 2100
Temperature dependence of the equilibrium form of per- Colbeck, S.C., (1985, p.720 *** MP 19.9
Growth, structure, and properties of realice to a creet al. (1986, p.9-164)
arain growth in unstrained polycrystaling ice w. A.J.
(1987, p (C1)277-(C1)281,
(1987, p.1-35) MP 2265 Wet precipitation in subfreezing air below cloud influences
radar backscattering. Colbeck, S.C., p. 135-144, MP 2297
Mete i. rpnism and classification of seasonal snow crystals. Collect. S.C., (1987, p.3-34) MP 2438
e crystal nuclei Apparent anomaly in free eing of ordinary water Swinzow.
G K , (1976, 23p) CR 76-20
ce crysta formation and supercooled fog dissipation Kumai, M. ;1982, p 579 587; MP 1539
frazil ice dy tamics Daly, S.F., [1987-6p] M 84-01 existal optics
Sea infrared reflectance of snow-covered substrates O'- Brigh, Li W, et al. [1481, 17p] CR 81-21
crystal structure
From the and mechanical properties of river and lake ice Ramseier, RO., [1972, 243p] MP 1883
Physics of ice Glen, J.W., (1974-81) M. II-C2a Tystal fabrics of Weat Arrarctic ice sheet Gow, A.J., et al.
[1976, p 1665-1677] MP 1382 lexural strength of ice in temperate lakes Gow, A J. (1977, p 247-256) MP 1063
(1977, p 247-256) MP 1063

```
Abnormal internal friction peaks in single-crystal ice. Stallman, P.E., et al., [1977, 15p.) SR 77-23 Radar anasotropy of rea ice. Kovace, A., et al., [1978, p. 171-201] MP 1111
    Radar anisotropy of caree 2013 MP 1111
Preferred crystal orientations in Arctic Ocean fast ice.
Weeks, W.F. et al. [1978, 24p.] CR 78-13
Ultrasonic measurements on deep ice cores from Antarctica.
Gow, A.J., et al. [1978, p. 48-50] MP 1202
Itagaki, K.
      X-ray measurement of charge density in ice. Itagaki, K., (1978, 12p.; CR 79-25
      Rada: anisotropy of ra ice. Kovacs, A., et al., 1978, p 6037-6046; MP 1139
      Ultrasonic investigation on ice cores from Antarctica.
Kohnen, H., et al, (1979, 16p) CR 79-10
      Ultrasonic investigation on ice cores from Antaratica.
Kohnen, H et al., [1979, p.4865-8274] MP 1239
   Kohnen, H. et al., (1979, p. 4865-4874) MP 1239
Anisotropic, operaties of sea ice. h. i.e., A., et al., (1979, p. 5740-5755) MP 1258
Cristal alignation, in the fast ice of Arctic Alaska Weeks, W.F., et al., (1979, 21p) CR 79-22
Anisotropic properties of sea ice in the 50-150 MHz range. Kovacs, A. et al., (1979, p. 324-353) MP 1620
Crys.al alignments in the fast ice of Arctic Alaska Weeks, W.F., et al., (1980, p. 1137-1146) MP 1277
Sea ice anisotropy, electromagnetic properties and strength Kovacs, A., et al., (1980, 18p) CR 80-20
Acoustic emission and deformation response of finite ice plates Xirouchakis, P.C., et al., (1°8), p. 385-394; MP 1455.
Growth, structure, and properties of sea ice.
   Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1982, 130p.] M 82-01
Configuration of ice in frozen ni-dia. Colbeck, S.C., [1982, 116-123] MP 1512
     Acoustic emissions from polycrystalline ice St Lawrence, W.F., et al., [1982, p 183-199] MP 1524
W.F., et al., [1982, 1983, 199]

Acoustic emissions from polyery-talline ice.
W.F., et al., [1982, 15p]
Polyery-stalline ice creep in relation to applied stresses. Cole, D.M., [1983, p.614-621]
Ice crystal morphology and growth 1 stes at low supersaturations and high temperatures. Colbeck, S.C., [1983, p.2677-2682]
Properties of sea ice in the coastal zones of the polar oceans. Weeks, W.F., et al., [1983, 38p.]
Study on the tensile attength of ice as a function of grain size. Currer, J.H., et al., [1983, 38p.]
Snow characterization at SNOW-ONE-B
al., [1983, p. 155-195,]
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1984, 1989, 209-217]
Compressive strength of frozen silt. Zhu, Y., et al., [1984,
    Compressive strength of frozen silt Zhu, Y, et al. (1984, p 3-15) MP 1773
   p 3-15<sub>1</sub>
Mechanical properties of sea ice a status report
Wecks,
WF, et al., (1984, p 135-198)
Quet freezing of la'es and the concept of orientation textures
in lake ice sheets Gow, A J., (1984, p.137-149)
MP 1828
   Crystalline structure of urea ice sheets used in modeling in the CRREL test basin Gow, A.J., [1984, p 241-253] MP 1835
   Crystalline structure of urea ice sheets Gow, A J. (1984, 48p) CR 84-24
   Structure and the compressive strength of ice from pressure ridges Richter, J.A., et al. [1985, p. 99-102] YP 1849
   lce electrical properties Gow, A.J., (1984 p. 0-82)
MP 1910
  MP 1910
Temperature dependence of the equilibrium form of ice Colbeck, S.C., [1985, p.726-732] MP 1939
Orientation textures in ice sheets of quietly frozer takes Gow, A.J., [1986, p.247-258] MP 2118
Crystal structure of Fram Strait sea ice Gow, A.J., et al., 1986, p.20-29]
Observations of the backscatter from snow at millimeter waveler giths Berger, R.H., et al., [1986, p.311-316]
MP 2665
  Compressive deformation of columnar sea ucc et al. (1986, p.241-252)
Laboratory and field studies of ice friction coefficient Tatin-claux, J.C., et al. (1986, p.349-400)
Growth, structure, and properties of sea icc et al. (1986, p.9-164)
Effect of grain size on the internal fracturing of polycrystalline ice. Cole, D.M., (1986, 71p)
Optical properties of sea ice structure. Gow. A.J., (1986, p.264-271)
Merchana defective, structural and column provides of the first properties of sea ice.
  p 264-271) MP 2257
Microwave dielectric, structural and salimity properties of sea ice. Arcone, S.A., et al., (1986, p.832-839) MP 2188
Triaxial testing of first-year sea ice. Richter-Menge, J.A., et al., (1986, 41p.) CR 86-16
Confined compressive strength of horizontal first-year sea ice samples. Richter-Menge, J.A., (1987, p.197-207) MP 2193
  Annealing recrystallization in laboratory and naturally deformed ice Gow, A J et al., (1987, p.(C1)271-(C1)276,
  Grain growth in unstrained polycrystalline face [1987, p.(C1)277-(C1)281] Gow. A J. and Sci-ice crystal structure and salinity, Hebron I fold, Labrador Gow. A.J., [1987–1862, and CR 87-04]
```

SUBJECT IND: X

Dielectric properties of strained ice. 2 Effect of sample preparation method. Itagaki, K, et al. (1987, p 149-153)		Mechanical properties of multi-year pressure r lae samples Richter-Menge, J.A., 1985, p.244-251, MP 1936
MP 2357	C-14 and other isotopy studies on natural ice Oeschger, H., et al., (1972, p. D70-D92) MP 1052	Richter-Menge, J.A., [1985, p. 244-251] MP 1936 Structure, salinity and density of multi-year sea ice pressure
Physical properties of summer sea ice in the Fram Strait, June-	Dating annual layers of Greenland ice. La ay, CC, Jr,	ridges Richter-Menge, J A, et al. [1985, p 493-497]
July 1984. Gow, A.J., et al, [1987, 81p.] CR 87-16	et al, (1977, p 302-306) MP 1094	MP 1965
Strain rate and grain-size effects in ice Cole, D.M., 1987,	Stable isotope profile through the Ross Ice Sheli at Little	lce properties in a grounded man-made ice island Cox,
p.274-280 ₁ MP 2311	America V. Antarctica. Dansgaard, W, et al, 1977,	G F.N., et al. (1986, p 135-142) MP 2032
Some observations on the character of snow. Townsend,	p.322-325) MP 1095	Effect of stratigraphy on radar-altimetry data collected over
R.A, et al, (1987, p 48-53) MP 2397	Ice deformation	:ce sheets
Flexure and fracture of macrocrystalline S1 type freshwater	Small-scale strain measurements on a glacier surface Col-	MP 2458
ice. Dempsey, J.P., et al, (1988, p 39-46) MP 2318	beck, S.C., et al, [1971, p.2.,7-23] MP 993	Density of natural ice accretions related to nondimensional icing parameters Jones, K.F., [1990, p 477-496]
Crack nucleation in polycrystalline ice. Cole, D.M., (1988,	Meso-scale strain measureme. the Beaufourt sea pack ice (AIDJEX 1971) Herry 1 Mil, et al. (1974,	MP 2705
p.79-87 ₁ MP 2325	p 119-136) MP 1035	Snow cover effects on antarctic sea ace thickness Ackley,
Emerging meteorite: crystalline structure of the enclosing ice Gow, A.J., et al. (1989, p. 87-91) MP 2503	Statistical variations in Aircre	S F., et al. (1990, p.16-21) MP 2726
Gow, A.J., et al, [1989, p 87-91] MP 2503 Vector analysis of ice petrographic data Ferrick, M.G., et	rates 10364, WD. 2 11 .61 MP 850	Ice detection
al. (1989, p 129-141) MP 2754	Remote measurement of the last title as So.D., III, et	Remote sensing of massive ice in permafrost along pipelines
Models of the mechanical properties of ice. Richter-Menge,	al, (1975, p 541.474 MP 849	in Alaska Kovacs. A. et al. [1979, p 268-279]
J.A, et al, (1989, p.87-99) MP 2687	Sea ice drift and deformation of the firmagery fli-	MP 1175
Physical properties of sea ice from the Weddell Sea Eicken,	bler, W.D., III, et al, (17 , 2 ' 35) MP 1059	Method of detecting soids in rubbled ice. Tuker, W B, et
H , et al, [1990, p. 28-32] MP 2727	Techniques for studying see it and deformation at sites	al (1984, p 183-1:18) MP 1772
Ice crystals	far from land using LAND. imagery Hibler, W.D., III, et al. (1976, p. 595-609) MP 866	Impulse radar sovir ling of frozen ground Kovacs, A, et al, (1985, p.28-40) MP 1952
Producing strain-free flat surfaces on single crystals of ice	Crystal fabrics of Weat Antarci ce sheet. Gow, A.J., et al.	Computer interfacing of meteorological sensors in severe
comments. Tobin, T.M., [1973, p.519-520]	[1976, p.1665-1677] MP 1382	weather. Rancourt, K, et al. (1985, p.205-21)
MP 1000	Dynamics of near-shore ice , cs. A., et 1, 1977.	MP 2175
Measuring the uniaxial compressive strength of ice Haynes,	p 151-163 ₃ °CP 1073	Comparison of winter climatic data for three New Hampshire
F.D., et al, (1977, p 213-223) MP 1027	Modeling pack ice as a vir	sites Govon: I W., et al, (1986, 78p) SR 86-05
Effect of temperature and strain rate on the strength of poly-	W.D., III, (1977, p 46-55) M. 2 1164	Pneumatically de-iced ice detector—final report, phase 2, part
crystalline ice Haynes, F.D., [1977, p 107-111] MP 1127	Arching of model ce floes at idge piers Calkins DJ,	1 Franklin, CH, et al. (1986, 9p + appends - MP 2249
Dielectric properties of dislocation-free ice Itagaki, K.	(1978, p 495-507 MF 1134	
[1978, p.207-217] MP 1171	Measurement of mesoscale defo mation of Beaufort see the (AIDJEX-1971) Hibler, W.D., III, et al., [1978, p. 148-	Rime meteorology in the Green Mountains. R: son, CC, cR 87-01
Polycrystalline ice mechanics. Hooke, R.L., et al. [1979,	172 ₁ MP 1:79	Pavement using detector—final report Goldste N., et al.
16p ₁ MP 1207	Polycrystalline . schames Hoole, R L., et al. (1979,	(1987, 26p + append) MP 2263
Dynamics of near-shore ice. Kovacs, A, et al. (1979,	16p) MP 1207	lee detector measurements compared to meteorological data
p.181-207 ₁ MP 1291	Sea ice ridging over the Alaskan continental shelf. Tucker,	Tucker, W.B, et al. (1987, p 31-37) MP 2277
Preparation of polycrystalline ice specimens for laboratory	W B., et al, [1979, 24p] CR 79-08	Frazil ce deposits and water channels bene in in ice-covered
experiments Cole, D M, (1979, p 15 -159)	Sea ice ridging over the Alaskan continental shelf. Tucker,	river Arcone S A, et al. (1987, 12p) CR 87-17
MP 1327	W B, et al, (1979, p 4885-4897) MP 1240	New England mountain using climatology. Rverson, CC.
2 chanical properties of polycrystalline ice Mellor, M.,	Mass-balance aspects of Weddell Sea pack-ice Ackley, S.F.,	(1988, 35p) CR 88-12
[1980, p 217-245] MP 1302	[197°, p 391-405] MP 1286	Atmospheric cing and broadcast antenna reflections Ryer-
Mechanical properties of polycrystalline ice Hooke, R.L., et al., [1930, p 263-275] MP 1328	Bending and buckling of a wedge on z i clastic foundation Nevel. D.E., [1980, p 278-288] MP 1303	son, C.C., (1988, 13p) CR 88-11
and the second s	Mechanical properties of polycrystalline ic Hooke, R.L. et	Development of an underwater frazil-ice detector Daly, SF., et al. (1990, p 77-82) MP 2702
C, clic loading and fatigue in ice. Mellor, M, et al., (1981, p 41-53) MP 1371	2l, (1980, p 263-275) MP 1328	Ice deterioration
Charged dislocation in ice 2 Contribution of dielectric	Investigation of the acoustic emission and deformation re-	lee dece , i atterns on a lake, a river and coastal bay in Canada.
relaxation. Itagaki, K., [1982, 15p.] CR 82-07	sponse of finite ice plates \(\lambda\) irouchakis, P.C. et al. [1981,	Bilello, M. A., [1977, p 120-127] MP 969
Attenuation and backscatter for snow and sleet at 96, 140, and	19p ₁ CR 81-06	Decay patterns 15 land-fast sea ice in Canada and Alaska
225 GHz Nemanch, J., et al. (1984, p.41-52)	Acoustic emission and deformation is the plates Xiroucha-	Bilello, M A., 1977, p 1-10; MP 1161
MP 1864	kis, P.C., et al. (1982, p. 129-13°) MP 1589 Ice behavior under constant stress and str in Mellor, M., et	Break-up dates for the Yukon River, Pt 1 Rampart to White-
Structure of ice in the central part of the Ross Ice Shelf,	al, [1982, p.201-219] MP 1525	horse, 1896-1978 Stephens, C.A. et al. (1979, c50
Antarctica Zotikov, I A, et al [1985, p 39-44] MP 2110	Deformation and failure of frozen soils and ice due to stresses	eives) MP 1317
4 .	Fish, A.M., [1982, p.419-428] MP 1553	Ma timum thickness and subsequent de ay of lake, river and fast sea ice in Canada and Alaska bilello, MA, (1980,
Cutting County high research is near the Mallon M. at al.	in a nining the characteristic length of floating ice sheets by	160p) CR 86-06
Cutting ice with high pressure water jets Mellor, M, et al. (1973, 22p) MP 1001	. 12 loads Sodhi, DS, ct al, (1985, p 155-159)	Ice growth on Post Pond, 1973-1982 Gow, A J., et ai,
Development of large ice saws Garfield, D.E., et al. (1976,	MP 1855	(1983, 25p ₁ CR 83-04
14p ₁ CR 76-47	On estimating ice stress from MIZEX 83 ice deformation and	Pred cting lake ice decay Ashton, G.D., [1983, 4p]
Dynamics and energetics of parallel motion tools for cutting	current measurements. Leppäranta, M. et al., 1986. p 17-19; MP 2226	SR 83-19
and boring Mellor, M. (1977, 85p) CR 77-07	Compressive deformation of columnar sea ice. Brown, k.L.,	First-generation model of ice deterioration Asiston, G.D.
Transverse rotation machines for cutting and boring in perma-	ct al. (1986, p 241-252) MP 2124	(1983, p 273-2/8) MP 2080
frost. Mellor, M., (1977, 36p.) CR 77-19	Small-scale projectile penetration in saime ice Cole, D.M.	Deterioration of floating ice covers Ashton, G D., (1984, p 25-33) MP 1676
Design for cutting machines in permafrost Mellor, M.	et al. (1986, p.415-438) MP 2201	Ice deterioration Ashton, G.D., [1984, p. 31-38]
[1978, 24p] CR 78-1?	Folding in the Greenland ice sheet. Whillans I M, et al.	MP 1791
Icebreaking concepts Mellor, M. (1980, 18p.) SR 80-02	(1987, p 485-493) MP 2185	Deterioration of floating ice covers Ashton, G D., [1985,
	Stram-rate and grain-size effects in ice Cole, D.M., £1987, p 274-280 ₁ MP 2311	p.177-182 ₁ MP 2122
Mechanics of cutting and boring in permafrost Mellor, M. (1980, 82p.) CR 80-21	p 274-280 ₁ MP 2311 Sca-ice pressure ridge microbial communities Ackley, S.F.	Ice drills
Equipment for making access holes through arctic sea ice	(1988, p 172-174) MP 2450	Melting and freezing of a drill hole through the Antarctic shelf
Mellor, M., (1986, 34p) SR 86-32	Profile properties of undeformed first-year sea ice Cox	ice Tien, C, et al. (1975, p 421-432) MP 861
Tactical bridging during winter 1986 Korean bridging exer-	GFN ct al, (1988, 57p) CR 88-13	1979 Greenland Ice Sheet Program Phase 1. casing a pera- tion Rand, J.H., [1980, 18p] SR 80-24
cise. Coutermarsh, B A., (1987, 23p) SR 87-13	lee reinforced with Geogrid Haynes, F.D. et al. 1989.	Calculating borehole geometry Jezek, k.C. et al. (1984,
Exothermic cutting of frozen materials Garfield, D.E., et al,	p 179-185) MP 2484	18p; SR 84-15
(1987, p 181-183) MP 2264	Compressive strength of antarctic frazilities Richter-Menge. JA, et al. (1989, p. 269-278) MP 2621	Shopper's guide to ice penetration Mellor, M., (1984, p.1-
Planing machines for building runways on ice Mellor, M.	Dynamic analysis of a floating ice sheet undergoing vertical	35 ₁ MP 1992
(1989, 8p + attachments) MP 2505	indentation McGilvary, W.R. et al. [1990, p.195-203]	Ice drilling and coring systems a retrospective view. Sell-
Penetration of floating ice sheets with cylindrical indentors Sodhi, DS, [1989, p 377-382] MP 2485	MP 2579	mann, P.V., et al. (1984, p 125-127) MP 1399
Experiments on the cutting process in ice Ueda HT, et al.	W.F. Weeks Sea Ice Symposium, San Francisco, CA. Dec.	Portable hot water ice drill Tucker, WB et al. (1986,
[1989, 36p] CR 89-05	1988 Ackley, S.F., ed. (1990, 299p.) M 90-01	p.549-564) MP 2207
Factors affecting rates of ice cutting with a chain saw Cou-	Ice density	Equipment for making access holes through arctic sea .cc. Mellor, M., 1986, 34p ₁ SR 86-32
termarsh, B A., (1989, 14p) SR 89-24	Investigation of ice islands in Babbage Bight Kovacs, A., et	Mellor, M. (1986, 34p) SR 86-32 Portable hot-water ice drill Tucker, W.B. et al. (1987.
Winter bridging exercise on thick ice Fort McCoy, Wiscon-	a), (1971 16 leaves) MP 1381	p 57-64, MP 2236
sin, 1988. Coutermarsh, B.A., (1990, 24p.)	Misgivin, in isostatic imbalance as a mechanism for sea ice crack; g. Ackley, S.F., et al. (1976, p. 85-94)	Update on portable hot-water sea ice drilling Govoni, J W.
SR 90-10	MP 1379	et al. (1789, p.175-178) MP 2479
Ice dams	Sintering and compaction of snow containing liquid water	Ice edge
Field investigations of a hanging ice dam Beltaos, S., et al. (1982, p.475-488) MP 1533	Colbeck, S.C., et al. (1) 79, p.13-32) MP 1190	Margin of the Gree and i.e sheet " ua Colbeck, S.C. et
Field investigation of St. Lawrence River hanging ice dams	Ice characteristics in V hitelish Bay and St. Marys River in	al, (1979 p.* .6.3) MP 1281
Shen, H.T., et al. (1984, p 241-249) MP 1830	winter Vance, G.P., (1980, 27p) SR 80-32	Physical oceanograph, of the seasonal sea are zone McPhee M.G. (1980) p.9° 132 ₁ MP 1294
St Lawrence River hanging ice dams, winter 1983 1984	Review of thermal properties of snow, ice and sea ice Yen, Y-C, [1981, 27p] CR 81-10	Choanoflagellata from the Weddell Sea, summer 1977
Shen, H.T., et al. (1984, 85p) MP 21/8	Equations for de ermining the gas and brine volumes in sea	Buck, KR. (1980, 26n) CR 80-16
Structure to form an ice cover on river rapids in winter Per	ice samples Cox, GFN, et al. (1982, 11p)	Air-ice-ocean interaction in Arctic marginal ice zones Wad-
ham, R.E., (1986, p.439-450) MP 2128	CR #2-30	hams, P. ed. (1981, 20p) SR 81-19
Jökulhlaups from ice-dammed Strandline Lake, Alaska	Equations for determining graph brine volumes in sea ice	Atmospheric dynamics in the antarctic marginal ice zone
Sturm, M. et al. (1987, p.79-94) MP 239	Cox. G.F.N., et al. (1983, p. 306-316) MP 2055	Andreas, L. L., c. al, (1984, p.649-661) MP 1667
Jökulhlaups from Strandline Lake, Alaska (especially / 2	Structure, valuaty and density or multi-year sea are pressure	Marginal ice zones a description of ail ice ocean interactive
1982 event) Sturm, M., et al. (1989, 19p.) MP 2520	ridges. Richter-Menge, J.A., et al., [1985, p. 194-198] MP 1857	processes, models and planned experiments. Johannessen, O.M., et al., (1984, p. 133-146). MP 1673

Ice edge (cont.)	Distortion of model subsurface radar pulses in complex die-	Ice thickness distribution across the Atlantic sector of the
Modeling the marginal ice zone. Hibler, W.D., III, ed., §1984, 99µ.; SR 84-07	lectrics Arcone, SA, (1981, p.855-864) MP 1472 Growth, structure, and properties of sea ice. Weeks, W.F.	Antarctic Ocean in midwinter. Wadhams, P. et al., (1987, p.14,535-14,552) MP 2314
On the role of receinteraction in marginal ice zone dynamics. Leppliranta, M., et al. [1984, p 23-29] NP 1781	et al. [1982, 130p] M 82-01 Charged dislocation in ice. 2. Contribution of dielectric	Electromagnetic measurements of a second-year sea ice floe Kovacs, A, et al. (1988, p 121-136) MP 2346
Analysis of linear res ice models with an ice margir. Lep-	relaxation. Itagaki, K , [1982, 15p] CR 82-07	Laboratory s'edy of transverse velocities and ice jamming is
parante, M., (1984 c.31-36) AfP 1782 Some simple concepts on wind forcing over the marginal icc.	Possibility of anomalous relaxation due to the charged dislo- cation process Itagaki, K., [1983, p.4261-4264]	a river beno Zuien, J.E., et al. (1988, p 189-197) MP 2501
zone. Tucker, W.B., (1984, p.43-48; MP 1783	MP 1669	Estimating sea ice thickness using data from impulse rada
Drag coefficient across the Antarctic marginalise zone. Andreas, E.L., et al. (1984, p. 63-7). MP 1784	Effect of X-ray irradiation on internal frictic and dielectric relaxation of ice ltagaki, K., et al. (1983, p.4314-4317)	sounding Kovacs, A. et al. (1989, 10p) CR 89-22 ICE FOG
Mechanism for floe electroning in the marginatice zone Lep- paranta, M., et 2!, (1984, p.73-76) MP 1785	MP 1670 Electromagnetic properties of sea ice. Morey, R.M., et al.	Chimatology of the cilo segions of the northern hemisphere
Ocean circulation its effect on seasonal seasier simulations	(1984, 32p.) TR 84-02	II. Wilse C., (1969, 158p) M I-A31 Ice fog
Hibler, W.D., III, et al. [1984, p.489-492] MP 1798 Air-ice-ocean interaction experiments in Arctic marginal ice	Electromagnetic properties of sea ice Morey, R M, et al. (1984, p.53-75) MP 1776	Radiation and evaporation heat loss during ice fog conditions McFadden, T., (1975, p. 18-27) MP 1051
zones. (1984, 56p) SR 84-28	Coaxial waveguide reflectometry for frozen ground and ice.	Suppression of ice fog from cooling ponds McFad len, T.
Mesoscale air-ice-ocean interaction experiments. Johannessen, O.M., ed, [1984, 176p] SR 84-29	Delaney, A.J., et al. [1984, p 428-431] MP 2048 Discussion. Electromagnetic properties of sea ice by R M	[1976, 78p] CR 76-43 Ice fog suppression us.ng i onomolecular films McFadden
Heat and moisture advection over antarctic sea ice dreas, E.L., (1985, p.736-746) MP 1888	Morey, A Kovacs and G F N. Cox. Arcone, S A., 1984, 93-941 MP 1821	T. (1977, p 361-367) MP 956
Rule of plastic ice interaction in marginal ice zone dynamics.	Authors' response to escussion on Electromagnetic proper-	lee fog suppression use g reinforced thin chemical films McFadden, T, et al. (1978, 23p) CR 78-26
Leppäranta, M., et al. '^85, p 11,8991,909; MP 1544	tie. of sea ice. Mc y, R M, et al, (1984, p.95-97) MP 1822	lee fog suppression using thin chemical films McFecden T., et al. (1979, 44p) MP 2192
Weddell-Scotia Sea Mid. October 1984. Crasey, F.D., et al.	Electro nagnetic properties of multi-year sea icc Morey, M al, (1985, p 151-167) MP 1902	lee tog surpression in Arctic communities McFadden, f.
[1386, p.3920-3924] MP 1575 MIZEX—a program for mesuscale air-ice-ocean interaction	lce c'actrical properties Gow, A.J., [1985, p 76-82]	[1980, 54-65] MP 1357 Suppression of ice fog from the Fort Wai vright, Alassa
experiments in Arctic marginal ice zones MI/EX bulletin 7. [1986, 88p] SR 86-03	MP 1910 Dielectric properties at 4.75 GHz of saline ice slabs Arcone,	cools and Walker, K.C., et al. (1982, 34p) SR 82-22
On estimating ice stress from MIZEX 83 ice deformation and	S A, et al, [1985, p 83-86] MP 1911	Ice for is an electr sophical obscurant. Koh, G, (1985,
current measurements Leppäranta, M., et r! (1986, p.17-19) MP 2220	Growth, structure, and properties of sea ice. Weeks, W.F., ct al., * '286, p.9-164; MP 2209	11p ₁ CR *< 00
Winter marginal ice zone experiment, Fram Strait/Greenland Sea, 1987/89. Davidson, K., ed. (1986, 53p.)	Microwave dielectric, structural and salinity properties of sea ice Arcone, S.A., et al., (1986, p. 832-839) MP 2188	Extinction coefficient for a distribution of ice fog particles Jordan, R., (1987, w. 7-539) MP 2286
SR 86-09	Dielectric properties of strained ice. 1. Effect of plastic	Obscuration and background dynamics in and over snow Hogan, A.W., [1987, n 181-185] MP 2417
Comment on "Atmospheric boundary layer modification in the marginal ice zone" by T J Bennett, Jr. and K Hunkins	straining Itagaki, K., [1987, p.143-147] MP 2356 Dielectric properties of strained ice. 2: Effect of sample	Ice forecasting
Andreas, E.L., (1987, p 3965-3969) MP 2394	preparation method. Itagaki, K., et al. (1987, p 149-153)	Ice accretion on ships Itagaki, K. [1977, 22p] SR 77-27
Physical properties of summer se, ice in the Fram Strait. Tucker, W.B., et al, (1987, p 6787-6203) MP 2240	MP 2357 Electromagnetic property trends : sea ice, Part 1. Kovacs,	Ice formation and breakup on Lake Champlain Bates, R E.
Role of floe collisions in sea acc rheology Shen, H.H., et al. (1987, p 7085-7096) MP 2242	A, cl al, (1987, 45p) CR 87-06 Microwave and structural proper ies of saline ice Gow.	(1980 p 125-143) MP 1425 Current procedures for forecasting aviation using Tucker
Esumating turbulent surface heat fluxes over polar, marine	A J., et al, (1987, 36p) CR 87-20	WB. (1983, 31p) SR 83-24
surfaces Andreas, E.L., [1985, p.65-68] MP 2448 Effect of ice pressure on marginal ice 2 the dynamics. Flato,	DC resistivity measurements of model saline ice sheets. Arcone, S.A., [1987, p.845-849] MP 2308	lce conditions on the Ohio and Illinois rivers, 1972-1985 Gatto, L.W., (1985, p.856-861) MP 1914
G.M., et al. [1989, p.514-521] MP 2522	Ice erosion	St Lawrence River freeze-up forecast Foltyn, E.P., et al (1986, p.467-481) MP 2120
Greanic heat flux in the Fram Strait measured by a drifting buoy. Perovich, D.K., et al., (1990, p 291-296)	Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20	Evaluation of an operational ice forecasting model during
MP 2740	Reservoir bank erosion caused and influenced by ice cover.	summer Tucker, W.B. et al. (1988, p 159-174) MP 2347
	Cistro I. W (1987-766) SP 87-31	[VIF 254]
Ice elasticity Mechanics of ice. Glen, J.W., (1975, 43p) N. II-C2b	Gatto, L.W., (1982, 26p) SR 82-31 Reservoir bank erosion caused by ice. Gatto, L.W., (1984,	Ice formation
Mechanics of ice. Glen, J.W., £1975, 43p.; M. 11-C2b. Concentrated loads on a floating ice sheet. Nevel. D.E.,	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787	Ice formation Temperature and flow conditions during the formation of river ice. Ashton, G D, et al. (1970, 12p.)
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p.237-245) Mechanical properties of polycrystalline ice Mellor, Mellor, M	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p. 203-214] MP 1787 Ice floes AIDJE: ir observations Thompson, T.W., et al., [1972,	Ice formation Femperature and flow conditions during the formation of river ice. Ashton. G D, et al. (1970, 12p) MP 1723
Mechanics of ice. Glen, J.W., [1975, 43p] Concentrated loads on a floating ice sheet [1977, p 237-245] Mechanical properties of polycrystalline ice [1980, p 217-245] Mellor, M MP 1302	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes	lee formation Temperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p] MP 1722 leings developed from surface water and ground water Carey, K.L., 77 71p; M III-D3
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133)	Reservoir bank erosion caused by ice. Gatto, L.W., 1984, p. 203-214; MP 1787 Ice floes AIDJE: it observations p.1-16, p.9-16 Dynamic* of near-shore ice Weeks, W.F., et al., [1976, p.9-34] MP 1380	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p) MP 1723 Icings developed from surface water and ground water Carey, K.L., 17, 7, 71p; Seasonal regime and invatriogical significance of stream teings in central Albara Kane, U.E., et al., (1973, p.528-
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice [1980, p. 217-245] Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133] Measuring mechanical properties of ice. Schwyz, J., et al.	Reservoir bank erosion caused by ice. Gatto, L.W., 1984, p. 203-2143 The floes AIDJE: a robservations p. 1-16, p. 1-16	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p) MP 1723 Icings developed from surface water and ground water Carey, K.L., '7 71p) Seasonal regime and invariogical significance of stream icings in central Alexa 4 Kane, U.E., et al., (1973, p.528, 540) MP 1026
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-224] MP 1556	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p. 203-214] MP 1787 Ice floes AIDJE: it observations Thompson, T.W., et al., [1972, p. 1-16, p. 9. Dynam-c* of near-shore ice Weeks, W.F., et al., [1976, p. 9. 34] MP 1380 Laboratory investigation of the mechanics and hydraulics of river .ce jams. Tatinelaux, J.C., et al., [1977, 45p] CR 77-09	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p.) MP 1723 leings developed from surface water and ground water Carey, K.L., "7, "71p.) Seasonal regime and hydrological significance of stream reings in central Alassa Kane, D.L., et al., (1973, p. 528-540) River ice problems Burgi F.L., et al., (1974, p. 1-15), MP 1002
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133] Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254] In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334] MP 1555	Reservoir bank erosion caused by ice. Gatto, L.W., 1984, p. 203-213. MP 1787 Ice floes AIDJE: a robservations Thompson, T.W., et al., (1972, p. 1-16). Weeks, W.F., et al., (1976, p. 9. 34). MP 1380 Laboratory investigation of the mechanics and hydraulics of riverce jams. Tatinclaux, J.C., et al., (1977, 45p.). CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p.) MP 1751	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p) MP 1723 Icings developed from surface water and ground water Care, K.L., '7 71p) Seasonal regime and invariogical significance of stream icings in central Alexa at Kane, D.L., et al., (1973, p. 528, 540) River ice problems Burgi F.L., et al., (1974, p. 1-15) MP 1002 Apparent anomaly in freezing of ordinary water Swinzow,
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133, hip 1436 Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p. 245-254] In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334] Flexural strength and clastic modulus of ice J.C., et al., [1982, p. 37-47] MP 1568	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] Ice floes AIDJE? at observations p 1-16, MP 989 Dynamer of near-shore ice Weeks, WF, et al., [1972, 99-34] Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, JC, et al., [1977, 45p] CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] Arching of model ice floes at bridge piers Calkins, D.J., 1978, p 495-507] MP 1134	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and hydrological significance of stream ings in central Alberta. Kane, U.E., et al., [1973, p. 528-540]. River ice problems. Burgi Fig. et al., [1974, p. 1-15]. MP 1026 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.]. G.K., [1976, 23p.]. Lee accumulation on ocean structures. Minst. L.D., [1977.].
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Measuring mechanical properties of ice. Schwszz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 376-334) MP 1556 Fleaural strength and clastic modulus of ice J.C., et al., [1982, p. 376-47] Determining the characteristic length of model ice sheets.	Reservoir bank erosion caused by ice. Gatto, L.W., 1984, p 203-214) Ice floes AIDJE: it observations Thompson, T.W., et al., [1972, p 1-16, p 9-34] Dynamic of near-shore ice Weeks, W.F., et al., [1976, p 9-34] Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p] CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] MP 1751 Arching of model ice flies at bridge piers Calkins, D.J.,	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p.) MP 1723 Icings developed from surface water and ground water Carey, K.L., ''.7 71p.) Seasonal regime and invarilogical significance of stream reings in central Alaccia. Kane, U.E., et al., (1973, p. 528-540) River ice problems. Burgi 1.1. et al., (1974, p. 1-15) Apparent anomaly in freezing of ordinary water. G.K., (1976, 23p.) WP 1026 Swinzow. CR 76-20
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice (1981, p. 217-245) Measuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Messuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Messuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Messuring mechanical properties of ice. MP 1555 Flexural strength and elastic modulus of ice Jic., et al. (1982, p. 37-47) Methanical behavia of suice. Mellor, M. (1983, 105p.)	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p. 203-214] The floes AIDJE? It observations Thompson, T.W., et al., [1972, p. 1-16] Dynam-e* of near-shore ice Weeks, W.F., et al., [1976, p. 9. 34] Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p.] CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p.] Arching of model ice flies at bridge piers Calkins, D.J., [1978, p. 495-507] MP 1134 Modeling of ice in rivers Ashtor, G.D., [1979, p. 14/1-14/26] Break-up of the Yukon River at the Haul Road Bridge, 1979	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., 7, 7. 71p.] Seasonal regime and hydrological significance of stream icings in central Alberta. Kane, U.E., et al., [1973, p. 528-540] River ice problems. Burgi Fig., et al., [1974, p. 1-15] MP 1026 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Lee accumulation on ocean structures. Minsk. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice lee. formation. Takagi, S., [1978, 13p.] CR. 78-66.
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133). Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Flexural strength and clastic modulus of ice. J.C., [1982, p. 37-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) MP 1568 Sodhi, D.S., et al., [1982, p. 99-104) MP 1570 Mechanical behavior of source. Mellor, M., [1983, 105p.] M83-1 Stress measurements, p. ice. Cox, G.F.N., et al., [1983,	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE: ar observations Thompson, T.W., et al., [1972, p 1-16] MP 989 Dynam-er of near-shore ice Weeks, W.F., et al., [1976, p 9. MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p] Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] MP 1751 Arching of model ice floes at bridge piers Calkins, D.J., [1978, p 495-507] MP 1134 Modeling of ice in rivers Ashton, G.D., [1979, p 14/1-14/26] Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p + Figs.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D.,	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p) MP 1723 Icings developed from surface water and ground water Cares, K.L., 17, 7, 17p. Seasonal regime and liver logical significance of stream toings in central Alacaaa Kane, U.E., et al., (1973, p. 528-540) River ice problems Burgi F. e. al., (1974, p. 1-15) MP 1002 Apparent anomaly in freezing of ordinary water G.K., (1976, 23p.) Ice accumulation on ocean structures Minsk L.D., (1977, 42p.) Segregation freezing as the cause of suction force for ice le. formation Takagi, S., (1978, 13p.) Eurodamentals of ice lens formation Takagi. S., (1978, MP 1173, MP 1
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133, hP 1430 Measuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) Messuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) Messuring mechanical properties of ice. Schwyrz, J., et al., (1981, p. 245-254) MP 1555 Flexural strength and elastic modulus of ice sheets, Sodhi, D.S., et al., (1982, p. 99-104) MP 1570 MP 1505 MP 1306 MP 1506 MP 1507 MP 1508 MP 1550 MP 1570	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p. 203-214) MP 1787 Ice floes AIDJE2 it observations Thompson, T.W., et al., (1972, p. 1-16). MP 989 Dynam-e* of near-shore ice. Weeks, W.F., et al., (1976, p. 9. 34) MP 1380 Laboratory investigation of the mechanics and hydraulics of river, ce jams. Tatinclaux, J.C., et al., (1977, 45p.) Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p.) MP 1351 Arching of model ice floes at bridge piers Calkins, D.J., (1978, p. 945-507) Modeling of ice in rivers Ashtor, G.D., (1979, p. 14/1. 14/26) Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1315 Freshwater ice growth, motion, and decay. Ashon, G.D., (1980, p. 261-304) MP 1299	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p.) MP 1723 leings developed from surface water and ground water Carey, K.L., 2.7, 71p.) Seasonal regime and hydrological significance of stream ings in central Alza, a. Kane, J. L., et al., (1973, p. 528-540) River ice problems. Burgi F. i., et al., (1974, p. 1-15) MP 1026 Apparent anomaly in freezing of ordinary water. G.K., (1976, 23p.) Lee accumulation on ocean structures. Minsk. L.D., (1977, 42p.) Segregation fivezing as the cause of suction force for ice le., formation. Takagi, S., (1978, 13p.) Fundamentals of ice lens formation. p. 235-242.] Frazil ice formation in turbulent flew. Muller, A., et al., (401er, A., et al., 2401er, A., et al., 2401er, A., et al., 2401er.
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Plezural strength and clastic modulus of ice. J.C., et al., [1982, p. 37-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) MP 1568 Sodhi, D.S., et al., [2982, p. 99-104) MP 1570 Mechanical behavic of struice. Mellor, M., [1983, 105p., M.83-1] Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo 'el ice in a small tank. Borland, MP 2319	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE: at observations p 1-16, MP 989 Dynam-er of near-shore ice Weeks, W F., et al., [1976, p 9-34] Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J C., et al., [1977, 45p] Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] Arching of model ice floes at bridge piers Arching of model ice floes at bridge piers Arching of model ice in rivers Ashton, G D., [1979, p 14/1-14/26] Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p + Figr.) MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p + Figr.) MP 1399 Method for measuring brash ice thickness with implies radar, Martinso), C R., et al., [1981, 10p.) SR 81-11	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and hydrological significance of stream ings in central Alberta. Kane, D.L., et al., [1973, p.528-540] River ice problems. Burgi Fig. et al., [1974, p.1-15] MP 1026 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Lee accumulation on ocean structures. Minsk. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice kerformation. Takagi, S., [1978, 13p.] Fundamentals of ice lens formation. Takagi, S., [1978, p.235-242] Frazil ice formation in turbulent flew. Miller, A., et al., [1978, p.219-234] Remote sensing of massive ice in permafrost along pipelines.
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating tee sheet (1977, p. 237-245) Mechanical properties of polycrystalline tee (1980, p. 217-245) Mechanical emission and deformation response of finite tee plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Mechanical properties of ice. Schwszz, J., et al., (1981, p. 245-224) Mechanical with the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Mechanical strength and clastic modulus of ice. J.C., et al., [1982, p. 37-471) Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104] Mechanical behavior of structor. Mellor, M., [1983, 105p.] Messensements on ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: model ice in a small tank. Borland.	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p. 203-214) Ice floes AIDJE: a robservations Thompson, T.W., et al., (1972, p. 1-16). Dynamer of near-shore ice. Weeks, W.F., et al., (1976, p. 9. 34) Laboratory investigation of the mechanics and hydraulics of riverce jams. Tatinclaux, J.C., et al., (1977, 45p.) CR. 77-09 Study of a grounded floeberg near Reindeer. Island, Alaska Kovacs, A., (1977, 9p.) Arching of model ice floes at bridge piers. MP 1751 Arching of model ice floes at bridge piers. MP 1751 Arching of model ice floes at bridge piers. MP 1751 MP 1335 Break-up of the Yukon River at the Haul Road Bridge. 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p. 261-304) Method for measuring brash ice thickness with impulse radar.	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p) MP 1723 Icings developed from surface water and ground water Carey, K.L., '7 71p1 Seasonal regime and invariogical significance of stream icings in central Alexa J. Kane, D.L., et al., (1973, p. 528-540) River ice problems. Burgi F.L., et al., (1974, p. 1-15) Apparent anomaly in freezing of ordinary water G.K., (1976, 23p) Ice accumulation on ocean structures. Minsk. L.D., (1977, 42p) Segregation freezing as the cause of suction force for ice keroformation. Takagi, S., (1978, 13p) Fundamentals of ice lens formation. Takagi, S., (1978, p. 219-234) Fazil ice formation, in turbulent flow Muller, A., et al., (1978, p. 219-234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A., et al., (1979, p. 268-279) MP 1175
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Measuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Mensuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Mensuring mechanical properties of ice. Schwyrz, J., et al. (1981, p. 245-254) Mensuring mechanical properties of ice. MP 1555 Flexural strength and clastic modulus of ice J.C., et al. (1982, p. 37-47) Determining the characteristic length of model ice sheets. Sodhi, D.S., et al. (1982, p. 99-104) Mechanical behavia of struice. Mellor, M. (1983, 105p.)	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE: a robservations Thompson, T.W., et al., [1972, p 1-16]. MP 989 Dynam-c of near-shore ice. Weeks, W.F., et al., [1976, p.9. 34]. Laboratory investigation of the mechanics and hydraulics of river .ce jams. Tatinclaux, J.C., et al., [1977, 45p]. CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p]. MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., [1978, p 495-507]. MP 1134 Modeling of ice in rivers. Ashtor, G.D., [1979, p 14/1-14/26]. MP 1335 Break-up of the Yukon River at the Haul Road Bridge. 1979 Stephens, C.A., et al., [1979, 22p + Figs.] MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., [1980, p 261-304]. MP 1299 Method for measuring brash ice thickness with imiguite radar. Martinsol, C.R., et al., [1981, 10p]. SR 81-11 Force distribution in a fragmented ice cover. Dals, S.F. et al., [1982, p.374-387]. MP 1531 Physical and structural characteristics of antarctic sea ice.	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 1722 leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and hydrological significance of stream ings in central Alberta. Kane, J.E., et al., [1973, p.528-540] River ice problems. Burgi Fig. et al., [1974, p.1-15] MP 1002 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Ice accumulation on ocean structures. Minsk. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice. formation. Takagi, S., [1978, 13p.] Fundamentals of ice lens formation. p. 235-242] Frazil ice formation, in turbulent flow. Miller, A., et al., [1978, p.219-234] Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p.28-279] MP 1173 River ice. Ashton, G.D., [1979, p.38-45] MP 1173 MP 1173
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133). Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p. 245-254) MP 1556 In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) MP 1555 Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) MP 1568 Sothi, D.S., et al., [1982, p. 99-104) MP 1570 Mechanical behavic refishance. Mellor, M., [1983, 105p.] M 83-1 Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo. lel ice in a small tank. MP 2319 On the determination of the average Loung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p. 39-43] MP 2324 Elastic properties of frazil ice from the Weddell Sea. Antarctica.	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJES at observations Thompson, T.W., et al., [1972, p 1-16] MP 989 Dynam-or of near-shore ice. Weeks, W.F., et al., [1976, p.9., 34] Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p.] Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p.] MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., [1978, p 495-507] MP 1134 Modeling of ice in rivers. Ashton, G.D., [1979, p 1471-14/26] Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p. + Figr.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., [1980, p 261-304] MP 1299 Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., [1981, 10p.] SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F., et al., [1982, p.374-3357] Physical and structural characteristics of antarctic sea ice. Go. V.A. et al., [1982, p.113-117] Characteristics of suff-year pressure ridges. Kovacs, A.	Ice formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p) MP 1723 Icings developed from surface water and ground water Carey, K.L., '7 71p. Seasonal regime and invariogical significance of stream icings in central Alexa J. Kane, J.L., et al., (1973, p. 528, 540) River ice problems. Butgi F. e. sl., (1974, p. 1-15) Apparent anomaly in freezing of ordinary water. G.K., (1976, 23p.) Ice accumulation on ocean structures. Minsk. L.D., (1977, 42p.) Segregation freezing as the cause of suction force for ice ke. formation. Takagi, S., (1978, 13p.) Fundamentals of ice lens formation. Takagi, S., (1978, p. 219-234) Frazil ice formation. in turbulent flow. 44uller, A., et al., (1978, p. 219-234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., (1979, p. 288-279) MP 1175 River ice. Ashton, G.D., (1979, p. 38-45) MP 1178 Modeling of ice in rivers. Ashton, G.D., (1979, p. 141-14726) MP 1335
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133, hip 1430 Measuring mechanical properties of ice. Schwyrz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwyrz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Plezural strength and clastic modulus of ice J.C., et al., [1982, p. 37-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) Mechanical behaviar of struce. Mellor, M., [1983, 105p.] Mestalling Strength and felice in a small tank. Schand, J.L., [1988, p. 47-2 On the determination of the average Loung's modulus for a floating ice cover. Kerr, A.D., et al., [1988, p. 39-43) MP 2324 Elastic properties of frazilice from the Weddell Sea. Antarc tica. Lange, M.A., et al., [1989, p. 208-217] MP 2620	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE2 it observations Thompson, T.W., et al., [1972, p 1-16]. MP 989 Dynam-e* of near-shore ice. Weeks, W.F., et al., [1976, p.9. MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p] CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] MP 1751 Arching of model ice flies at bridge piers. Calkins, D.J., [1978, p 495-507] MP 1131 Modeling of ice in rivers. Ashtor, G.D., [1979, p 14/1-14/26] MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p. + Figz.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) MP 1299 Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., [1981, 10p.) SR 81-11 Force distribution in a fragmented ice cover. MP 1531 Physical and structural characteristics of antarctic sea ice Go.v. A.J. et w., (15/2. p.113-117) MP 1548 Characteristics of suff-year pressure ridges. (1983, p.173-182)	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 172 leings developed from surface water and ground water Carey, K.L., 7, 7.7p.] Seasonal regime and hydrological significance of stream is ings in central Alza, a. Kane, U.E., et al., [1973, p. 528-540] River ice problems. Burgi F. i. e. al., [1974, p. 1-15] MP 1026 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Cee accumulation on ocean structures. Minst. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice le., formation. Takagi, S., [1978, 13p.] CR 78-40. Fundamentals of ice lens formation. Takagi, S., (1978, 1978, p. 219-234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p. 288-279] River ice. Ashton, G.D., [1979, p. 38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p. 14-1-14/26] Forecasting ice formation and breakup on Lake Caamplain.
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Measuring mechanical properties of ice. Schwirz, J., et al., [1981, p. 245-244] Measuring mechanical properties of ice. Schwirz, J., et al., [1981, p. 245-245] In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334] Flexural strength and clastic modulus of ice. J.C., et al., [1982, p. 37-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104] Mechanical behavit of struce. Mellor, M., [1983, 105p.] Mechanical behavit of struce. Mellor, M., [1983, 105p.] Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo. [el ice in a small tank. Borland, S.L., [1988, p. 47-) On the determination of the average "Loung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p. 39-43, MP 2319] Cyclic loading of saline ice initial experimental results (Cole, D.M., (1990, p. 265-271) Me 288	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) MP 1787 Ice floes AIDJE? at observations Thompson, T.W., et al., (1972, p 1-16) MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., (1976, p. 9. MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p) Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p) MP 175. Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507) Modeling of ice in rivers. Ashton, G.D., (1979, p 1471-14/26) Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p. + Figs.) MP 1315. Preshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) MP 1299. Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p.) SR 81-11. Force distribution in a fragmented ice cover. Dals, S.F. et al., (1982, p, 374-3187) MP 1531. Physical and structural characteristics of antarettic sea ice. Gov. A.J. et al., (1972, p. 113-117) MP 1548. Size and shape of ice floes in the Baltic Sea in spine. Lepparanta, M., (1983, p. 127-136) MP 2061.	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 1722 Leings developed from surface water and ground water Cares, K.L., ".7 71p.] Seasonal regime and livari logical significance of stream icings in central Alza, a. Kane, U.L., et al., [1973, p. 528-540] River ice problems Burgi F. e. vl., [1974, p. 1-15] MP 1002 Apparent anomaly in freezing of ordinary water G.K., [1976, 23p.] Lea accumulation on ocean structures Minsk L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice k. formation Takagi, S., [1978, 13p.] Fundamentals of ice lens formation p. 235-242.] Frazil ice formation in turbulent flew fuller, A., et al., [1978, p. 219-234] Remote sensing of massive ice in permafrost along bijedines in Alaska. Kovacs, A. et al., [1979, p. 38-45] MP 1173 River ice Ashton, G.D., [1979, p. 38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p. 14]. 1-14/26] MP 1335 Forecasting ice formation and breakup on Lake Coamplain Bates, R.L., et al., [1979, 21p.] Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake Wije'er thermal structure, ice conditions and climate of Lake
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133). Measuring mechanical properties of ice. Schwsz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) The properties of ice. Tatinclaux, J.C., [1982, p. 376-334) The properties of ice. Tatinclaux, J.C., [1982, p. 376-334) The properties of ice. Tatinclaux, J.C., [1982, p. 97-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) MP 1556 Stress measurements in ice. Cox, G.F.N., et al., [1983, 105p.] M83-1 Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo 'el ice in a small tank. Botand, S.L., [1988, p. 47-2] On the determination of the average 'coung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p. 39-43] Elastic properties of frazil ice from the Weddell Sea. Antarc tica. Lange, M.A., et al., [1989, p. 208-217) MP 2581 Ce electrical properties Engineering properties of sea ice. Schwarz, J. et al., [1977.	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE: Ar observations Thompson, T.W., et al., [1972, p 1-16] MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., [1976, p. 9-34] MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p] Study of a grounded floebirg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] MP 175. Arching of model ice flies at bridge piers. Calkins, D.J., [1978, p 495-507] MP 1315. Modeling of ice in rivers. Ashtor, G.D., [1979, p 1471-14726] Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., [1979, 22p + Figr.) MP 1315. Preshwater ice growth, motion, and decay. Ashton, G.D., [1980, p 261-304] Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., [1981, 10p] SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F., et al., [1982, p, 374-387] Physical and situatural characteristics of antarctic sea ice. Gov. A.J. et al., [1983, 173-182] Size and shape of ice floes in the Baltic Sea in spring. Lepparants, M., [1983, p. 127-136] MP 2061 Ice forces on a bridge pier. Ottauquechee River, Vermont, Sodth, D.S., et al., [1983, 6p.] CR 83-32	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p.) MP 1723 leings developed from surface water and ground water Carey, K.L., '7 71p.) Seasonal regime and livary logical significance of stream is ings in central Alburg. Kane, D.L., et al., (1973, p. 528-540) River ice problems. Burgi F.L., et al., (1974, p. 1-15) MP 1022 Apparent anomaly in freezing of ordinary water. Swinzow, G.K., (1976, 23p.) Lee accumulation on ocean structures. Minsk. L.D., (1977, 42p.) Segregation freezing as the cause of suction force for ice kerformation. Takagi, S., (1978, 13p.) Fundamentals of ice lens formation. Takagi, S., (1978, 13p.) Frazil ice formation in turbulent flow. Muller, A., et al., (1978, p. 219-234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., (1979, p. 268-279) MP 1173 River ice. Ashton, G.D., (1979, p. 38-45) Modeling of ice in rivers. Ashton, G.D., (1779, p. 14.1-14/26) Forecasting ice formation and breakup on Lake Campilain. Bates, R.L., et al., (1980, 26p.) Evending the useful life of Dy L-2 to 1986. Tobiasson, W., Extending the useful life of Dy L-2 to 1986. Tobiasson, W.,
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133-1814] Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] Mensuring the district modulus of ice. J., [1982, p. 326-334] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104] MP 1568 Determining the characteristic length of model ice sheets. MP 1570 Mechanical behavia of suice. Mellor, M., [1983, 105p.] M 83-1 Stress measurement, in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo 'el ice in a small tank. Borland, S.L., [1988, p.47-] On the determination of the average coung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p. 39-43] MP 2324 Elastic properties of frazil ice from the Weddell Sca. Antarctical. Lange, M.A., et al., [1989, p. 208-217] MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M., (1990, p. 265-271) MP 2581 Ice electrical properties Engineering properties of sea ice. Schwarz, J., et al., [1977, p. 495-551]	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) MP 1787 Ice floes AIDJE2 or observations Thompson, T.W., et al., (1972, p 1-16). MP 989 Dynam-cr of near-shore ice. Weeks, W.F., et al., (1976, p. 9-34) Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p). CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p). MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507). MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1335 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304). MP 1299 Method for measuring brash ice thickness with impulse radar, Martinso), C.R., et al., (1981, 10p). SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F., et al., (1982, p. 374-387). MP 1531 Physical and structural characteristics of antarctic scalic Gov. A.J., et al., (1982, p. 173-182; MP 1548). Size and shape of ice floes in the Baltic Sea in spring Lepparants, M., (1983, p. 173-186). MP 2061 lee forces on a bridge pier, Ottauquechee River, Vermont, CR, 83-32 Force distribution in a fragmented ice cover. Stewart, D.M., 1983, p. 127-136). CR, 83-32 Force distribution in a fragmented ice cover. Stewart, D.M., 1983, p. 127-136). CR, 83-32 Force distribution in a fragmented ice cover. Stewart, D.M., 1983, p. 127-136, p. MP 2061	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and liver logical significance of stream icings in central Alza, a. Kane, b.L., et al., [1973, p.528-540] River ice problems Burgi F. e. vl., [1974, p.1-15] MP 1002 Apparent anomaly in freezing of ordinary water G.K., [1976, 23p.] Lee accumulation on ocean structures G.K., [1976, 13p.] Lea accumulation on ocean structures Minsk L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice kerormation Takagi, S., [1978, 13p.] CR 78-66 Fundamentals of ice lens formation p. 235-2242] Frazil ice formation, in turbulent flow (1978, p. 219-234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p. 268-279] River ice Ashton, G.D., [1979, p.38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p.14], 1-14/26) MP 1335 Forecasting ice formation and breakup on Lake Champlain Bates, R.L., et al., [1979, 21p.] CR 79-28 Winter thermal structure, ice conditions and climate of Lake Champlain Bates, R.E., et al., [1979, 21p.] CR 79-28 SR 80-13 SR 80-13
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133). Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254) MP 1556 In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Teleural strength and clastic modulus of ice. J.C., et al., [1982, p. 37-47] Methanical behavic reference. Mellor, M., [1983, 105p.] Mechanical behavic reference. Mellor, M., [1983,	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) MP 1787 Ice floes AIDJE? at observations Thompson, T.W., et al., (1972, p 1-16) MP 989 Dynam-or of near-shore ice. Weeks, W.F., et al., (1976, p.9., MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p) Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p) MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507) MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p + Figr.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) MP 1299 Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p) SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F. et al., (1982, p, 374-3187) Physical and structural characteristics of antaretic sea ice. Gov. A.J. et al., (1981, 10p) SR 81-11 Force distribution in the Baltic Sea in spring. Lepparanta, M., (1983, p.127-136) MP 1548 Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p.127-136) CR 83-32 Force distribution in a fragmented ice cover. Stewart, D.M., et al., (1994, 16p.) CR 84-07 Mechanism for floe clustering in the marginal ice zone. Lep-	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p.) MP 1723 Leings developed from surface water and ground water Care, K.L., '7. 71p.) Seasonal regime and livary logical significance of stream is ings in central Aleilus. Kane, D.L., et al., (1973, p. 528-540) River ice problems. Burgi F.L., et al., (1974, p. 1-15). Apparent anomaly in freezing of ordinary water. Swinzow, G.K., (1976, 23p.) Lee accumulation on ocean structures. Minsk. L.D., (1977, 42p.) Segregation freezing as the cause of suction force for ice ke., formation. Takagi, S., (1978, 13p.) Fundamentals of ice lens formation. Takagi, S., (1978, 13p.) Frazil ice formation in turbulent flow. Muller, A., et al., (1978, p. 219-234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A et al., (1979, p. 268-279). MP 1173 River ice. Ashton, G.D., (1979, p. 38-45). MP 1173 River ice. Ashton, G.D., (1979, p. 38-45). MP 1174 Modeling of ice in rivers. Ashton, G.D., (1779, p. 14.1-14/26). MP 1335 Forecasting ice formation and breakup on Lake Campilain Bates, R.L., et al., (1979, 21p.). (TR 79-268). CR 80-03 Extending the useful life of D. 12 to 1986. Tobrassian, W., et al., (1980, 37p.). SR 80-13 Sea ice growth drift and decay. Hibler, W.D. III, (1980, MP 1298).
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133, hip 1430 Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Messuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Mensuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Merical properties of ice. Mellor, M. [1983, 105p.] Mechanical behavia of structure. Mellor, M. [1983, 105p.] Mechanical behavia of structure. Mellor, M. [1983, 105p.] Mechanical behavia of structure. Mellor, M. [1983, 105p.] Mechanical behavia of structure in a small tank. MP 2319 On the determination of the average coung's modulus for a floating ice cover. Ketr., A.D., et al., [1988, p. 39-43), MP 2324 Elastic properties of frazil ice from the Weddell Sea. Antarctical. Lange, M.A., et al., [1989, p. 208-217) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M. (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M. (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M. (1990, p. 265-271) MP 1065 Dielectric constant and reflection crefficient of snow surface layers in the McMurdo lee Shelf. Kovacs, A., et al., [1977, p. 137-138]	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p203-214) Re floes AIDJE2 it observations Thompson, T.W., et al., (1972, p1-16) Dyname* of near-shore ice. Weeks, W.F., et al., (1976, p.9., 34) Laboratory investigation of the mechanics and hydraulics of river. ce jams. Tatinclaux, J.C., et al., (1977, 45p.) CR 77-09 Study of a grounded floeberg near Reindeer Island, Alasks Kovacs, A., (1977, 9p.) Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p495-507) Arching of model ice floes at bridge piers. MP 1131 Modeling of ice in rivers. Ashton, G.D., (1979, p. 14/1-14/26) Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Figr.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p. 261-304) Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p.) SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F. et al., (1982, p.374-387) Physical and structural characteristics of antiactic sea ice Go.y. A.J. et al., (1982, p.113-182) Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p. 127-136) Lepparanta, M., (1983, p. 127-136) CR 84-07	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 1723 leings developed from surface water and ground water Carey, K.L., 2.7, 71p.] Seasonal regime and hydrological significance of stream icings in central Alza, a. Kane, J. L., et al., [1973, p.528-540] River nee problems. Burgi F. i., et al., [1974, p.1-15] MP 1026 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Lee accumulation on ocean structures. Minst. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice lee, formation. Takagi, S., [1978, 13p.] Fundamentals of ice lens formation. Takagi, S., (1978, 13p.) Frazil ice formation, in turbulent flow. Multer, A., et al., [1978, p.219-234] Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p.38-45] MP 1173 River ice. Ashton, G.D., [1979, p.38-45] MP 1173 River ice. Ashton, G.D., [1979, p.38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p.14-1, 14/26] Forecasting ice formation and breakup on Lake Coamplain Bates, R.E., et al., [1979, 21p.] Will'er thermal structure, ice conditions and climate of Lake Coamplain. Bates R.E., [1980, 26p.] Extending the useful life of DY L-2 to 1986. Tobiasson, W., et al., [1980, 37p.] Sea ice growth drift and decay. Hibler, W.D. III., [1930, 28p.] Earlier growth drift and decay.
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133, hip 1430 Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Measuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Messuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Mensuring mechanical properties of ice. Schwstz, J., et al., [1981, p. 245-254) Merical properties of ice. Mellor, M. [1983, 105p.] Mechanical behavia of structure. Mellor, M. [1983, 105p.] Mechanical behavia of structure. Mellor, M. [1983, 105p.] Mechanical behavia of structure. Mellor, M. [1983, 105p.] Mechanical behavia of structure in a small tank. MP 2319 On the determination of the average coung's modulus for a floating ice cover. Ketr., A.D., et al., [1988, p. 39-43), MP 2324 Elastic properties of frazil ice from the Weddell Sea. Antarctical. Lange, M.A., et al., [1989, p. 208-217) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M. (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M. (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M. (1990, p. 265-271) MP 1065 Dielectric constant and reflection crefficient of snow surface layers in the McMurdo lee Shelf. Kovacs, A., et al., [1977, p. 137-138]	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) Re floes AIDJE? at observations Thompson, T.W., et al., (1972, p 1-16). MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., (1976, p. 9. MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p). CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p). MP 175. Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507). MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p. + Fig.). MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p. + Fig.). MP 1335 Preshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304). MP 1299 Method for measuring brash ice thickness with impulse radar, Martinso., C.R., et al., (1981, 10p.). SR 81-11 Force distribution in a fragmented ice cover. Dals, S.F. et al., (1982, p.374-3187). MP 1531 Physical and structural characteristics of antaretic sea ice. Gov. A.J. et al., (1983, p.127-136). MP 1548 Size and shape of ice floes in the Baltic Sea in sping. Lepparanta, M., (1983, p.127-136). MP 2061 Ice forces on a bridge pier, Ottauquechee River, Vermont, Sodhi, D.S., et al., (1983, 6p.). MP 2061 Ice forces on a bridge pier, Ottauquechee River, Vermont, Sodhi, D.S., et al., (1983, 6p.). MP 2061 Ice forces on a bridge pier, Ottauquechee River, Vermont, Sodhi, D.S., et al., (1984, p.73-76). MP 1785 On the rheology of a broken ice field due to floe colistion Shen, H., et al., (1984, p.29-34). MP 1812	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and livari logical significance of stream icings in central Alzaza. Kane, U.L., et al., [1973, p.528-540] River ice problems. Burgi F. e. al., [1974, p.1-15] MP 1002 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Lea accumulation on ocean structures. Minsk. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice k., formation. Takagi, S., [1978, 13p.] Fundamentals of ice lens formation. Takagi, S., (1978, 12p.) Frazil ice formation in turbulent flew. Muller, A., et al., (1978, p.219-234) Remote sensing of massive ice in permafrost along bijedines in Alaska. Kovacs, A. et al., [1979, p.288-279] River ice. Ashton, G.D., (1979, p.38-45). MP 1173 Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26). MP 1335 Forecasting ice formation and breakup on Lake Coamplain. Bates, R.L., et al., [1979, 21p.] Will'er thermal structure, ice conditions and climate of Lake Champlain. Bates R.E., [1980, 26p.] Extending the useful life of DY L-2 to 1986. Tobiasson, W., et al., [1980, 37p.] Sea ice growth drift and decay. Hibler, W.D. III, (1980, 1981-199) Freshwiter ice growth, motion, and decay. Ashton, G.D., [1979, 261-304] Lee formation and breakup on Lake Champlain. Bates, R.E., et al., Et al
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133). Measuring mechanical properties of ice. Schwsz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Teleural strength and clastic modulus of ice. J.C., [1982, p. 37-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 97-47] Mechanical behavic of sizuice. Mellor, M., [1983, 105p.] Mestandistic measurements on ice. Cox, G.F.N., et al., [1983, 31p.] Stress measurements on ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD; mo. lel ice in a small tank. Boland, S.L., [1988, p.47-5] On the determination of the average Loung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p. 39-43], MP 2324 Elastic properties of frazil ice from the Weddell Sea. Antarc tica. Lange, M.A., et al., [1989, p. 208-217] MP 2620 Cyclic loading of saline ice initial experimental results Colz, D.M., (1990, p. 265-271) MP 2581 Ice electrical properties Engineering properties Engineering properties Engineering properties Engineering properties of sea icc. Schwarz, J., et al., [1977, p. 495-53], Dielectric constant and reflection chefficient of snow surface layers in the Medhurdo lee Shelf. Kovacs, A., et al., [1977, p. 137-138] Internal properties of the ice sheet at Cape Polger by radio echo sounding. Keliher, T.E., et al., (1978, 12p. C.F., 8-04.	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE: Ar observations Thompson, T.W., et al., [1972, p 1-16] MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., [1976, p. 9-34] MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., [1977, 45p] Study of a grounded floebirg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] MP 175. Arching of model ice flies at bridge piers. Calkins, D.J., [1978, p 495-507] MP 1313 Modeling of ice in rivers. Ashtor, G.D., [1979, p 14/1-14/26] Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p + Figr.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., [1980, p 261-304] Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., [1981, 10p] SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F., et al., [1982, p, 374-387] Physical and situatural characteristics of antarctic sea ice. Gov. A.J. et al., [1981, 10p] SR 81-11 Characteristics of subtry-car pressure ridges. MP 1531 Characteristics of subtry-car pressure ridges. Kovacs, A., [1983, p.173-182] Size and shape of ice floes in the Baltic Sea in spring. Lepparants, M., [1983, p. 127-136] MP 2061 Ice forces on a bridge pier. Oitauquechee River, Vermont, Sodhi, D.S., et al., [1984, p. 1993, p. 179-187] Force distribution in a fragmented ice cover. Stewart, D.M., et al., [1984, 16p.) CR 83-32 Force distribution in a fragmented ice cover. Stewart, D.M., et al., [1984, p. 19-76] MP 1785 On the rhoology of a proken ice field due to floe collision Shen, H. et al., [1984, p. 29-34] MP 1972	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., (1970, 12p.) MP 1723 leings developed from surface water and ground water carey, K.L., 2.7, 71p.] Seasonal regime and hydrological significance of stream is ings in central Alz., a. Kane, J.L., et al., (1973, p. 528-540) River nee problems. Burgi F. i. e. al., (1974, p. 1-15) MP 1026 Apparent anomaly in freezing of ordinary water. G.K., (1976, 23p.) Lee accumulation on ocean structures. Minst. L.D., (1977, 42p.) Segregation freezing as the cause of suction force for ice le., formation. Takagi, S., (1978, 13p.) Fundamentals of ice lens formation. Takagi, S., (1978, 13p.) Frazil ice formation, in turbulent flow. MP 1173 Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., (1979, p. 38-45) MP 1173 Modeling of ice in rivers. Ashton, G.D., (1979, p. 14-14/26) Forecasting ice formation and breakup on Lake Coamplain. Bates, R.E., et al., (1979, 21p.) Willer thermal structure, ice conditions and climate of Lake Coamplain. Bates, R.E., (1980, 26p.) Extending the useful life of DY L-2 to 1986. Tobiasson, W. et al., (1980, 37p.) Sea ice growth drift and decay. Hibler, W.D. III., (1930, p. 141-209) Freshwiter tice growth, motion, and decay. Albon, G.D., MP 1298 Freshwiter ice growth, motion, and decay. Albon, G.D., MP 1298 Length of the massive ice in permafrost along pipelines. Research of the massive ice along pipelines. Research of the massive ice and climate of Lake Coamplain. Bates R.E., (1980, 26p.) Extending the useful life of DY L-2 to 1986. Tobiasson, W. et al., (1980, 37p.) Sea ice growth drift and decay. Hibler, W.D. III., (1930, p. 141-209) Freshwiter ice growth, motion, and decay. Albon, G.D., MP 1298
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p.237-245) Mechanical properties of polycrystalline ice (1980, p.217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p.123-133) Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p.245-224) MP 1556 In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p.326-334) Flexural strength and elastic modulus of ice. J.C., et al., [1982, p.37-47] MP 1555 Petermining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p.99-104) MP 1550 Mechanical behavic of suice. Mellor, M., [1983, 105p.] MP 1568 Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo 'el ice in a small tank. MP 2319 On the determination of the average "loung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p.39-43] MP 2324 Elastic properties of frazil ice from the Weddell Sea, Antarctica. Lange, M.A., et al., [1989, p.208-217] MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole., D.M., (1990, p.265-271) MP 2630 Literactical properties Engineering properties of sea ice. Schwarz, J., et al., [1977, p.495-531) MP 1065 Dielectric constant and reflection coefficient of snow surface layers in the McMurdo lee Shelf. Kovacs, A., et al., [1977, p.137-132] Internal properties of the ice sheet at Cape Polger oy radio echo sounding Keiher, T.E., et al., [1978, 12p.] Literaction of a surface wave with a dielectric slab discon tunuity. Arcone, S.A., et al., [1978, 12p.]	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) Re floes AIDJE? at observations Thompson, T.W., et al., (1972, p 1-16). MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., (1976, p. 9. 34) Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p) CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p) Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507) Modeling of ice in rivers. Ashton, G.D., (1979, p 14/1-14/26) Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1335 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1395 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1981, 10p.) MP 1299 Method for measuring brash ice thickness with impulse radar, Martinso., C.R., et al., (1982, p. 374-337) Physical and structural characteristics of antaretic sea ice. Go. v. A.J. et al., (1981, 10p.) SR 81-11 Force distribution in a fragmented ice cover. July, S.F. et al., (1982, p. 374-3136) MP 1598 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1983, p. 173-182) Force distribution in a fragmented ice cover. Stewart, D.M., et al., (1983, p. 173-186) MP 1698 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1983, p. 173-186) MP 1698 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1983, p. 173-186) MP 1698 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1983, p. 173-187) MP 1698 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1983, p. 173-187) MP 1698 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1983, p. 173-187) MP 1698 Size and shape of ice floes in the Baltic Sea in sping. Lepparants, M., (1984, p. 193-44) MP 1785 On the rhoology of a broken ice field due to	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and liver logical significance of stream icings in central Alza, a. Kane, J.L., et al., [1973, p.52s. 540] River ice problems Burgi F. e. vi., [1974, p.1-15] MP 1026 Apparent anomaly in freezing of ordinary water G.K., [1976, 23p.] Lee accumulation on ocean structures Minsk. L.D., [1977, 42p.] Segregation fivering as the cause of suction force for ice le. formation Takagi, S., [1978, 13p.] CR 78-fiv. Pundamentals of ice lens formation p. 235-242] Frazil ice formation, in turbulent flow Liuller, A., et al., [1978, p.21p.] River ice Ashton, G.D., [1979, p.38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1779, p.14], 1-14/26] MP 1335 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Whister thermal structure, ice conditions and climate of Lake Champlain Bates, R.E., et al., [1979, 21p.] Whister thermal structure, ice conditions and climate of Lake Champlain Bates, R.E., et al., [1979, 21p.] Sea ice growth drift and decay Little 1980, 37p.] Freshwater ice growth, motion, and decay (1980, p.261-304) Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.566-669) MP 1293 Sancial Structure, ice conditions and climate of Lake Champlain. River ice growth drift and decay (1980, p.261-304) Lee formation and breakup on Lake Champlain. River ice growth drift and decay (1980, p.261-304) Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.656-669)
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice [1980, p. 217-245] Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-1333, hip 1436 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334] Flexural strength and clastic modulus of ice. J.C., et al., [1982, p. 37-47] Methanical behavic references in the Medior, M., [1983, 105p., M., 1983, 105	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) RM 1787 Ice floes AIDJE: A observations Thompson, T.W., et al., (1972, p 1-16). MP 989 Dynam-or of near-shore ice. Weeks, W.F., et al., (1976, p.9., 34) Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p) Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p) MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507) MP 1134 Modeling of ice in rivers. Ashton, G.D., (1979, p 1471-14/26) Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Figr.) MP 1315 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p.) MP 1299 Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p.) SR 81-11 Force distribution in a fragmented ice cover. July, S.F., et al., (1982, p, 374-3387) Physical and structural characteristics of antaretic sea ice. Gov. A.J., et al., (1982, p. 173-182) Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p. 127-136) MP 1698 Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p. 127-136) MP 1698 Force distribution in a fragmented ice cover. Stewart, D.M., et al., (1984, 16p.) MP 2061 Ice forces on a bridge pier, Ottauquechee River, Vermont, Sodh, D.S., et al., (1984, p. 73-76) MP 1698 On the rhoology of a broken ice field due to floe collistion Shen, H., et al., (1984, p. 73-76) MP 1812 Ice block stability, Daly, S.F., (1984, p. 544-548) MP 1972 Level ice breaking by a simple wedge. Tatinclaux, J.C., (1985, 46p.) Cer. (1985, 46p.) MP 1972 Level ice distribution in the wake of a simple wedge.	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and livari logical significance of stream icings in central Alza, a. Kane, U.L., et al., [1973, p.528-540] River ice problems Burgi 1. e. al., [1974, p.1-15] MP 1002 Apparent anomaly in freezing of ordinary water G.K., [1976, 23p.] Lea accumulation on ocean structures Minsk L.D., [1977, 42p.] Lea eccumulation on ocean structures Minsk L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice k., formation Takagi, S., [1978, 13p.] Fundamentals of ice lens formation Takagi, S., (1978, p.235-242) Frazil ice formation in turbulent flew Muller, A., et al., (1978, p.219-234) Remote sensing of massive ice in permafrost along bijedines in Alaska. Kovacs, A. et al., [1979, p.268-279] MP 1173 River ice Ashton, G.D., (1979, p.38-45) MP 1174 Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) MP 135 Forecasting ice formation and breakup on Lake Campilan Bates, R.L., et al., [1979, 21p.] Will'er thermal structure, ice conditions and climate of Lake Champlain Bates R.E., [1980, 26p.] Extending the useful life of DY L-2 to 1986 Tobiasson, W., et al., [1980, 37p.] Sea ice growth drift and decay Hibler, W.D. III, (1930, p.121-1209) Freshwiter ice growth, motion, and decay (1980, p.261-304) Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.125-143) NP 1298 Bates, R.E., MP 1429 Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.125-143) NP 1298 Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.125-143) Numerical sciutions for rigid-ice model of secondary frost heave O Neill, & et al. (1980, p.656-669) MP 1439 Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.125-143)
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133). Measuring mechanical properties of ice. Schwsz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Melasuring mechanical properties of ice. Schwsz, J., et al., [1981, p. 245-254) In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 376-334) Melasuring the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 97-47) Mechanical behavior of sevenice. Mellor, M., [1983, 105p.] Mechanical behavior of sevenice. Mellor, M., [1983, 193-43] Mechanical behavior of sevenice. Mellor, M., [1983, 193-43] Melastic properties of frazil ice from the Wedell Sea. Antarc tica. Lange, M.A., et al., [1988, p. 208-217) MP 2581 Ice electrical properties Cola, D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cola, D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cola, D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cola, D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial	Reservoir bank erosion caused by ice. Gatto, L.W., [1984, p 203-214] MP 1787 Ice floes AIDJE2 it observations Thompson, T.W., et al., [1972, p 1-16]. MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., [1976, p.9. 34] Laboratory investigation of the mechanics and hydraulics of river. ce jams. Tatinclaux, J.C., et al., [1977, 45p] CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., [1977, 9p] Arching of model ice floes at bridge piers. Calkins, D.J., [1978, p 495-507] MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., [1978, p 495-507] MP 1134 Modeling of ice in rivers. Ashtor, G.D., [1979, p 14/1-14/26] Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., [1979, 22p. + Figs.] MP 1315 Preshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) Method for measuring brash ice thickness with inipulse radar, Martinson, C.R., et al., [1981, 10p.] SR 81-11 Force distribution in a fragmented ice cover. Daly, S.F., et al., [1982, p.374-387] Physical and structural charecteristics of antarctic sea ice. Go. v.A.J., et al., [1982, p.374-387] Characteristics of routi-year pressure ridges. (1983, p.173-186] Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p.127-136) MP 1598 Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p.127-136) MP 1698 Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p.127-136) MP 1698 Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p.127-136) MP 1698 Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1984, 1973-76) MP 1785 On the rheology of a broken ice field due to floe collision. Shen, H., et al., [1984, p.29-34] MP 1972 Level ice breaking by a simple wedge. Taiticlaux, J.C., (1985, 46p.) CR 88-22	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 1723 Leings developed from surface water and ground water Carey, K.L., 7, 7, 71p.] Seasonal regime and liver/logical significance of stream is ings in central Alza, a. Kane, J.E., et al., [1973, p. 528-540] River ice problems. Burgi F. i. e. al., (1974, p. 1-15) MP 1026 Apparent anomaly in freezing of ordinary water. G.K., [1976, 23p.] Lee accumulation on ocean structures. Minst. L.D., [1977, 42p.] Segregation fivezing as the cause of suction force for ice le., formation. Takagi. S., [1978, 13p.] CR 78-40. Fundamentals of ice lens formation. Takagi. S., (1978, p. 235-2242) Frazil ice formation, in turbulent flow. Muller, A., et al., [1978, p. 219-233] Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p. 288-279] MP 1173 River ice. Ashton, G.D., [1979, p. 38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p. 14-1-14/26] Willer, A., et al., [1979, 21p.] Willer thermal structure, ice conditions and climate of Lake Champlain. Bates, R.E., [1980, 26p.] Extending the useful life of DY L-2 to 1986. Tobasson, W., et al., [1980, 37p.], SR 80-13 Sea ice growth drift and decay. Hibter, W.D. Ill., [1980, p. 14-109] Freshw therite growth, motion, and decay. Ashton, G.D., [1980, 37p.] Jee formation and breakup on Lake Champlain. Bates, R.E., [1980, p. 125-143] Numerical sclutions for rigid-ice model of secondary frost heave. O Neill, k. et al. (1980, p. 656-669) MP 1435
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice [1980, p. 217-245] Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-1333, MP 1305 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334] Flexural strength and clastic modulus of ice. J.C., et al., [1982, p. 37-47] Methanical behavic of suice. Mellor, M., [1983, 105p.] MP 1555 Sodhi, D.S., et al., [1982, p. 99-104) MP 1568 Sodhi, D.S., et al., [2982, p. 99-104) MP 1570 Mechanical behavic of suice. Mellor, M., [1983, 105p.] MR 83-13 Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD: mo. 'el ice in a small tank. Borland, S.L., [1988, p. 47] On the determination of the average "Loung's modulus for a floating ice cover. Keir, A.D., et al. [1988, p. 39-43] MP 2314 Elastic properties of frazil ice from the Weddell Sea. Antarc tica. Lange, M.A., et al., [1989, p. 208-217] MP 2620 Cyclic loading of saline ice initial experimental results (Col., D.M., (1990, p. 265-271) MP 2681 Ice electrical properties of sea ice. Schwarz, J., et al., [1977, p. 499-531] Dielectric constant and reflection chefficient of snow surface layers in the McMurdo lee Shelf. Kovacs, A., et al., [1977, p. 137-132] Internal properties of the ice sheet at Cape Folger oy radio echo sounding Keliher, T.E., et al., [1978, 12p.] Cityle, p. 207-217, MP 1011 Internal properties of dislocation-free ice (1978, p. 207-217) Stray measurement of charge density in ice. (1978, p. 207-217) Break-up of the Yukon River at the Haul Road Bridge, 1979	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) Ref floes AIDJE? at observations Thompson, T.W., et al., (1972, p 1-16). MP 989 Dynam-er of near-shore ice. Weeks, W.F., et al., (1976, p. 9. 34) Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p). CR 77-09 Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p). MP 173. Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507). MP 133. Modeling of ice in rivers. Ashton, G.D., (1979, p 14/1-14/26). MP 133. Break-up of the Yukon River at the Haul Road Bridge, 1979. Stephens, C.A., et al., (1979, 22p. + Figr.) MP 1315. Preshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304). MP 1299. Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p.) SR 81-11. Force distribution in a fragmented ice cover. Dals, S.F. et al., (1982, p, 374-3187). MP 1531. Physical and structural characteristics of antaretic sea ice. Gov. A.J. et al., (1972, p. 113-117). MP 1548. Characteristics of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p. 127-136). MP 1599. Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p. 127-136). CR 83-32. Force distribution in a fragmented ice cover. Stewart, D.M., Cr. 84-07. MP 1548. Physical and structural characteristics of antaretic sea ice forces on a bridge pier, Ottauquechee River, Vermont, Sodhi, D.S., et al., (1984, p. 73-76). MP 1785. On the rheology of a broken ice field due to floe collision Shen, H., et al., (1984, p. 73-76). MP 1785. On the rheology of a broken ice field due to floe collision Shen, H., et al., (1984, p. 73-76). MP 1812. Ice block stability. Daly, S.F., (1984, p. 544-548). MP 1972. Level ice breaking by a simple wedge. Tatinclaux, J.C., (1985, p. 622-629). MP 208. Mesoscale sea celeformation in the East Greenland marginal ice zone. Lepparantz, M., et al., (1987, p. 7060-7070).	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] Leings developed from surface water and ground water Carey, K.L., ".7 71p.] Seasonal regime and livare logical significance of stream icings in central Alzaza. Kane, D.L., et al., [1973, p.528-540.] River ice problems. Burgi F. e. vl., [1974, p.1-15.] Apparent anomaly in freezing of ordinary water G.K., [1976, 23p.] Lea accumulation on ocean structures. Minsk. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice lc. formation. Takagi, S., [1978, 13p.] Fundamentals of ice lens formation. Takagi, S., [1978, p.235-242] Frazil ice formation in turbulent flow. Muller, A., et al., [1978, p.219-234] Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p.268-279] River ice. Ashton, G.D., [1979, p.38-45]. MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p.14.1-14/26]. MP 1335 Forecasting ice formation and breakup on Lake Champlain. Bates, R.L., et al., [1979, 21p.] Winter thermal structure, ice conditions and climate of Lake Champlain. Bates, R.E., et al., [1980, 26p.] Extending the useful life of DY L-2 to 1986. Tobiasson, W., et al., [1980, 37p.] Sea ice growth drift and decay. Hibler, W.D. III, [1930, p.11-1209] Freshwiter ice growth, motion, and decay. (1980, p.261-304) Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.156-669) MP 1298 Preshwiter ice growth, motion, and decay. (1980, p.261-304) Lee formation and breakup on Lake Champlain. Bates, R.E., (1980, p.656-669) MP 1298 Lee jams and meteorological data for three winters. Ottauque-chee River, Vt. Bates, R.E., et al., [1981, 27p.] Nea ice piling at Jaiway. Rock. Bering. Strait, Alaika.
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p. 237-245) Mechanical properties of polycrystalline ice (1980, p. 217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al., [1981, p. 123-133) Measuring mechanical properties of ice. Schwsz, J., et al., [1981, p. 245-254) MP 1556 In-situ measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p. 326-334) Teleural strength and clastic modulus of ice. J.C., et al., [1982, p. 37-47] Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p. 99-104) MP 1550 Mechanical behavior of situate. Mellor, M., [1983, 105p.] M83-1 Stress measurements in ice. Cox, G.F.N., et al., [1983, 31p.] Growth of EG/AD; mo. let ice in a small tank. Borland, S.L., [1988, p. 47-5] On the determination of the average Loung's modulus for a floating ice cover. Keir, A.D., et al., [1988, p. 39-43] MP 2324 Elastic properties of frazil ice from the Weddell Sea. Antarc tica. Lange, M.A., et al., [1980, p. 208-217] MP 2620 Cyclic loading of saline ice initial experimental results Colz., D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Colz., D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Colz., D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Colz., D.M., (1990, p. 265-271) MP 2620 Cyclic loading of saline ice initial experimental results Colz., D.M., (1970, p. 137-138) Internal properties of field content of the field of snow surface layers in the McMurdo lee Shelf. Kovacs, A., et al., (1978, p. 207-217) X-ray measurement of charge density in ice (1978, p. 207-217) X-ray measurement of charge density in ice (1978, p. 207-217) Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Figs.) MP 1315 Oli p	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) RM 1787 Ice floes AIDJE: Ar observations Thompson, T.W., et al., (1972, p 1-16). MP 989 Dynam-or of near-shore ice. Weeks, W.F., et al., (1976, p.9., MP 1380 Laboratory investigation of the mechanics and hydraulics of river ice jams. Tatinclaux, J.C., et al., (1977, 45p.) Study of a grounded floeberg near Reindeer Island, Alaska Kovacs, A., (1977, 9p.) MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507] MP 1315 Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Figr.) MP 1315 Preshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) MP 1299 Method for measuring brash ice thickness with impulse radar, Martinson, C.R., et al., (1981, 10p.) SR 81-11 Porce distribution in a fragmented ice cover. Daly, S.F., et al., (1982, p, 374-3187) Physical and structural characteristics of antarctic sea ice. Go. v.A. et al., (1981, 1913-117) MP 1531 Characteristics of subtry-year pressure ridges. Kovacs, A., (1983, p 173-182) Size and shape of ice floes in the Baltic Sea in spring. Lepparanta, M., (1983, p. 127-136) MP 2061 Ice forces on a bridge pier, Ottauquechee River, Vermont, Sodhi, D.S., et al., (1984, 195) CR 83-32 Force distribution in a fragmented ice cover. Stewart, D.M., et al., (1984, 16p.) MP 2061 Ice block stability. Daly, S.F., (1984, p. 544-548) MP 1972 Level ice breaking by a simple wedge. Tatinclaux, J.C., (1985, 46p.) Messocale sea ice deformation in the East Greenland marginal ice zone. Lepparanta, M., et al., (1984, p. 622-629) MP 2081 Role of floe collisions in sea ice theology. Shen, H.H., et al.	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 1723 leings developed from surface water and ground water carey, K.L., "7 71p.] Seasonal regime and hydrological significance of stream ings in central Alz., a. Kane, U.L., et al., [1973, p. 528-540] River nee problems Burgi F. i. e. al., [1974, p. 1-15] MP 1026 Apparent anomaly in freezing of ordinary water G.K., [1976, 23p.] Lee accumulation on ocean structures Minst. L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice le., formation. Takagi, S., [1978, 13p.] Fundamentals of ice lens formation. Takagi, S., [1978, 13p.] Frazil ice formation, in turbulent flow. [stuller, A., et al., [1978, p. 219-234] Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p. 288-279] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1979, p. 14.1-14/26] Forecasting ice formation and breakup on Lake Coamplain Bates, R.E., et al., [1979, 21p.] Winter thermal structure, ice conditions and climate of Lake Coamplain Bates, R.E., et al., [1979, 21p.] CR 79-26 Winter thermal structure, ice conditions and climate of Lake Coamplain Bates, R.E., et al., [1979, 21p.] CR 79-26 Winter thermal structure, ice conditions and climate of Lake Coamplain Bates, R.E., et al., [1980, 26p.] Extending the useful life of DYL-2 to 1986. Tobiasson, W., et al., [1980, p. 261-304] Lee formation and breakup on Lake Champlain. Bates, R.E., [1980, p. 261-304] Lee formation and breakup on Lake Champlain. Bates, R.E., [1980, p. 261-304] Lee formation and breakup on Lake Champlain. Bates, R.E., [1980, p. 261-304] Lee formation and breakup on Lake Champlain. Bates, R.E., [1980, p. 261-304] Lee formation and breakup on Lake Champlain. Bates, R.E., [1980, p. 261-304] Lee jams and meteorological data for three winters, Ottauque-chec River, Vt. Bates, R.E., et al., [1981, p. 985-1000, MP 1258 CR 88-01 CR 88-01 CR 88-02 CR 88-01 CR 88-02 CR 88-01 CR
Mechanics of ice. Glen, J.W., [1975, 43p.] Concentrated loads on a floating ice sheet (1977, p.237-245) Mechanical properties of polycrystalline ice (1980, p.217-245) Mechanical properties of polycrystalline ice plates. Xirouchakis, P.C., et al., [1981, p.123-133, hip 1430 Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p.245-254) Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p.245-254] Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p.245-254] Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p.245-254] Measuring mechanical properties of ice. Schwizz, J., et al., [1981, p.245-254] Mesuring the measurements of the mechanical properties of ice. Tatinclaux, J.C., [1982, p.326-334] MP 1555 Plezural strength and elastic modulus of ice J.C., et al., [1982, p.39-104] MP 1568 Determining the characteristic length of model ice sheets. Sodhi, D.S., et al., [1982, p.99-104] MP 1570 Mechanical behavity of structure. Mellor, M., [1983, 105p.] MB 1570 Mechanical behavity of structure. Mellor, M., [1983, 105p.] MB 2512 Growth of EG/AD; mit et ice in a small tank. Borland, S.L., [1988, p.47-) On the determination of the average Loung's modulus for a floating ice cover. Ketr., A.D., et al., [1988, p. 39-43) MP 2324 Elastic properties of frazil ice from the Weddell Sea. Antarc tica. Lange, M.A., et al., [1989, p. 208-217] MP 2620 Cyclic loading of saline ice initial experimental results Cole, D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole, D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole, D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole, D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole, D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental results Cole, D.M., (1990, p.265-271) MP 2620 Cyclic loading of saline ice initial experimental resul	Reservoir bank erosion caused by ice. Gatto, L.W., (1984, p 203-214) Re floes AIDJE? AIDJE ar observations Thompson, T.W., et al., (1972, p 1-16). Dynam-er of near-shore ice. Weeks, W.F., et al., (1976, p.9. 34) Laboratory investigation of the mechanics and hydraulics of river. ce jams. Tatinelaux, J.C., et al., (1977, 45p.) CR 77-09 Study of a grounded floeberg near Reindeer Island, Alasks Kovaes, A., (1977, 9p.) Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507) MP 1751 Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p 495-507) MP 1134 Modeling of ice in rivers. Ashtor, G.D., (1979, p 14/1-14/26) Break-up of the Yukon River at the Haul Road Bridge, 1979 Stephens, C.A., et al., (1979, 22p. + Fig.) MP 1335 Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) Method for measuring brash ice thickness with imigulise radar. Martinsol, C.R., et al., (1981, 10p.) SR 81-11 Force distribution in a fragmented ice cover. July S.F., et al., (1982, p.374-387) Physical and structural characteristics of antarctic sea ice. Go. y. A.J. et al., (1981, 1917-117) MP 1538 Characteristics of rulti-year pressure ridges. (1983, p 173-182) Size and shape of ice floes in the Baltic Sea in spring. Lepigranta, M., (1983, p 127-136) MP 1061 Lee forces on a bridge pier. Ottauquechee River, Vermont, Sodh, D.S., et al., (1983, p 127-136) MP 1061 MP 1085 On the rheology of a broken ice field due to floe collision. Shen, H., et al., (1984, p 29-34) MP 1785 On the rheology of a broken ice field due to floe collision. Shen, H., et al., (1984, p 29-34) Level ice breaking by a simple wedge. Tatinclaux, J.C., (1985, 46p.) CR 85-22 Lee floe distribution in the wake of a simple wedge. Tatinclaux, J.C., (1985, 46p.) CR 85-22 Lee floe distribution in the wake of a simple wedge. Tatinclaux, J.C., (1985, 46p.) MP 2241	lee formation Femperature and flow conditions during the formation of river ice. Ashton, G.D., et al., [1970, 12p.] MP 1722 leings developed from surface water and ground water Carey, K.L., "7 71p.] Seasonal regime and hydrogical significance of stream icings in central Alz., a. Kane, J.E., et al., [1973, p.52s. 540] River ice problems Burgi F. e. vl., [1974, p.1-15] MP 1026 Apparent anomaly in freezing of ordinary water G. r. [1976, 23p.] Ge accumulation on ocean structures Minsk L.D., [1977, 42p.] Segregation freezing as the cause of suction force for ice le., formation Takagi, S., [1978, 13p.] CR 78-fix Fundamentals of ice lens formation p. 235-242] Frazil ice formation, in turbulent flow (1978, p.219-2234) Remote sensing of massive ice in permafrost along pipelines in Alaska. Kovacs, A. et al., [1979, p.288-279] MP 1173 River ice Ashton, G.D., [1979, p.38-45] MP 1173 River ice Ashton, G.D., [1979, p.38-45] MP 1173 Modeling of ice in rivers. Ashton, G.D., [1779, p.14-1-14/26] MP 133 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Will-rethermal structure, ice conditions and climate of Lake Champlain Bates, R.E., et al., [1979, 21p.] Will-rethermal structure, ice conditions and climate of Lake Champlain Bates, R.E., et al., [1979, 21p.] Sea ice growth drift and decay Hibler, W.D. III., [1980, 37p.] Sea ice growth drift and decay Hibler, W.D. III., [1980, p.11-209] Ireshwater ice growth, motion, and decay Alston, G.D., (1980, p.12-14) NM 1299 Ice formation and breakup on Lake Champlain. Bates, R.E., et al., [1980, p.656-669] MP 1436 Ice jams and meteorological data for three winters, Ottauque-chec River, V. Bates, R.E., et al., [1981, 27p.] Nea ice piling at Tairway Rock, Bering Stratt, Alaika Kovace, A., et al., [1981, p.985-1000], MP 1456

Tests of frazil collector lines to assist ice cover formation.	Laboratory and field studies of ice friction coefficient Tatin-	Third International Symposium on Ice Problems, 1975
Perham, R.E., (1981, p 442-448) MP 1488	claux, J.C., et al, [1986, p 389-400] MP 2126	Frankenstein, G.E., ed. (1975, 627p.) MP 845
Initial stage of the formation of soil-laden ice lenses Takagi, S., [1982, p.223-232] MP 1596	Friction of solids on ice. Huber, N.P., et al, (1986, 4p.) MP 2179	Mechanics and hydraulies of river ice jams Tatinelaux, J.C.,
S., (1982, p.223-232) MP 1596 Case study of land treatment in a cold climate—West Dover,	Preliminary study of friction between ice and sled runners.	et al. (1976, 97p) MP 1060 Potential river ice jams at Windsor, Vermont Calkins, D.J.,
Vermont. Bouzoun, J.R., et al., [1982, 96p]	Itagaki, K., et al, [1987, p 297-301] MP 2338	et al, [1976, 31p] CR 76-31
CR 82-44	Parameters affecting the kinetic friction of ice. Akkok, M.	Laboratory investigation of the mechanics and hydraulies of
Growth of black ice, snow ice and snow thickness, subarctic basins. Lepparanta, M., 1983, p.59-701 MP 2063	et al, (1987, p 552-561) MP 2258	river ice jams Tatınclaux, J.C., et al. (1977, 45p)
basins. Leppäranta, M., (1983, p.59-70) MP 2063 Characteristics of multi-year pressure ridges. Kovacs, A.,	Effect of pressure on kinetic friction of ice Tatinclaux, J.C., [1989, p.127-134] MP 2680	CR 77-09 Air photo interpretation of a small ice jam. DenHartog, S.L.,
(1983, p 173-182) MP 1698	Ice growth	(1977, p.705-719) MP 935
Physical mechanism for establishing algal populations in frazil	Growth and mechanical properties of river and lake ice	Ice arching and the drift of pack ice through restricted chan-
ice. Garrison, D L., et al, (1983, p.363-365)	Ramseier, RO, [1972, 243p] MP 1883	nels. Sodhi, D.S. (1977, 11p.) CR 77-18
MP 1717	Structural growth of lake ice. Gow, A.J., et al, [1977, 24p]	Aerial photointerpretation of a small ice jam. DenHartog.
Mechanics of ice jam formation in rivers. Ackermann, N.L., et al, [1983, 14p.] CR 83-31	CR 77-01 Seasonal variations in apparent sea ice viscosity on the geo-	S L., (1977, 17p.) SR 77-32
Ice observation program on the semisubmersible drilling ves-	physical scale. Hibler, W.D., III, et al. (1977, p 87-90)	Physical measurement of ice jams 1976-77 field season. Wuebben, J.L., et al., 1978, 19p.; SR 78-03
sel SEDCO 708. Minsk, L.D., (1984, 14p)	MP 900	Investigation of ice clogged channels in the St. Marys River.
SR 84-02	Characteristics of ice on two Vermont rivers. Deck, D.S.,	Mellor, M., et al. (1978, 73p) MP 1170
St. Lawrence River freeze-up forecast. Shen, HT, et al. (1984, p.177-190) MP 1713	(1978, 30p) SR 78-30	Physical measurements of river ice jams Calkins, D.J.,
feing rate on stationary structures under marine conditions	River ice. Ashton. G.D. 1979, p. 38-45; MP 1178 Accelerated ice growth in rivers Calkins, D.J., (1979, 5p.)	(1978, p 693-695) MP 1159 River channel characteristics at selected ice jam sites in Ver-
Itagaki, K., (1984, 9p) CR 84-12	CR 79-14	niont Gatto, L.W., [1978, 529] CR 78-25
Forecasting water temperature decline and freeze-up in rivers	Ice formation and breakup on Lake Champlain Bates, R E.,	River ice Ashton, G D., [1979, p 38-45] MP 1178
Shen, H.T., et al, (1984, 17p) CR 84-19	[1980, p 125-143] MP 1429	Modeling of ice in rivers Ashton, G.D., (1979, p.14/1-
Ice jam research needs. Gerard, R., [1984, p 181-193] MP 1813	Application of a numerical sea ice model to the East Greenland area. Tucker, W.B. [1981, 109p] MP 1535	14/26 ₁ MP 1335
Computer simulation of ice cover formation in the Upper St.	Tests of frazil collector lines to assist ice cover formation.	Freshwater ice growth, motion, and decay. Ashton, G.D., (1980, p 261-304) MP 1299
Lawrence River. Shen, H.T., et al, (1984, p.227-245)	Petham, R.E., 1981, p.442-449 MP 1488	Ice jams and meteorological data for three winters, Ottauque-
MP 1814	Ice growth and circulation in Kac' smak Bay, Alaska Daly,	chee River, Vt. Bates, R E, et al. (1981, 27p.)
Frazil ice formation. Ettema, R., et al. [1984, 44p] CR 84-18	SF, (1982, p (C)1-(C)9) MP 1501	CR #1-01
Ice bands in turbulent pipe flow. Ashton, G.D., 1984,	Using sea ice to measure vertical heat flux in the ocean McPhee, M.G., et al., (1982, p. 071-2074) MP 1521	Ice jam problems at Oil City, Pennsylvania Deck, D.S., et
7p) MP 2087	Ice growth on Post Pond, 1973-1982. Gow, A.J. et al.	al, [1981, 19p] SR 81-09 Modeling hydrologic impacts of winter navigation. Daly,
Mathematical modeling of river ice processes Shen, HT.	(1983, "5p) CR 83-04	S.F., et al. (1981, p.1073-1080) MP 1445
(1984, p.554-558) MP 1973	Frazil ic measurements in CRREL's flume facility. Daly,	ice control arrangement for winter navigation. Perham,
Technique for observing freezing fronts. Colbeck, S.C. (1985, p.13-20) MP 1861	SF 17. [1986, 14.7.438] MP 2127	R.E., [1981, p 1096-1103) MP 1449
Grain growth and the creep behavior of ice. Cole, D.M.,	Structure to form an 'Le cover on river rapids in winter. Per- ham, R.F. (198), 439-4501 MP 2128	Asymmetric flows application to flow below ice jams
(1985, p 187-189) MP 1862	Frazil ic. chbles, Tanana River, Alaska Chacho, E.F., et	Gögüs, M., et al. (1981, p 342-350) MP 1733
Data acquisition in USACRREL's flume facility. Daly, S.F.,	al. (198/ p 475-483) MP 2130	Port Huron ice control model studies Calkins, D.J. et al. (1982, p. 361-373) MP 1530
et al, (1985, p 1053-1058) MP 2089	River ice a 1 salmonids Walsh, M., et al. [1986, p D-4 1-	Ice jams and flooding on Ottauquechee River, VT Bates, R.,
Pneumatically de-iced ice detector—final report, phase 2, part 1. Franklin, C H, et al. [1986, 9p + appends]	D-4.26 ₁ MP 2477	et al, [1982, 25p] SR 82-06
MP 2249	Frazil ice deposits and water channels beneath an ice-covered river. Arcone, S.A., et al. (1987, 12p) CR 87-17	Ice engineering for civil work baseline study Carey, K.L.
Field techniques for obtaining engineering characteristics of	Multifrequency passi e microwave observation of saline ice	ct al. [1983, 91p] MP 2441 Ice jams in shallow rivers with floodplain flow Calkins, D.J.
frazil ice accumulations. Dean A.M., Jr., [1986, p 265-	grown in a tank Grenfell, TC, et al. (1988, p.1687-	(1983, p 538-548) MP 1644
278 ₁ MP 2390 Meteurological system performance in using conditions	1690 ₁ MP 2459	Asymmetric plane flow with application to ice jams Tatin-
Bates, R.E., [1987, p 73-86] MP 2285	Numerical simulation of first-year sea ice Cox, CFN, et al., [1988, p.12,449-12,460] 51P 2404	claux, J.C. et al. (1983, p 1540-1556) MP 1645
International Symposium on Cold Regions Heat Transfer,	Development of sea ice in the Weddell Sea Lange M /. et	Mechanics of ice jam formation in rivers Ackermann, N.L.
1987. [1987, 270p] MP 2302	al, (1989, p 92-96) All 2615	et al. (1983, 14p) CR 83-31 Ice-related flood frequency analysis: application of analytical
Evolution of frazil ice in rivers and streams research and	Thin ice growth. Ashton, G D., (1989, p 564-566)	estimates. Gerard, R. et al. (1984, p.85-101)
control. Daly, S.F., [1987, p.11-16] MP 2303 Intake design for ice conditions. Ashton, G.D., [1988,	MP 2657	MP 1712
p.107-138 ₁ MP 2518	Acoustics and morphology of undeformed sea ice Jezek, K.C., et al. 1990, p 67-75; 3,77 2730	lce cover melting in a shallow river Calkins, D.J., 1984,
omputer-controlled data acquisition system for a hydraulic	Sea ice a habitat for the foraminifer Neogloboquist ina pa-	p 255-265; MP 1763 Ice jams in shallow rivers with floodplain flow Discussion
tlume. Zabilansky, L.J., (1988, p 453-460) MP 2349	chyderma? Dieckmann, G, et al, (1990, p 86-52)	Beltaos, S. (1984, p 370-371) MP 1798
Ice formation downstream of Oahe Dam—1987 1988 winter. Ashton, G.D., [1988, 37p] MP 2506	MP 2732	Method of detecting voids in rubbled ice Tucker, W.B., et
Preliminary results of an experiment using a 16 ft x 50 ft long	Laboratory investigation of the kinetic friction coefficient of	al. (1984, p 183-188) MP 1772
frazil collector line array. Perham, R.E., [1988, p 139-	ice. Forland, K A, et al. (1984, p.19-28) 12P 1825	Controlling river ice to alleviate ice jam flooding Deck, DS, 1984, p 524-528; MP 1795
156 ₁ MP 2474	Fracture of \$2 columnar freshwater ice: florting double can-	D S. (1984, p 524-528) MP 1795 Salmon River see jams Cunningham, L.L., et al. (1984,
ice cover formation downstream of a reservoir Ashton.	tilever beam tests Bentley, D.L., et al. 1988, p.152-	p 529-533 ₁ MP 1796
G.D., (1988, p 189-198) Mt ² 2498 Development of sea ice in the Weddell Sea Lange, M.A., et	161 ₁ MP 2493 Ice heat flux	Ice jam research needs Gerard, R. [1984, p 181-193]
al. r1989. p 92-961 MF 2615	Ice heat sinks Part I Vertical systems Lunardini, V.J.	MP 1813
International Symposium on Cold Regions Heat Transfer,	(1986, 107p) SR \$6-14	Controlling river ice to alleviate ice jam flooding. Deck, DS, 11984, p 69-76; MP 1885
1989. (1989, 314p) MP 2636	lee heat sinks Part 2 Horizontal systems Lunardini, V J.	Cold facts of ice jams case studies of mitigation methods.
Cold regions heat transfer Cheng, K.C., et al, (1989, p 1- 25) MP 2637	(1986, 104p) SR 86-25	Calkins, D.J., [1984, p. 39-47] MP 1793
Time estimation for maximum supercooling in dynamic featil	International Symposium on Cole Regions Heat Transfer, 1989 (1989, 314p) MP 2636	lee jam flood prevention measures, Lamoille River, Hardwick
ice formation Daly, S.F., et al. (1989, 13p.)	Year of Bowen ratios over the frozen Beaufort Sea Andreas,	VT. Calkins, D.J., [1985, p.149-168] MP 1940 Hudson Riserice management Ferrick, M.G., et al., [1985,
SR 89-26	E.L., (1989, p.12.721-12.724) MP 2508	p 96-110; MP 2174
ICE PIJAMS	Irr islands	Construction and calibration of the Ottauquechee River mod-
Show and ice on the earth's surface. Mellor, M. [1964. 1637] M II-Cl	Investigation of ice islands in Babbage Bight. Kovacs, A, et al., [1971, 46 leaves] MP 1381	el. Gooch, G. (1985, 10p.) SR 85-13
Ice friction	Islands of grounded sea ice Kovaes, A. et al., 1976, 24p.	Cazenovia Creek Model data acquisition system Bennett, B M, et al. [1985, p 1424-1429] MP 2090
Engineering properties of sea ice. Schwarz, J., et al. (1977.	CR 76-04	B M, et al. [1985, p 1424-1429] MP 2090 Upper Delaware River ice control—a case study Zufelt,
y 499-531) MP 1065	Dynamics of near-shore ice Weeks, W.F. et al. (1976, p.9-	J.E., et al. (1986, p 760-770) MP 2005
Abnormal internal friction peaks in single-crystal ice Stall- man, N.E., et al., 11977, 15p ₁ SR 77-23	34) MP 1380	Ice interaction with the U.S. Army ribbon bridge. Couter-
Ship resistance in thick brash ice. Mellor, M., (1980, p. 305-	Islands of grounded sea ice. Kosaes, A. et al. (175, p. 35- 50) 34P 987	marsh, B.A., (1986, 18p) CR 86-01
321 ₁ MP 1329	Iceberg thickness and crack detection Kovacs, A. (1978,	Hydrologic aspects of ice jams Calkins, D I, (1986, p 603- 609) MP 2116
Model tests in the of a Canadian Coast Guard R-class ice-	p 131 (45) MP 1128	Potential solution to ice jam flooding Salmon River, Idaho
breaker. Tatinclaux, J C., [1984, 24p] SR 84-06	Destruction of ice islands with explosives Mellor, M., et al.	Earickson, J., et al. (1986, p. 15-25) MP 2131
Laboratory investigation of the kinetic friction coefficient of ice. Forland, N.A., et al., (1984, p. 19-28). MP 1825.	[1978, p.753-765] MP 1018 Profiles c. pressure tidges and ice islands in the Beaufort Sea	Controlled river ice cover breakup, part 1 Hadson River field
Kinetic friction coefficient of ice, Forland, KA, et al.	Hnatink, J. et al. (1978, p. 519-532) MP 1187	experiments Ferrick, M.G., et al. (1986, p.281-291) MP 2391
[1985, 40p] CR 85-06	Mechanical properties of ice in the Arctic seas. Weeks,	Corps of engineers seek ice solutions Frankenstein, GE,
Sheet ice forces on a conical structure an experimental study	W.F., et al., (1984, p. 235-259) MP 1674	(1987, p.5-7) MP 2219
S-shi, D.S. et al. (1985, p 46-54) MP 1915	ice island fragment in Stefansson Sound, Alaska Kovacs,	Ice jams and the winter climate near White River, SD Bilel-
Field tests of the kinetic friction coefficient of sea ice Tatin- claux, J.C., et al. (1985, 20p) CR 4.5-17	A. [1985, p.101-115] MP 1900 Ice properties in a grounded man made ice island. Cox,	In. M.A. (1987, p.154-162) MP 2399
Level ice breaking by a simple wedge Tation'aux, JC,	GFN, et ai, (1986, p.135-142) MP 2032	Preliminary study of scour under an ice jam Wuebben, J L., [1988, p 177-192] MP 2475
(1965, 46p) 'R 85-22	Ice jams	Transverse velocities and ice jamming potential in a river
Dynamic friction of bobsled runners on ice Huber, S.P., et	Use of explosives in removing ice jams Frankenstein, G.E.	bend Zufelt, J.L., 1988, p. 193-207; MP 2476
al. (1985, 26p) MP 2082 Some effects of friction on ice forces against vertical struc-	et al. (1970, 10p) MP 1021 River ice problems Burgi, P.H., et al., (1974, p.1.15)	Laboratory study of transverse velocities and ice jamming in
tures. Kato. K., et al. (1986, p 528-533) MP 2036	MP 1002	a river bend Zufelt, J L., et al. (1988, p 189-197) MP 2501

Ice jams (cont.)	State of the art of ship model testing in ice Vance, GP.,	lee cover research-present state and future needs Kerr,
Development of a dynamic ice breakup control method for	[1981, p 693-706] MP 1573	A D, et al, (1986, p. 384-399) MP 2004 Crushing of ice sheet against rigid cylindrical structures.
the Connecticut River near Windsor, Vermont. Ferrick, M.G., et al, (1988, p.221-233) MP 2510	Foundations of structures in polar waters. Chamberlain, E.J., (1981, 16p) SR 81-25	Sodhi, DS, et al, [1986, p 1-12] MP 2018
Dynamic ice breakup control for the Connecticut River near	Sea ice rubble formations in the Bering Sea and Norton	Offshore Mechanics and Arctic Engineering Symposium, 5th,
Windsor, Vermont. Ferrick, M.G., et al. [1988, p 245- 258] MP 2449	Sound, Alaska Kovacs, A., [1981, 23p.] SR 81-34 Port Huron ice control model studies Calkins, D.J., et al.	1986, (1986, 4 vols.) MP 2031 lee properties in a grounded man-made ice island. Cox.
Airborne radar survey of a brash ice jam in the St. Clair River.	[1982, p 361-373] MP 1530	G F.N., et al. (1986, p.135-142) MP 2032
Dely, S.F., et al, [1989, 17p.] CR 89-02 Effect of Toston dam on unstream ice conditions. Ashton.	Force measurements and analysis of river ice break up. Deck, D.S., 1982, p 303-3361 MP 1739	Some effects of friction on ice forces against vertical struc- tures. Kato, K, et al. (1986, p 528-533) MP 2036
Effect of Toston dam on upstream ice conditions. Ashton, G.D., (1989, 9p.) SR 89-16	On forecasting mesoscale ice dynamics and build-up Hibler,	Impact ice force and pressure. An experimental study with
Framework for control of dynamic see breakup by river regu-	W.D., III, et al. (1983, p.110-115) MP 1625	urea ice. Sodhi, DS, et al, [1986, p 569-576] MP 2037
lation. Ferrick, M.G., et al. (1989, 14p) CR 89-12 Salmon River ice jam control studies: interim report Axel-	Method for determining ice loads on offshore structures. Johnson, J B, [1983, p 124-128] MP 2056	Vibration analysis of the Yamachiche Lightpier. Haynes,
son, K.D., et zi, [1990, 8p.] SR 90-06	Buckling loads of floating ice on structures. Sochi, DS, et	F D., (1986, p.9-18) MP 2253
Segregation-freezing temperature as the cause of suction	al, 1983, p 260-265; MP 1626 Protection of offshore arctic structures by explosives. Mel-	Ice forces on bridge piers. Haynes, F.D. (1986, p 83-101) MP 2160
force. Takagi, S., (1977, p.59-66) MP 901	lor, M. (1983, p 310-322) MP 1605	leing and wind loading on a simulated power line. Govoni.
Segregation freezing as the cause of suction force for ice lens formation. Takagi, S., (1978, p. 45-51) MP 1081	Dynamic buckling of floating ice sheets. Sodhi, D.S., [1983, p 822-833] MP 1607	J W. et al. (1986, p 23-27) MP 2206 Model study of ice forces on a single pile Zabilansky, L.J.
formation, Takagi, S., (1978, p 45-51) MP 1081 Segregation freezing as the cause of suction force for ice lens	Effect of vessel size on shorelines along the Great Lakes chan-	(1986, p 77-87) MP 2388
formation. Takagi, S., (1978, 13p) CR 78-06	nels Wuebben, J.L., [1983, 62p] SR 83-11	Static and dynamic ice loads on the Yamachiche Bend lightpi- er, 1984-86. Frederking, R., et al. (1986, p.115-126)
Fundamentals of ice lens formation. Takagi, S., (1978, p.235-242) MP 1173	Atmospheric icing of structures. Minsk, L.D., ed. (1983), 366p.; SR 83-17	MP 2389
Mechanical properties of frozen ground Ladanys, B, et al.	Field measurements of combined using and wind loads on	International Offshore Mechanics and Arctic Engineering Symposium, 1987, [1987, 4 vols] MP 2189
(1979, p.7-18) MP 1726 Numerical solutions for rigid-ice model of secondary frost	wires. Govons, J.W., et al. (1983, p.205-215) MP 1637	Ice beam moving against a sloping structure. Sodhi, D.S.
heave. O'Neill, K., et al. (1980, p 656-669)	Ice forces on model bridge piers. Haynes, F.D., et al. 1983.	(1987, p.281-284) MP 2194 Advances in ice mechanics—1987, (1987, 49p)
MP 1454 Initial stage of the formation of soil-laden ice lenses. Takagi.	IIp CR 83-19 Measurement of ice forces on structures Sodhi, D.S., et al,	MP 2207
S, (1982, p 223-232) MP 1596	(1983, p 139-155) MP 1641	Advances in sea ice mechanics in the USA. Sodhi, D.S., et al. (1987, p 37-49) MP 2208
Field tests of a frost-heave model. Guymon, G.L., et al. (1983, p 409-414) MP 1657	Methods of ice control. Frankenstein, G.E., et al. (1983, p 204-215) MP 1642	Effect of oscillatory loads on the bearing capacity of floating
Investigation of transient processes in an advancing zone of	Ice action on two cylindrical structures. Kato, K, et al.	ice covers Kerr, A.D., et al., [1987, p.219-224] MP 2216
freezing. McGaw, R., et al. (1983, p 821-825) MP 1663	(1983, p 159-166) MP 1643	Mechanical properties of multi-year sea ice. Richter-Menge,
Ice segregation and frost heaving, [1984, 72p]	Offshore petroleum production in ice-covered waters. Tuck- er, W.B., [1983, p 207-215] MP 2006	JA, et al. (1987, p 121-153) MP 2428 Effect of ice-floe size on propeller torque in ship-model tests.
MP 1809	lce engineering for civil work: baseline study. Carey, K.L., et al. (1983, 910.) MP 2441	Tatinclaux, J.C., (1987, p.291-298) MP 2289
Exploration of a rigid ice model of frost heave O'Neill, K. et al. (1985, p 281-296) MP 1880	et al. (1983, 91p.) MP 2441 [ce action on pairs of cylindrical and conical structures.	Kadluk ice stress measurement program. Cox, G.F.N., 1987, p 100-107; MP 2298
Ice leads	Kato, K. et al. (1983, 35p) CR 83-25	(1987, p 100-107) MP 2298 Mechanical properties of multi-year pressure ridge ice.
Structures in ice infested water. Assur, A. (1972, p.93-97) MP 1016	Ice forces on a bridge pier, Ottauquechee River, Vermont Sodhi, D.S., et al. (1983, 6p.) CR 83-32	Richter-Menge, J.A., (1987, p 108-119) MP 2299
Investigation of ice forces on vertical structures. Hirayama,	Mechanical properties of ice in the Arctic seas. Weeks,	Working group on ice forces 3rd state-of-the-art report. Sanderson, T.J.O., ed. (1987, 221p.) SR 87-17
K., et al. [1974, 153p] MP 1041 Third International Symposium on Ice Problems, 1975	W.F., et al. (1984, p. 235-259) MP 1674 Ice resistance tests on two models of the WTGB icebreaker.	Flexural and buckling failure of floating ice sheets against
Frankenstein, G E., ed. (1975, 627p) MP \$45	Tatinclaux, J C., et al. (1984, p 627-658) MP 1716	structures. Sodhi, D.S., (1987, p.53-73) MP 2315 Conference on Offshore Mechanics and Arctic Engineering.
Bibliography on harbor and channel design in cold regions Haynes, F.D., (1976, 32p.) CR 76-03	fee action on two cylindrical structures Kato, K, et al. (1984, p.107-112) MP 1741	7th, 1988, Vol 4, (1988, 348p) MP 2317
Haynes, F.D., (1976, 32p) CR 76-03 Passage of ice at hydraulic structures Calkins, D.J. et al.	(1984, p 107-112) MP 1741 Force distribution in a fragmented ice cover Stewart, D.M.	Onshore ice pileup and override Kovacs, A, et al. (1988, p 108-142) MP 2336
(1976, p 1726-1736) MP 966	et al, (1984, 16p) CR 84-07	Verification tests of the surface integral method for calculat-
Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 26p] CR 77-04	Offshore oil in the Alaskan Arctic Weeks, W.F., et al. 41984, p.371-3781 Weeks, W.F. at al.	ing structural ice loads Johnson, J.B., et al. (1988, p. 449- 4561 MP 2353
Yukon River breakup 1976 Johnson, P. et al. (1977.	Laboratory investigation of the kinetic friction coefficient of	Mukluk ice stress measurement program Cox. G F.N., et al.
p 592-596; MP 960 Intermittent ice forces acting on inclined wedges Tryde, P.	ice, Forland, K.A., et al. (1984, p.19-28) MP 1825 Evaluation of a biaxial ice stress sensor Cox, G.F.N.,	[1988, p.457-463] MP 2354 Model study of uplifting ice forces the instrumentation.
(1977, 26p.) CR 77-26	(1984, p 349-361) MP 1836	Zabilansky, L.J., (1988, p.745-748) MP 2487
Ice and ship effects on the St Marys River ice booms Perham, R.E., [1978, p 222-230] MP 1617	Forces associated with ice pile-up and ride-up Sodhi, D.S., et al. (1984, p 239-262) MP 1887	Mukluk ice stress measurement program Cox. G.F.N., [1988, p.11-15] MP 2618
Ice cover forces on structures. Kerr, A D. (1978, p 123-	Computational mechanics in arctic engineering. Sodhi, D.S.	Working group on ice forces 4th state-of-the-art report.
134; MP 879 Ice forces on the Yukon River bridge—1978 breakup John-	(1984, p. 351-374) MP 2072 Combined icing and wind loads on a simulated power line test	Timeo, G.W., ed. (1989, 385p) SR 89-05 lee-induced vibrations of structures Sodhi, D.S., (1989,
son, P.R., et al. (1979, 40p) MP 1304	span Govoni, J W., et al. (1984, p.173-182)	p 189-221 ₁ MP 2492
Loading on the Hartford Civic Center roof before collapse Redfield, R, et al, [1979, 32p] SR 79-09	MP 2114 Ice forces on inclined model bridge piers Haynes, F.D., et	Conference on offshore mechanics and Arctic engineering, 8th, 1989, 1989, 476p MP 2481
Modeling of ice in rivers Ashton, G.D., [1979, p.14/1-	al, (1984, p.1167-1173) MP 2407	On modeling the energetics of the ridging process. Hopkins,
14/261 MP 1335 Bushline products of modes shared floature ice sheets Social	Buckling analysis of cracked, floating ice sheets. Adley, M.D. et al. [1984, 28p] SR 84-23	MA, et al. [1989, p 175-178] MP 2483 Penetration of floating ice sheets with cylindrical indentors.
Buckling analysis of wedge-shaped floating ice sheets Sodhi, D.S. (1979, p 797-810) MP 1232	fee forces on rigid, vertical, cylindrical structures. Sodhi,	Sodhi, D.S., [1989, p.377-382] MP 2485
Ice thickness-tensule stress relationship for load-bearing ice. Johnson, P.R., 1980, 11p 1 SR 40-09	D.S., et al. (1984, 36p) CR 84-33 Offshore Mechanics and Arctic Engineering Symposium, 4th,	lce force measurements on a bridge pier in a small river. Sodhi, D.S., et al. (1989, p. 1419-1427) MP 2764
Ice engineering. O'Steen, D.A., 1980, p.41-471	1985. (1985. 2 vols) MP 2105	Conference on offshore mechanics and aretic engineering.
MP 1602	In-ice calibration tests for an elongated, uniaxial brass ice stress sensor Johnson, J.B., [1985, p. 244-249]	9th, 1990 (1990, 339p.) MP 2584 Cyclic loading of saline ice, initial experimental results.
Cost of ice damage to shoreline structures during navigation Carey, K.L., (1980, 33p) SR 80-22	MP 1859	Cole, D.M., (1990, p.265-271) MP 2581
lce laboratory facilities for solving ice problems Franken- stein, G E., [1980, p 93-103] MP 1301	Sheet ice forces on a conical structure, an experimental study Sodhi, D.S., et al., [1985, p.46-54] MP 1915	Ice mechanics Growth and mechanical properties of fiver and lake ice
Working group on ice forces on structures Carstens, T, ed.	Arctic ice and drilling structures Sodhi, D.S., £1985, p.63-	Ramseier, R.O., (1972, 243p.) MP 1883
(1980, 146p) SR 80-26	69; MP 2119 Kadluk ice stress measurement program Johnson, J. B., et al.	ICE MECHANICS Impact of spheres on ree Closure Yen, YC., et al.
Review of buckling analyses of ice sheets Sodhi, D.S. et al. [1980, p.131-146] MP 1322	(1985, p 88-100) MP 1899	Impact of spheres on ree Closure Yen, YC., et al. [1972, p.473] MP 988
Single and double reaction beam load cells for measuring ice	Compressive strength of multi-year sea ice Kosacs, A. (1985, p.116-127) MP 1901	Ice mechanics
forces. Johnson, P.R., et al. (1980, 17p ₁) CR 80-25 Icing on structures. Minsk, L.D., (1980, 18p ₃)	Sheet ice forces on a conical structure, an experimental study	Arctic marine nasigation and ice dynamics—summary find- ings—Weeks, W.F., (1973, p.86-99) MP 2274
CR 80-31	Sodhi, D.S., et al. [1985, p.643-655] MP 1906 Real time measurements of uplifting see forces Zabilansky.	Mesoscale deformation of sea ice from satellite imagery
ice force measurement on the Yukon River bridge. McFadden, T., et al. [1981, p.749-777] MP 1396	LJ, (1985, p.253-259) MP 2092	River tee problems Burgt, P.H., et al. (1974, p.1-15)
Investigation of the acoustic emission and deformation re-	Ice accretion measurement on a wire at Mt. Washington McComber, P., et al., [1985, p.34-43] MP 2173	MF 1002
sponse of finite ice plates Xirouchakis, P.C. et al. (1981, 19p.) CR 81-06	Computer interfacing of meteorological sensors in severe	Results of the US contribution to the Joint US/USSR Bering Sea Experiment Campbell, WJ, et al. (1974, 1979)
On the buckling force of floating ice plates Kerr. AD.	weather Rancourt, K., et al. (1985, p 205-211) MP 2175	MP 1032
(1981, 7p.) CR 81-09 Modeling hydrologic impacts of winter navigation Daly.	Instrumentation for an uplifting see force model Labsiansky,	lee dynamics, Canadian Archipelago and adjacent Arctic ba- sin Ramseier, R.O., et al., (1975, p.853-877)
S.F., ct al. (1981, p.1073-1080) MP 1445	L.J., [1985, p. 1430-1435] MP 2091 Sea use and the Faureau Rock (second - Konnes A et al.	MP 1585
Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al. (1981, p. 385-394)	Sea ice and the Fairway Rock icefoot Kovacs, A, et al. [1985, p.25-32] MP 2145	Sea see engineering Assur. A. (1976, p. 231-234)
MP 1455	In-tee calibration tests for an elongate, uniaxial brass ice stress sensor Johnson, J.B., [1985, p. 506-510] MP 1966	MP 986
Dynamic ice-structure interaction analysis for narrow vertical structures Eranti, E. et al. (1981, p.472-479)	Vibration analysis of the Yamachiche lightpier Haynes,	Interpretation of the tensile strength of ice under trianial stress. Nevel, D.F., et al., [1976, n. 375-387]
MP 1456	FD ₊ (1986, p.238-241) SIP 1989	MP 996

Machanics and hydraulies of sives ice is ms. Tatinclaus IC		
Mechanics and hydraulics of river ice jams. Tatinclaux, J C., et al. (1976, 97p) MP 1860	Modeling of see discharge in river models. Calkins, D.J., [1983, p 285-290] MP 2001	Advances in sea see mechanics in the USA. Sodhi, D.S., et al, (1987, p.37-49) MP 2208
Creep theory for a floating ice sheet. Nevel, D E., 1976,	Spaceborne SAR and sea see: a status report. Weeks, W.F.,	Sea see structure and mechanical properties. Richter-
98p. ₃ SR 76-04	(1983, p.113-115) MP 2225	Menge, J.A., et al. (1987, 30p) CR 87-83
Dynamics of near-shore ice. Weeks, W.F., et al. [1976, p.9-34] MP 1380	Relationship between creep and strength behavior of ice at failure. Cole, D.M., [1983, p.189-197] MP 1681	Corps of engineers seek see solutions. Frankenstein, G.E., 1987, p.5-71 MP 2219
Passage of see at hydraulic structures. Calkins, D.J., et al,	Mechanics of ice jam formation in rivers. Ackermann, N L.,	Mesoscale sea see deformation in the East Greenland margin-
(1976, p.1726-1736) MP 966	et al, (1983, 14p.) CR 83-31	al ice zone. Leppäranta, M., et al. [1987, p.7060-7070] MP 2241
Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al. (1976, 31p) CR 76-31	Thermodynamic model of soil creep at constant stresses and strains. Fish, A.M., (1983, 18p.) CR 83-33	Role of floe collisions in sea ice theology. Shen, H.H., et al.
Internal structure and crystal fabrics of the West Antarctic ice	Marginal ice zones: a description of air-ice-ocean interactive	(1987, p.7085-7096) MP 2242
sheet. Gow, A.J., et al, [1976, 25p] CR 76-35	processes, models and planned experiments. Johannessen, O.M., et al., [1984, p.133-146] MP 1673	Mechanical properties of multi-year sea ice. Richter-Menge, J.A., et al. (1987, p.121-153) MP 2428
Sea ice properties and geometry. Weeks, W.F., [1976, p.137-171] MP 918	Mechanical properties of ice in the Arctic seas. Weeks,	J.A., et al. [1987, p.121-153] MP 2428 Mechanical properties of multi-year pressure ridge ice.
Structural growth of lake ic Gow, A.J., et al, [1977, 24p]	W.F., et al, (1984, p 235-259) MP 1674	Richter-Menge, J A., {1987, p 106-1193 MP 2299
CR 77-01	Modified theory of bottom crevasses. Jezek, K.C., [1984, p.1925-1931] MP 2059	Shape of creep curves in frozen soils and polycrystalline ice. Fish, A.M., (1987, p.623-629) MP 2329
Dynamics of near-shore ice. Kovacs, A, et al. (1977, p.106-112) MP 924	Frazil ice dynamics. Daly, S.F., (1984, 46p.) M 84-01	Fish, A.M., (1987, p.623-629) MP 2329 Coupled air-ice-ocean models. Hibler, W.D., 121, (1987,
Laboratory investigation of the mechanics and hydraulies of	Mechanical properties of multi-year sea ice. Phase 1: Test	p.131-137 ₁ 54P 2412
river ice jams. Tatinclaux, J.C., et al. (1977, 45p.) CR 77-09	results. Cox. G F.N., et al. (1984, 105p) CR 84-09 Modeling the marginal ice zone. Hibler, W.D., III, ed.	DOD floating ice problems. Cox, G F.N., (1987, p.151-
Air photo interpretation of a small ice jam. DenHartog, S L.	(1984, 99p) SR 84-87	1541 MP 2414 Conference on Offshore Mechanics and Arctic Engineering.
(1977, p.705-719) MP 935	Large-scale ice/ocean model for the marginal ice zone. Hi-	7th, 1988, Vol.4 (1988, 348p.) MP 2317
Engineering properties of sea ice. Schwarz, J., et al. (1977, p.499-531) MP 1065	bler, W.D., III, et al. (1984, p.1-7) MP 1778 East Greenland Sea ice variability in large-scale model simu-	Mechanical properties of multi-year sea ice. Richter-Menge, J.A., et al. [1988, 27p.] CR 88-05
Movement of coastal sea ice near Prudhoe Bay. Weeks,	lations. Walsh, J E., et al. (1984, p.9-14) MP 1779	Ice stress measurements around offshore structures. John-
W.F., et al. (1977, p 533-546) MP 1066	On the role of ice interaction in marginal ice zone dynamics. Lepptranta, M., et al. (1984, p 23-29) MP 1781	son, J.B., (1988, p.55-59) MP 2611
Dynamics of near-shore ice Kovaes, A, et al. (1977, p.411-424) MP 1076	Lepptranta, M., et al. (1984, p 23-29) MP 1781 Some simple concepts on wind forcing over the marginal ice	Profile properties of undeformed first-year sea ice. Cos., G.F.N., et al., [1988, 57p.] CR 88-13
Some elements of iceberg technology. Weeks, W.F. et al.	zone. Tucker, W.B., (1984, p.43-48) MP 1783	Mechanical properties of multi-year sea ice. Richter-Menge.
(1978, p 45-98) MP 1616 Model simulation of near shore see drift, deformation and	Mechanical properties of multi-year sea ice. Testing tech- niques. Mellor, M., et al., (1984, 39p.) CR 84-08	J.A., (1988, p.54-61) MP 2619
thickness. Hibler, W.D., III, (1978, p.33-44)	Role of sea ice dynamics in modeling CO2 increases. Hibler,	Working group on ice forces. 4th state-of-the-art report. Timeo, G.W., ed. (1989, 385p) SR 89-05
MP 1010	W.D., III, [1984, p.238-253] MP 1749	Conference on offshore mechanics and Arctic engineering.
Axial double point-load tests on snow and ice. Kovacs, A., [1978, 11p.] CR 78-01	Ice flow leading to the deep core hole at Dye 3, Greenland. Whillans, I M., et al., [1984, p 185-190] MP 1824	8th, 1989, (1989, 476p.) MP 2481
Report of the ITTC panel on testing in ice, 1978. Franken-	Ice dynamics. Hibler, W.D., III, [1984, 52p.]	Effect of ice pressure on marginal ice zone dynamics. Flate, G.M., et al., (1989, p.514-521) MP 2522
stein, G.E., et al. [1978, p.157-179] MP 1140	M 84-03	Proceedings, (1989, 475p.) SR 89-39
River ice Ashton, G D., (1978, p.369-392) MP 1216 Polycrystalline ice mechanics Hooke, R L., et al., (1979,	Mechanical properties of sea ice: a status report. Weeks, W.F., et al., (1984, p.135-198) MP 1808	Models of the mechanical properties of ice. Richter-Menge,
16p. ₁ MP 1207	Rise pattern and velocity of frazil ice. Wuebben, J.L.,	J.A., et al. (1989, p.87-99) MP 2667
Ice forces on the Yukon River bridge-1978 breakup. John-	(1984, p 297-316) MP 1816	Conference on offshore mechanics and arctic engineering, 9th, 1990, (1990, 339p.) MP 2584
son, P.R., et al. (1979, 40p) MP 1304 Dynamics of near-shore see Kovacs, A, et al. (1979,	Laboratory investigation of the kinetic friction coefficient of see. Forland, K.A., et al. (1984, p.19-28) MP 1825	Dynamic analysis of a floating ice sheet undergoing vertical
p.181-207 ₁ MP 1291	Forces associated with ice pile-up and rule-up Sodhi, D.S.	indentation. McGilvary, W.R., et al. (1990, p.195-203) MP 2579
Some Bessel function identities arising in ice mechanics prob- lems. Takagi, S., (1979, 130.) CR 79-27	et al. (1984, p.239-262) MP 1887	Wave-induced bergy bit motion near a floating platform.
lems. Takagi, S., [1979, 13p.] CR 79-27 Ultrasonic tests of Byrd Station ice cores. Gow, A.J., et al.	Computational mechanics in arctic engineering. Sodhi, D.S., [1984, p.351-374] MP 2072	Mak, L.M., et al. (1990, p.205-215) MP 2500
(1979, p.147-153) MP 1282	Static determination of Young's modulus in sea ice. Richter-	Measurement of sea ice thickness using electromagnetic induction. Holladay, J.S., et al., [1990, p.309-315]
Documentation for a two-level dynamic thermodynamic sea ice model Hibler, W.D., III, (1980, 35p.) SR 88-86	Menge, J.A., [1984, p.283-286] MP 1789	MP 2590
Some promising trends in ice mechanics. Assur, A. (1980,	Air-ice-ocean interaction experiments in Arctic marginal ice zones. 1984, 56p.; SR 84-28	Wind-generated polynyas off the coasts of the Bering Sea
p 1-15 ₁ MP 1300	MIZEX 83 mesoscale sea ice dynamics, initial analysis. Hi-	islands. Kozo, T l, et al. (1990, p.126-132) MP 2734
lee laboratory facilities for solving ice problems. Franken- stein, G.E., [1980, p.93-103] MP 1301	bler, W.D., III, et al. (1984, p.19-28) MP 1811 On the rheology of a broken see field due to floe collision.	On modeling the baroclinic adjustment of the Arctic Ocean.
Mechanical properties of polycrystalline ice. Mellor, M.	Shen, H., et al. (1984, p.29-34) MP 1812	Hibler, W.D., III., (1990, p.247-250) MP 2739 Ice melting
(1980, p.217-245) MP 1302	Crystalline structure of urea ice sheets. Gow, A.J., [1984,	Towing icebergs. Lonsdale, H K., et al. (1974, p.2)
Mechanical properties of polycrystalline see Hooke, R. L., et al., §1980, p. 263-275; MP 1328	48p. ₃ CR 84-24 Shore ice override and pileup features, Beaufort Sea	MP 1020
Ship resistance in thick brash ice Mellor, M., [1980, p. 305-	Kovacs, A., [1984, 28p. + map] CR 84-26	Physics of ice Glen, J.W., [1974, 81p] M. H-C28 Heat transfer in drill holes in Antarctic ice. Yen, YC., et
321; MP 1329	MIZEX 84 mesoscale sea see dynamics: post operations re- port. Hibler, W.D., III, et al., (1984, p.66-69)	al. (1976, 15p) CR 76-12
Measurement of the shear stress on the underside of simulated ice covers. Calkins, D.J., et al., [1980, 11p.]		
CR 90-24	MP 1257	Heat transfer between water jets and ice blocks Yen, YC.
	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al.	(1976, p.299-307) MP 862
Dynamic ice-structure interaction analysis for narrow vertical structures. Franti. E., et al. (1981, p. 472-479)	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., (1984, p.67-91) MP 1994	(1976, p 299-307) MP 882 Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p 571-588) MP 1867
structures. Eranti, E., et al., [1981], p.472-479; MP 1456	Arctic sea see and naval operations. Hibler, W.D., III, et al., [1934, p.67-91] MP 1996 Surfacing submannes through ice Assur, A., [1934, p.304-318] MP 1998	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-588) MP 802 MP 802 Heat transfer over a vertical melting plate. Yen, YC., et al.
structures. Eranti, E., et al., [1931], p.472-479; MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D., III, et al.	MP 1257 Arctic sea see and naval operations. Hibler, W.D. III, et al., (1984, p. 67-91) MP 1994 Surfacing submarines through ice Assur, A., (1984, p. 309-318) Rheology of glacier ice Jerek, K.C., et al., (1985, p. 3135-	(1976, p. 299-307) MP 802 Short-term forecasting of water run-off from snow and ice. Cobeck, S.C., (1977, p. 571-588) MP 1067 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) CR 77-32
structures. Eranti, E., et al., [1981], p.472-479; MP 1456	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1984, p. 67-91] MP 1994 Surfacing submarines through ice Assur, A., [1984, p. 309-318] MP 1998 Rheology of glacier ice Jezek, K.C., et al., [1985, p.1335-1337] MP 1844	(1976, p. 299-307) MP 802 Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-588) MP 1067 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) CR 77-32 Bubbler induced melting of ice covers. Keribar, R. et al., (1978, p. 162-366) MP 1160
structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D., III, et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J. et al., [1981, p.245-254] MP 1556	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1984, p.67-91] MP 1994 Surfacing submarines through ice Assur, A., [1984, p. 304-318] MP 1998 Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1844 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1985, 50p.] CR 85-85	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-588) MP 1067 Heat transfer over a vertical melting plate. (1977, 12p.) Rubbler induced melting of ice covers. (1978, p.) 562-366) Point source bubbler systems to suppress ice. Ashton, G.D.
Structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III, et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J. et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A., et al., [1981,	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1984, p. 67-91] MP 1994 Surfacing submarines through ice Assur, A., [1984, p. 309-318] MP 1998 Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] MP 1844 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1985, 50p.] Air-tee ocean interaction in Arctic marginal ice rones	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-583) MP 1867 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., (1978, p. 562-366) Postt source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) CR 79-12
structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III. et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A., et al., [1981, p.125-135] Growth, structure, and properties of sea ice. Weeks, W.F.,	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1984, p.67-91] MP 1994 Surfacing submarines through ice Assur, A., [1984, p. 304-318] MP 1998 Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1844 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1985, 50p.] CR 85-85	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-588) MP 1067 Heat transfer over a vertical melting plate. (1977, 12p.) Rubbler induced melting of ice covers. (1978, p. 162-366) Point source bubbler systems to suppress ice. (1979, 12p.) Case study fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1222
## Structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III, et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J. et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A. et al., [1981, p.125-135] Growth, structure, and properties of sea ice Wels, W.F., et al., [1982, 130p] M 82-81	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1984, p. 67-91] MP 1994 Surfacing submarines through ice Assur, A., [1984, p. 309-318] MP 1996 Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] MP 1844 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1985, 50p.] CR 85-95 Air-tee ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] SR 85-96 Mechanical properties of multi-year pressure ridge samples	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-583) MP 1067 Heat transfer on er a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., (1978, p.)562-366) Point source bubbler systems to suppress ice. Asheo, G. D., (1979, 12p.) Cit. 79-12 Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1232 Point source bubbler systems to suppress ice. Asheo, G. D.
structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III. et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A., et al., [1981, p.125-135] Growth, structure, and properties of sea ice. Weeks, W.F.,	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al. (1914, p. 67-91) Surfacing submarines through ice Assur, A., (1914, p. 304-318) Rheology of glacier ice Jerek, K.C., et al., (1985, p.1335-1337) Numerical modeling of sea ice dynamics and ice thickness. Hibler, W.D., III, (1985, 50p.) Air-see ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., (1985, 119p.) SR 85-86 Mechanical properties of multi-year perssure ridge samples Richter-Menge, J.A., (1985, p. 244-251) MP 1936	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Crobeck, S.C., [1977, p. 571-583] MP 1867 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-386] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice., [1979, p. 100] MP 1226 MP 1236 MP 1240 MP 1240 MY 1240 MY 1240 Manual Manu
structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III, et al., [1981, p.1317-1329] Measuring mechanical properties of ice. Schwarz, J. et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A. et al., [1981, p.125-135] Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M., et al., [1982, p.201-219] Port Huron ice control model studies. Calkins, D.J., et al.	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1934, p.67-91] Surfacing submarines through ice. Assur, A., [1934, p.300-313] Rheology of glacier ice. Jerek, K.C., et al., [1935, p.1335-1337] Rheology of glacier ice. Jerek, K.C., et al., [1935, p.1335-1337] Rhibler, W.D., III, [1935, 50p.] Alivice ocean interaction in Arctic marginal ice rones MIZEX-West. Wadhams, P., ed., [1935, 119p.] SR 85-66 Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1935, p.244-251] Modeling seasice dynamics. Hibler, W.D., III, [1935, p.549-579] MP 2001	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-583) MP 1067 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Bubbler unduced melting of ice covers. Keribar, R., et al., (1978, p. 152-166) Point source bubbler systems to suppress ice., (1979, 12p.) Care study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1222 Point source bubbler systems to suppress ice., Ashton, G.D., (1979, p. 9)-100. MP 1326 Maximum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bitchlo, M.A., (1980)
MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D., III. et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A., et al., [1981, p.125-135] Growth, structure, and properties of sea ice et al., [1982, 130p.] Ice behavior under constant stress and strain al., [1982, p.201-219] Port Huron ice control model studies. Calkins, DJ., et al., [1982, p.361-373] MF 1530	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1914, p.67-91] Surfacing submarines through ice Assur, A., [1914, p. 304-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] Numerical modeling of sea ice dynamics and ice thickness. Hibler, W.D., III, [1985, 50p.] Air-see ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] Mechanical properties of multi-year persister ridge samples Richter-Menge, J.A., [1985, p.244-251] MP 1936 Modeling sea-ice dynamics. Hibler, W.D., III, [1915, p.549-579] Grain site and the compressive strength of ice. Cole, D.M.,	(1976, p. 299-307) MP 802 Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] MP 1867 Heat transfer or er a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler unduced melting of ice covers. Keribar, R., et al., [1978, p. 362-366] MP 1160 Point source bubbler systems to suppress ice. (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1024-1040] MP 1222 Point source bubbler systems to suppress ice., (1979, p. 93-100) MP 1222 Maximum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bilello, M.A., [1980, CR 80-65]
structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III, et al., [1981, p.1317-1329] Measuring mechanical properties of ice. Schwarz, J. et al., [1981, p.245-254] Dynamics of near-shore ice. Kovacs, A. et al., [1981, p.125-135] Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M., et al., [1982, p.201-219] Port Huron ice control model studies. Calkins, D.J., et al.	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1934, p.67-91] Surfacing submannes through ice Assur, A., [1934, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1848 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III., [1935, 50p.] CR 85-85 Air-see ocean interaction in Arctic marginal ice rones MIZEX-West. Wadhams, P., ed., [1985, 119p.] SR 85-66 Mechanical properties of multi-year pressure ridge samples. Richter-Menge, J.A., [1985, p.244-251] Modeling sea-ice dynamics. Hibler, W.D., III., [1935, p.549-579] Grain size and the compressive strength of ice. Cole, D.M., [1935, p.369-374] MP 1907 Mechanical properties of multi-year sea see. Phase 2 Test	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] MP 1067 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, e. et al., (1978, p. 162-366) Point source bubbler systems to suppress ice., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1222 Point source bubbler systems to suppress ice., Ashton, G. D., (1979, p. 9)-100. MP 1326 Maximum thathens and subsequent decay of lake, mer and fast sea see in Canada and Alaska. Riedlo, M.A., [1980, 160p.] Freshwater see growth, motion, and decay. MP 1896.
MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III. et al., [1981, p. 1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Dynamics of near-shore ice. Kovacs, A., et al., [1981, p. 125-135] Growth, structure, and properties of sea ice. al., [1982, 130p.] Ice behavior under constant stress and strain MP 1525 Port Huron ice control model studies. Calkins, D.J. et al., [1982, p. 361-373] Glacier mechanics. Mellor, M., [1982, p. 455-474] MP 1532 In-satu measurements of the mechanical properties of ice.	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1914, p.67-91] Surfacing submarines through ice Assur, A., [1914, p. 304-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.135-137] Numerical modeling of sea ice dynamics and ice thickness. Hibler, W.D., III., [1985, 50p.] Air-see ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] SR 85-86 Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p.244-251] Mechanical properties of multi-year pressure ridge samples, p.548-579, p.548-579, p.548-579. Grain sure and the compressive strength of ice. Cole, D.M., [1985, p.369-374] Mechanical properties of multi-year sea see results. Cos., G.E.N., et al., [1985, 81p] Phase 2. Test	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] Heat transfer oner a vertical melting plate. Yen, YC., et al., (1977, 12p.) Bubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-366] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point More Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MP 1222 Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MP 1222 Maximum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bifello, M.A., 1980, (180), p. 261-304] Freshwater ice growth, motion, and decay. MP 1299 Continuum sea see model for a global climate model.
structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III, et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of see. Schwarz, J. et al., [1981, p.245-254] Dynamics of near-shore see. Kovaes, A. et al., [1981, p.125-135] Growth, structure, and properties of sea see et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M. et al., [1982, p.201-219] Port Huron see control model studies Calkins, D.J., et al., [1982, p.361-373] MP 1530 Glacier mechanics. Mellor, M., [1982, p.455-474] MP 1532 In-satu measurements of the mechanical properties of see Tatintelaux, J.C., [1982, p.326-3334] MP 1555	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1934, p.67-91] Surfacing submannes through ice Assur, A., [1934, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1848 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III., [1935, 50p.] CR 85-85 Air-see ocean interaction in Arctic marginal ice rones MIZEX-West. Wadhams, P., ed., [1985, 119p.] SR 85-66 Mechanical properties of multi-year pressure ridge samples. Richter-Menge, J.A., [1985, p.244-251] Modeling sea-ice dynamics. Hibler, W.D., III., [1935, p.549-579] Grain size and the compressive strength of ice. Cole, D.M., [1935, p.369-374] MP 1907 Mechanical properties of multi-year sea see. Phase 2 Test	(1976, p. 299-307) Short-term forecasting of water run-off from sow and ice. Colbeck, S.C., [1977, p. 571-583] MP 1067 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Bubbler unduced melting of ice covers. Keribar, R., et al., (1978, p. 152-366) Point source bubbler systems to suppress ice. (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1222 Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1326 Naturmum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Biello, M.A., (1980, 160), p. 281-304; Creshwater see growth, motion, and decay (1980, p. 281-304) Continuum sea see model for a global climate model. Ling. C.H., et al., (1980, p. 187-196) MP 1822 Ablation seasons of arctic and antarctic sea see
MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D., III. et al., [1981, p. 1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Dynamics of near-shore ice. Kovacs, A., et al., [1981, p. 125-135] Growth, structure, and properties of sea ice. al., [1992, 130p.] He behavior under constant stress and strain Mellor, M., et al., [1982, p. 201-219] MP 1525 Port Huron ice control model studies. Calkins, D.J., et al., [1982, p. 361-373] Glacier mechanics. Mellor, M., [1982, p. 455-474] In-satu measurements of the mechanical properties of ice. Tatinelaus, J.C., [1982, p. 326-334] Ottauquechee Riveranalysis of freeze-up processes. Calkins, D.J., et al., [1982, p. 2577] MP 1738	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1914, p.67-91] Surfacing submarines through ice Assur, A., [1914, p. 304-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1985, 50p.) Air-sec ocean interaction in Arctic marginal sec rones Mil/EX-West Wadhams, P., ed., [1985, 119p.] SR 85-86 Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p.244-251] MP 1907 Mechanical properties of multi-year sea see rice and the compressive strength of ice. Cole, D.M., [1985, p.369-374] MP 1907 Mechanical properties of multi-year sea see ricesults. Cos., G.E.N., et al., [1985, 81p.] On estimating ice stress from MII/EX-83 see deformation and current measurements. Lepparanta, M., et al., [1986, p.171-19] MP 2220	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-366] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point MyP-122. Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MP-122. Point source bubbler systems to suppress ice. [1979, p. 93-100] MP-122. MP-1326 Freshwater tee growth, motion, and decay [1980, p. 187-104] Freshwater ice growth, motion, and decay [1980, p. 187-104] Continuum sea see model for a global climate model. Ling. C.H., et al., [1980, p. 187-194] Alation seasons of arctic and antarctic sea ice. MP-1517 MP-1517
Structures. Eranti, E., et al., [1981, p.472-479] MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III. et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of see. Schwarz, J., et al., [1981, p.245-254] MP 1556 Dynamics of near-shore see. Kovaes, A., et al., [1981, p.125-135] Growth, structure, and properties of sea see et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M., et al., [1982, p. 201-219] MP 1525 Port Huron see control model studies Calkins, D.J., et al., [1982, p.361-373] MP 1530 Glacier mechanics. Mellor, M., [1982, p.455-474] MP 1535 Ottauquechee River—analysis of freeze-up processes Calkins, D.J., et al., [1982, p. 277] Physical properties of the see cover of the Greenland Sea	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1934, p.67-91] Surfacing submarines through ice Assur, A., [1934, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1935, p.1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1935, p.1335-1337] Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1935, 50p.] Air-ice ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1935, 119.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1935, p. 244-251] Mechanical properties of multi-year seasure ridge samples Richter-Menge, J.A., [1935, p. 244-251] MP 1936 Mechanical properties of multi-year seasure ridge samples (1935, p. 369-374) Mechanical properties of multi-year seasure ridge samples (1935, p. 369-374) Mechanical properties of multi-year seasure ridge samples (1935, p. 369-374) Mechanical properties of multi-year seasure ridge samples (1935, p. 369-374) Mechanical properties of multi-year seasure ridge samples (1935, p. 369-374) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year seasure ridge samples (1935, p. 379-379) Mechanical properties of multi-year se	(1976, p. 299-307) Short-term forecasting of water run-off from sow and ice. Colbeck, S.C., [1977, p. 571-583] MP 1067 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Bubbler unduced melting of ice covers. Keribar, R., et al., (1978, p. 152-366) Point source bubbler systems to suppress ice. (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1222 Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1326 Naturmum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Biello, M.A., (1980, 160), p. 281-304; Creshwater see growth, motion, and decay (1980, p. 281-304) Continuum sea see model for a global climate model. Ling. C.H., et al., (1980, p. 187-196) MP 1822 Ablation seasons of arctic and antarctic sea see
MP 1456 Modeling mesoscale ace dynamics. Hibler, W.D. III. et al., [1981, p. 1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Dynamics of near-shore ice. Kovacs, A., et al., [1981, p. 125-135] Growth, structure, and properties of sea see et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M., et al., [1982, p. 201-219] Port Huron ice control model studies Calkins, D.J., et al., [1982, p. 361-373] Glacier mechanics. Mellor, M., [1982, p. 455-474] MP 1532 In-satu measurements of the mechanical properties of ice Tatinelaux, J.C., [1982, p. 326-334] Ottauquechee River—analysis of freeze-up processes Calkins, D.J., et al., [1982, p. 2-37] MP 1538 Physical properties of the see cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Wy 1738 Hydraulic model study of Port Huron ice control structure	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., (1934, p.67-91) Surfacing submarines through ice Assur, A., (1934, p. 304-3181) MP 1998 Rheology of glacier ice Jerek, K.C., et al., (1985, p.1315-1317) NB 1844 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, (1985, 50p.) Airisec ocean interaction in Arctic marginal ice rones Mil/EEX-West Wadhams, P., ed., (1985, 1199.) SR 85-86 Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., (1985, p. 244-251) MP 1906 Modeling sea-ice dynamics. Hibler, W.D., III, (1985, p. 549-579) Grain size and the compressive strength of ice. Cole, D.M., (1985, p. 369-374) Mechanical properties of multi-year sea see ricesults. Coa., G.E.N., et al., (1985, 81p.) CR 85-16 On estimating ice stress from MI/EX-83 ice deformation and current measurements. Leppdranta, M., et al., (1986, p. 171-19) MP 2220 Fraril ice pebbles, Tanana River, Ataska Chacho, E.F., et al., (1986, p. 475-485) Growth, structure, and properties of sea ice. Weeks, W.F.,	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Crobeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., [1977, 12p.] Bubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-386] Point source bubbler systems to suppress ice. Ashton, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice. [1979, p. 93-100] MP 1222 Point source bubbler systems to suppress ice. [1979, p. 93-100] MP 1236 MP 1336 MP 1340 MP 1350 Freshwater see in Canada and Alaska. Bilello, M.A., [1980, G. P. 600] Freshwater see growth, motion, and decay. [1980, p. 281-304] CR 1980 CR 19
MP 1456 Modeling mesoscale see dynamics. Hibler, W.D., III, et al., (1981, p. 1317-1329) MP 1526 Measuring mechanical properties of see. Schwarz, J., et al., (1981, p. 245-254) Dynamics of near-shore see. Kowacs, A., et al., (1981, p. 125-135) Growth, structure, and properties of sea see. Weeks, W.F., et al., (1982, 130p) Ice behavior under constant stress and strain. Meltor, M., et al., (1982, p. 201-219) MP 1529 Port Huron see control model studies. Calkins, D.J., et al., (1982, p. 361-373) Glacier mechanics. Mellor, M., (1982, p. 455-474) In-satu measurements of the mechanical properties of see. Tatinclaux, J.C., (1982, p. 326-334) MP 1530 Ottauquechee River- analysis of freeze-up processes. Calkins, D.J., et al., (1982, p. 297) MP 1738 Physical properties of the see cover of the Greenland Sea Weeks, W.F., (1982, 27p) Hydraulic model study of Port Huron see control structure Calkins, D.J., et al., (1982, 39p) CR 82-34	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1934, p.67-91] Surfacing submannes through ice Assur, A., [1934, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1315-1317] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1315-1317] Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III., [1935, 50p.] Air-ice ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p.244-251] Medding sea-ice dynamics. Hibler, W.D., III., [1935, p.549-579] Grain sure and the compressive strength of ice. Cole, D.M., [1935, p.369-374] Mechanical properties of multi-year sea see results. Cos., G.E.N., et al., [1985, 81p.] On estimating ice stress from MIZEX 83 ice deformation and current measurements. Lepparanta, M., et al., [1936, p.17-19] MP 2220 Frazil ice pebbles, Tanana River, Alaska Chacho, E.F., et al., [1936, p.475-483] Growth, structure, and properties of sea see (et al., [1936, p.91-164]) MP 2230	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-583) MP 1867 Heat transfer on er a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., (1978, p. 162-364) Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) MP 1222 Point source bubbler systems to suppress ice. Ashten, G.D., MP 1222 Matimum thickness and subsequent decay of lake, river and fast sea ice in Canada and Alaska. Bidello, M.A., (1980, 160p.) Freshwater ice growth, motion, and decay. Ashten, G.D., (1980, p. 181-304) Cill, et al., (1980, p. 187-198) Ablation seasons of arctic and antarctic sea ice. Andreas, El., et al., (1982, p. 440-447) Sea ice drag laws and boundary layer during rapid melting. MCFher, M.G., (1982, 17p.) Performance of a point source bubbler under the MP 1527 MP 1527
MP 1456 Modeling mesoscale ace dynamics. Hibler, W.D. III. et al., [1981, p. 1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Dynamics of near-shore ice. Kovacs, A., et al., [1981, p. 125-135] Growth, structure, and properties of sea see et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M., et al., [1982, p. 201-219] Port Huron ice control model studies Calkins, D.J., et al., [1982, p. 361-373] Glacier mechanics. Mellor, M., [1982, p. 455-474] MP 1532 In-satu measurements of the mechanical properties of ice Tatinelaux, J.C., [1982, p. 326-334] Ottauquechee River—analysis of freeze-up processes Calkins, D.J., et al., [1982, p. 2-37] MP 1538 Physical properties of the see cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Wy 1738 Hydraulic model study of Port Huron ice control structure	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., (1934, p.67-91) Surfacing submarines through ice Assur, A., (1934, p. 304-3181) MP 1998 Rheology of glacier ice Jerek, K.C., et al., (1985, p.1315-1317) NB 1844 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, (1985, 50p.) Airisec ocean interaction in Arctic marginal ice rones Mil/EEX-West Wadhams, P., ed., (1985, 1199.) SR 85-86 Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., (1985, p. 244-251) MP 1906 Modeling sea-ice dynamics. Hibler, W.D., III, (1985, p. 549-579) Grain size and the compressive strength of ice. Cole, D.M., (1985, p. 369-374) Mechanical properties of multi-year sea see ricesults. Coa., G.E.N., et al., (1985, 81p.) CR 85-16 On estimating ice stress from MI/EX-83 ice deformation and current measurements. Leppdranta, M., et al., (1986, p. 171-19) MP 2220 Fraril ice pebbles, Tanana River, Ataska Chacho, E.F., et al., (1986, p. 475-485) Growth, structure, and properties of sea ice. Weeks, W.F.,	(1976, p. 294-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-583) Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., (1978, p. 162-384) Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T. et al., (1979, p. 1029-1040) Point source bubbler systems to suppress ice. (1979, p. 93-100) MP 1226 Point source bubbler systems to suppress ice. (1979, p. 93-100) MP 1230 MP 1336 MP 1306 Firshwater see in Canada and Alaska. Bidello, M.A., (1980, 160p.) Firshwater see in Canada and Alaska. Bidello, M.A., (1980, 160p.) Cit., et al., (1980, p. 187-196) Ashten, G.D., MP 1239 Continuum sea see model for a global climate model. Ling. (1980, p. 187-196) Ashten, G.D., MP 1237 Sea see drag laws and boundary layer during rapid melting. McFiber, M.G., (1982, 17p.) Eleforensine of a point source bubbler under thick see Haynes, F.D., et al., (1982, p. 111-124) On the differences in ablation seasons of Arctica and Antaretic sea. see Andreas, E.L., et al., (1982, p. 111-124) On the differences in ablation seasons of Arctica and Antaretic sea. see Andreas, E.L., et al., (1982, p. 9) CR 82-53
MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III. et al. (1981, p. 1317-1329) MP 1526 Measuring mechanical properties of see. Schwarz, J., et al. (1981, p. 245-254) Mp 1536 Dynamics of near-shore see. Kovaes, A., et al. (1981, p. 125-135) Growth, structure, and properties of sea see. Weeks, W.F., et al. (1982, 130p.) Growth, structure, and properties of sea see. Weeks, W.F., et al. (1982, p. 120-1219) Me 1529 Hother on see control model studies. Calkins, D.J., et al. (1982, p. 201-237) Glacier mechanics. Mellor, M., (1982, p. 345-374) MP 1530 Glacier mechanics. Mellor, M., (1982, p. 455-474) MP 1531 Ottauquechee River-analysis of ficere-up processes. Calkins, D.J., et al. (1982, p. 226-334) Physical properties of the see cover of the Greenland Sea Weeks, W.F., (1982, 27p.) Hydraulic model study of Port Huron see control structure Calkins, D.J., et al. (1982, p. 27p.) Stress-strain-time relations for see under unnavial compression. Mellor, M., et al. (1983, p. 207-230) MP 1587 Numerical simulation of the Weddell Sea pack see. Holler,	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1934, p.67-91] Surfacing submannes through ice Assur, A., [1934, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] Numerical modeling of sea ice dynamics and see thickness Hibler, W.D., III., [1985, 50p.] Air-stee ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p.244-251] MP 1936 Mechanical properties of multi-year sea see results. Cos., G.F.N., et al., [1985, 81p.] Grain size and the compressive strength of see. Cole, D.M., [1935, p.369-374] MP 1209 Grain size and the compressive strength of see. Cole, D.M., [1935, p.369-374] On estimating properties of multi-year sea see Phase 2. Test results. Cos., G.F.N., et al., [1985, 81p.] On estimating estress from MIZEX 83 see deformation and current measurements. Lepparanta, M., et al., [1936, p.119] Frazil see pebbles, Tanana River, Alaska Chacho, E.F., et al., [1986, p.475-483] Growth, structure, and properties of sea see retal, [1986, p.475-483] Growth, structure, and properties of sea see weeks, W.F., MP 2209 Mechanical behavior of sea see Mellor, M., [1986, p.185, 281] MP 210 Growth, structure, and properties of sea see weeks, W.F., MP 2209 Mechanical behavior of sea see Mellor, M., [1986, p.185, 281] MP 210 Growth, structure, and properties of sea see weeks, W.F., MP 2209 Mechanical behavior of sea see Mellor, M., [1986, p.185, 281]	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., (1977, p. 571-583) MP 1967 Heat transfer on er a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., (1978, p.)62-366) Point source bubbler systems to supporess ice. Ashton, G. D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) Mr ISSA Mr ISSA Maximum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bidello, M.A., (1980, 160p.) Freshwater see growth, motion, and decay. Ashton, G.D., (1970, p. 261-304) Citt, et al., (1980, p.187-1984) Ablation seasons of arctic and antarctic sea see. Andreas, E.L., et al., (1982, p. 187-184) MP 1527 Case drag laws and boundary layer during rapid melting. MCPher. M.G., (1982, 17p.) CR 22-04 Haynes, F.D., et al., (1982, p. 111-124) MP 1529 On the differences in abiliation seasons of Arctic and Antarctic sea see. Andreas, E.L., et al., (1982, p. 111-124) Mr 1529 On the differences in abiliation seasons of Arctic and Antarctic sea see. Andreas, E.L., et al., (1982, p. 111-124) Mr 1529 On the differences in abiliation seasons of Arctic and Antarctic sea see. Andreas, E.L., et al., (1982, p. 111-124) Mr 1529 On the differences in abiliation seasons of Arctic and Antarctic sea see. Andreas, E.L., et al., (1982, p. p.) CR 22-04 Post transfer of the see backfilling of DYE 2.
MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III. et al., [1981, p.1317-1329] MP 1526 Measuring mechanical properties of see. Schwarz, J., et al., [1981, p.245-254] Mp 1556 Measuring mechanical properties of see. Schwarz, J., et al., [1981, p.245-254] Mp 1556 Dynamics of near-shore see. Kovacs, A., et al., [1981, p.125-135] Growth, structure, and properties of sea see et al., [1982, 130p.] Ice behavior under constant stress and strain Mellor, M., et al., [1982, p.201-219] Port Huron see control model studies. Calkins, D.J., et al., [1982, p.361-373] Glacier mechanics. Mellor, M., [1982, p.455-474] MP 1532 In-situ measurements of the mechanical properties of see Tatinelaus, J.C., [1982, p.36-334] MP 1530 Ottauquechee River-analysis of freeze-up processes. Calkins, D.J., et al., [1982, p.2-37] Physical properties of the see cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Hydraulic model study of Port Huron see control structure Calkins, D.J., et al., [1982, 59p.] Stress-strain-time relations for see under uniaxial compression. Mellor, M., et al., [1983, p.207-230] Nm 1587 Numerical simulation of the Weddell Sea pack see Hibler, W.D., III, et al., [1983, p.2873-2887] MP 1592	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1914, p.67-91] Surfacing submarines through ice Assur, A., [1914, p. 304-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1948 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III., [1985, 50p.] Air-see ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p.244-251] MP 1936 Medding sea-ice dynamics. Hibler, W.D., III., [1915, p.549-579] Grain size and the compressive strength of ice. Cole, D.M., [1935, p.369-374] Mechanical properties of multi-year sea ice. Plasse 2. Test results. Coa., G.F.N., et al., [1985, 81p.] On estimating ice stress from MIZEX-33 ice deformation and current measurements. Leppdranta, M., et al., [1916, p.17-19] Frari ice pebbles, Tanana River, Ataska Chache, F., et al., [1986, p.475-485] Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1986, p.9-164] MP 2130 Hechanical behavior of sea ice. Mellor, M., [1986, p.185, 284] Ice dynamics. Hibler, W.D., III., [1986, p.5**-A40] MP 2211	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-366] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MP 1222 Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MY 1229 Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MY 1326 MY 1326 MY 1326 Freshwater ice growth, motion, and decay. (1980, p. 261-304) CR 80-60 Freshwater ice growth, motion, and decay. (1980, p. 187-196) CR 198-6 MY 1229 Ashten, G.D., MY 1326 MY 1326 CR 82-6 MY 1326 MY 1326 MY 1326 MY 1326 CR 82-6 MY 1326 CR 82-3 Developing a water well for the see backfilling of DYE 2 Rand, J.H., (1982, 199) SR 82-32 SR 82-32
MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III. et al. (1981, p. 1317-1329) MP 1526 Measuring mechanical properties of see. Schwarz, J., et al. (1981, p. 245-254) Mp 1536 Dynamics of near-shore see. Kovaes, A., et al. (1981, p. 125-135) Growth, structure, and properties of sea see. Weeks, W.F., et al. (1982, 130p.) Growth, structure, and properties of sea see. Weeks, W.F., et al. (1982, p. 120-1219) Me 1529 Hother on see control model studies. Calkins, D.J., et al. (1982, p. 201-237) Glacier mechanics. Mellor, M., (1982, p. 345-374) MP 1530 Glacier mechanics. Mellor, M., (1982, p. 455-474) MP 1531 Ottauquechee River-analysis of ficere-up processes. Calkins, D.J., et al. (1982, p. 226-334) Physical properties of the see cover of the Greenland Sea Weeks, W.F., (1982, 27p.) Hydraulic model study of Port Huron see control structure Calkins, D.J., et al. (1982, p. 27p.) Stress-strain-time relations for see under unnavial compression. Mellor, M., et al. (1983, p. 207-230) MP 1587 Numerical simulation of the Weddell Sea pack see. Holler,	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1914, p. 67-91] Surfacing submannes through ice Assur, A., [1914, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1985, p. 1335-1337] Kreman and the companies and see thickness Hibler, W.D., III., [1985, p. 548-54] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p. 244-251] MP 1906 MP 1907 MP 1908 Mechanical properties of multi-year sea see Phase 2 Test results. Cos., G.F.N., et al., [1985, B1p.] On estimating aroperties of multi-year sea see Phase 2 Test results. Cos., G.F.N., et al., [1985, B1p.] On estimating estress from MIZEN 83 see deformation and current measurements. Lepparanta, M., et al., [1936, p. 1510] Fraril see pebbles, Tanana River, Alaska Chacho, E.F., et al., [1986, p. 475-483] Growth, structure, and properties of sea see Weeks, W.F., et al., [1986, p. 975-484] Mechanical behavior of sea see Mellor, M., [1986, p. 165, 281] Ice dynamics. Hibler, W.D., III., [1986, p. 575-440] MP 2210 On the profile properties of undeformed first-year sea see Cos., G.F.N., et al., [1986, p. 257-130] MP 2199	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] MP 1967 Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Rubbler induced melting of ice covers. Keribar, R., et al., (1978, p.)62-366] Point source bubbler systems to suppress ice. Ashton, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska. McFadden, T., et al., (1979, p. 1029-1040) Maximum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bifello, M.A., (1980, p. 187-198) Freshwater see growth, motion, and decay. Ashton, G.D., (1980, p. 261-304) Continuum sea see model for a global climate model. Ling, C.H., et al., (1980, p. 187-198) ANAtion seasons of arctic and antarctic sea see. Andreas, E.L., et al., (1980, p. 187-198) MP 1527 Sea see drag laws and boundary layer during rapid melting. MCPhec, M.G., (1982, 17p.) Performance of a point source bubbler under thick see Haynes, F.D., et al., (1982, 17p.) Performance of a point source bubbler under thick see reas rec. Andreas, E.L., et al., (1982, 197) Onthe differences in ablation seasons of Arctic and Antarctic sea see. Andreas, E.L., et al., (1982, 197) CR 82-32 Soft drink bubbles. Crapin, J.H., (1983, p. *1) MP 1736
MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III. et al., [1981, p. 1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Dynamics of near-shore ice. Kovacs, A., et al., [1981, p. 125-135] Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1982, 130p.] Ice behavior under constant stress and strain. Mellor, M., et al., [1982, p. 201-219] MP 1525 Port Huron ice control model studies. Calkins, D.J., et al., [1982, p. 361-373] Glacier mechanics. Mellor, M., [1982, p. 455-474] MP 1530 Ottauquechee River—analysis of freeze-up processes. Calkins, D.J., et al., [1982, p. 2-37] MP 1738 Physical properties of the sec cover of the Greenland Sea Weeks, W.F., [1982, 279, 277] Hydraulic model study of Port Huron ice control structure Calkins, D.J., et al., [1982, 59p.] Stress-strain time relations for ice under uniavial compression. Mellor, M., et al., [1983, p. 207-230] MP 1587 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., III, et al., [1983, p. 217-2887] On forecasting mesoscale ice dynamics and build-up. Hibber, W.D., III, et al., [1983, p. 217-2887] MP 1625 Mechanical behavior of sea ice. Mellor, M., [1983, 1059]	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1914, p.67-91] Surfacing submarines through ice Assur, A., [1914, p. 304-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1998 Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1848 Numerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III., [1985, 50p.] Air-sice ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] SR 85-86 Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p.244-251] MP 2901 Grain sire and the compressive strength of ice. Cole, D.M., [1985, p.349-579] Grain sire and the compressive strength of ice. Cole, D.M., [1985, p.369-374] Mechanical properties of multi-year sea ice results. Coa., G.F.N., et al., [1985, 81p.] On estimating ice stress from MIZEX 33 ice deformation and current measurements. Leppdranta, M., et al., [1916, p.17-48] Growth, structure, and properties of sea ice. Mellor, M., [1986, p.475-483] Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1986, p.475-483] MP 2210 Ice dynamics. Hibler, W.D., III., [1986, p.57-346, p.475-483] On the profile properties of undeformed first-year sea ice. Cox., G.F.N., et al., [1986, p.57-346] MP 2211 On the profile properties of undeformed first-year sea ice. Cox., G.F.N., et al., [1986, p.257-336] MP 2110 Travial testing of first-year sea ice. Richter Menge, J.A., et	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., [1977, 12p.] Bubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-366] MP 1166 Point source bubbler systems to suppress ice. Ashton, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040) MP 1222 Point source bubbler systems to suppress ice. Ashton, G.D., (1979, p. 93-100) Maturium thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bidello, M.A., 1980, 160p.; Freshwater see growth, motion, and decay. [1980, p. 261-304] CH., et al., [1912, p. 146-4847] MP 1622 Alation seasons of arctic and antarctic sea see. Andreas, E.L., et al., [1982, p. 111-124] MP 1517 Sea see drag laws and boundary layer during rapid melting. McPriec. M.G., [1982, 17p.] Performance of a point source bubbler under thick see. Haynes, F.D., et al., [1982, p. 111-124] MP 1529 Onthe differences in ablation seasons of Arctic and Antarctic sea see. Andreas, E.L., et al., [1982, p. 111-124] Developing a water well for the see backfilling of DYE 2, Rand, J.H., [1983, 17p.] SR 22-33 Soft drink bubbles. Crapin, J.H., [1983, p. 71] MP 1736
MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III, et al. (1981, p. 1317-1329) MP 1526 Measuring mechanical properties of see. Schwarz, J., et al. (1981, p. 245-254) Dynamics of near-shore see. Kovacs, A., et al. (1981, p. 245-254) Dynamics of near-shore see. Kovacs, A., et al. (1981, p. 125-135) Growth, structure, and properties of sea see. Weeks, W.F., et al. (1982, 1309) Ice behavior under constant stress and strain. Meltor, M., et al. (1982, p. 201-219) MP 1526 Port Huron see control model studies. Calkins, D.J., et al. (1982, p. 361-373) Glacier mechanics. Mellor, M., (1982, p. 455-474) In-satu measurements of the mechanical properties of see. Tatinclaux, J.C., (1982, p. 326-334) MP 1530 Ottauquechee River- analysis of freeze-up processes. Calkins, D.J., et al., (1982, p. 237) MP 1738 Physical properties of the see cover of the Greenland Sea. Weeks, W.F., (1982, 27p.) Hydraulic model study of Port Huron see control structure Calkins, D.J., et al., (1982, 59p.) Stress-strain-time relations for see under umasual compression. Mellor, M., et al., (1983, p. 237-2387) Nmerical simulation of the Weddell Sea pack see. Hibler, W.D., III, et al., (1983, p. 1873-2887) MP 1525 Mechanical behavior of sea see. Mellor, M., (1983), 105p.; MP 1625 Mechanical behavior of sea see. Mellor, M., (1983), 105p.; M. 83-1	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1914, p.67-91] Surfacing submannes through ice Assur, A., [1914, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1848 Numerical modeling of sea ice dynamics and see thichness Hibler, W.D., III., [1985, 50p.] Air-see ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p. 244-251] MP 1936 Modeling sea-see dynamics. Hibler, W.D., III., [1985, p. 549-579] Grain sure and the compressive strength of see. Cole, D.M., [1985, p. 369-374] MP 1997 Mechanical properties of multi-year sea see Plasse 2. Test results. Coa, G.F.N., et al., [1985, 81p.] On estimating see stress from MIZEX-83 see deformation and current measurements. Leppdranta, M., et al., [1916, p. 171-19] Frazil see pebbles, Tanana River, Alaska Chacho, E.F., et al., [1986, p. 9-164] MP 2220 Frazil see pebbles, Tanana River, Alaska Chacho, E.F., et al., [1986, p. 9-164] MP 2210 Growth, structure, and properties of sea see Weeks, W.F., et al., [1986, p. 9-164] MP 2210 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2211 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2211 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2211 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2211 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2211 On the profile properties of undeformed first-years sea see Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2210 Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2210 Cost, G.F.N., et al., [1986, p. 5***-\$440] MP 2211 On the profile properties of undeformed first-years sea see Cost, G.F.R., et al., [1986, p. 5***-\$440] MP 2210 Cost, G.	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Bubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-366] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MP 1222 Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) Mattinum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bidello, M.A., 1980, 1860, p. 187-189. Freshwater ice growth, motion, and decay. (1980, p. 181-104) CR 19-02 Alatinum sea see model for a global climate model. Ling. C.H., et al., (1980, p. 187-189) Alatinon seasons of arctic and antarctic sea ice. L., et al., (1982, p. 140-447) Sea ice drag laws and boundary layer during rapid melting. MCPber, M.G., (1982, 17p.) Performance of a point source bubbler under thick ice. Hajnes, F.D., et al., (1982, p. 111-124) Developing a water well for the see backfilling of DYE 2. Rand, J.H., (1983, p. 11, (1983, p. 409-414). Lake ice decay. Ashten, G.D., (1983, p. 83-56).
MP 1456 Modeling mesoscale ice dynamics. Hibler, W.D. III. et al., [1981, p. 1317-1329] MP 1526 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Measuring mechanical properties of ice. Schwarz, J., et al., [1981, p. 245-254] MP 1556 Dynamics of near-shore ice. Kovacs, A., et al., [1981, p. 125-135] Growth, structure, and properties of sea ice. Weeks, W.F., et al., [1982, 130p.] He behavior under constant stress and strain. Mellor, M., et al., [1982, p. 201-219] MP 1525 Port Huron ice control model studies. Calkins, D.J., et al., [1982, p. 361-373] Glacier mechanics. Mellor, M., [1982, p. 455-474] MP 1530 Ottauquechee River—analysis of freeze-up processes. Calkins, D.J., et al., [1982, p. 2-37] MP 1738 Physical properties of the see cover of the Greenland Sea Weeks, W.F., [1982, 279, 279] MP 1738 Hydraulic model study of Port Huron ice control structure. Calkins, D.J., et al., [1982, 59p.] Stress-strain-time relations for ice under umasual compression. Mellor, M., et al., [1983, p. 207-230] MP 1587 Numerical simulation of the Weddell Sea pack ice. Hibler, W.D., III, et al., [1983, p. 217-2887] MP 1592 On forecasting presoscale ice dynamics and build-up. Hibler, W.D., III, et al., [1983, p. 217-2887] MP 1625 Mechanical behavior of sea ice. Mellor, M., [1983, 1059] MR 83-17 Sea ice model in wind foreing fields. Tucker, W.B., [1983, 1169] CR 83-17	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III, et al., [1934, p.67-91] Surfacing submarines through ice Assur, A., [1934, p.309-313] Rheology of glacier ice Jerek, K.C., et al., [1935, p.1335-1337] Rheology of glacier ice Jerek, K.C., et al., [1935, p.1335-1337] Nmerical modeling of sea ice dynamics and ice thickness Hibler, W.D., III, [1935, 50p.] Air-ice ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1935, p.244-251] Modeling seasured dynamics. Hibler, W.D., III, [1935, p.549-579] Grain sure and the compressive strength of ice. Cole, D.M., [1935, p.369-374] Mechanical properties of multi-year sea ice results. Coa., G.E.N., et al., [1935, 81p.] On estimating ice stress from MIZEX-X3 ice deformation and current measurements. Leppdranta, M., et al., [1936, p.17-19] Frani ice pebbles, Tanana River, Ataska Chacho, E.F., et al., [1936, p.97-483] Growth, structure, and properties of sea ice Weeks, W.F., et al., [1936, p.9164] Mrechanical behavior of sea ice Mellor, M., [1936, p.185, 231] On the profile properties of undeformed first-year sea ice Coi., G.F.N., et al., [1936, p.257-330] Mr 2109 Transult strug of first-year sea ice. Richter Menge, J.A., et al., [1936, 41p.] Venfication tests for a stiff inclusion stress sense. Coi., G.F.N., et al., [1937, p.81-83] Mr 2223 Mr 2223 Mr 2223 Mr 2224	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Crobeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., [1977, 12p.] Bubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-386] MP 1166 Point source bubbler systems to suppress ice. Ashton, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice. Ashton, G.D., MP 1222. Point source bubbler systems to suppress ice. [1979, p. 93-100] MP 1222. Point source bubbler systems to suppress ice. [1979, p. 93-100] MP 1230 Matimum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bilello, M.A., [1980, G. D., [1980, p. 181-304] Freshwater see growth, motion, and decay. [1980, p. 281-304] Freshwater see growth, motion, and decay. Ashton, G.D., [1980, p. 281-304] Cill, et al., [1980, p. 187-196] MP 1375 Solid first see an of arctic and antarctic sea see. Andreas, E.L., et al., [1982, p. 111-124] On the differences in ablation seasons of Arctic and Antarctic sea. Ce. Andreas, E.L., et al., [1982, p. 111-124] On the differences in ablation seasons of Arctic and Antarctic sea. Ce. Andreas, E.L., et al., [1982, p. 111-124] Developing a water well for the see backfilling of DYE 2. Rand, J.H., [1982, p. 111-124] Sold drink bubbles. Crapin, J.H., [1983, p. 11] Field tests of a frost-heave model. Guymon, G.L., et al., [1983, p. 409-414] Lake see decay. Ashton, G.D., [1983, p. 85-84] MP 1684
MP 1456 Modeling mesoscale see dynamics. Hibler, W.D. III. et al. (1981, p. 1317-1329) MP 1526 Measuring mechanical properties of see. Schwarz, J., et al. (1981, p.245-254) Mp 1536 Measuring mechanical properties of see. Schwarz, J., et al. (1981, p.245-254) Mp 1556 Dynamics of near-shore see. Kovacs, A., et al. (1981, p.125-135) Growth, structure, and properties of sea see. Weeks, W.F., et al. (1982, 130p.) Ice behavior under constant stress and strain. Meltor, M., et al. (1982, p. 201-219) MP 1529 Port Huron see control model studies. Calkins, D.J., et al. (1982, p. 361-373) Glacier mechanics. Mellor, M., (1982, p. 455-474) MP 1530 Glacier mechanics. Mellor, M., (1982, p. 455-474) MP 1530 Ottauquechee River-analysis of freeze-up processes. Calkins, D.J., et al. (1982, p. 22-37) Mp 1738 Physical properties of the see cover of the Greenland Sea Weeks, W.F., (1982, 27p.) Hydraulic model study of Port Huron see control structure Calkins, D.J., et al. (1982, p. 207-230) Stress-strain.time relations for see under unnavial compression. Mellor, M., et al. (1983, p. 207-230) NP 1592 On forecasting presocate see dynamics and build-up. Hibber, W.D., III, et al. (1983, p. 100-115) MP 1625 Mechanical behavior of sea see. Mellor, M., (1983, 105p.) MB 38-1 Sea see model in wind foreing fields. Tucker, W.B., 1183.	MP 1257 Arctic sea see and naval operations. Hibler, W.D., III., et al., [1914, p.67-91] Surfacing submannes through ice Assur, A., [1914, p. 309-318] Rheology of glacier ice Jerek, K.C., et al., [1985, p.1335-1337] MP 1848 Numerical modeling of sea ice dynamics and see thickness Hibler, W.D., III., [1985, 50p.] Air-see ocean interaction in Arctic marginal ice rones MIZEX-West Wadhams, P., ed., [1985, 119p.] Mechanical properties of multi-year pressure ridge samples Richter-Menge, J.A., [1985, p. 244-251] MP 1936 Modeling sea-see dynamics. Hibler, W.D., III., [1985, p. 549-579] Grain sure and the compressive strength of see. Cole, D.M., [1985, p. 369-374] MP 1997 Mechanical properties of multi-year sea see results. Coa, G.F.N., et al., [1985, 81p.] On estimating see stress from MIZEX-83 see deformation and current measurements. Leppdranta, M., et al., [1986, p. 475-481] Growth, structure, and properties of sea see Weeks, W.F., et al., [1986, p. 9-164] MP 2210 Growth, structure, and properties of sea see Weeks, W.F., et al., [1986, p. 9-164] MP 2210 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 577-840] MP 2211 On the profile properties of undeformed first-year sea see Cost, G.F.N., et al., [1986, p. 577-840] MP 2210 United States of the sea see Richter Menge, J.A., et al., [1986, 41p.] MP 2211 Verification tests for a stiff inclusion stress sensee. Cost.	(1976, p. 299-307) Short-term forecasting of water run-off from snow and ice. Colbeck, S.C., [1977, p. 571-583] Heat transfer over a vertical melting plate. Yen, YC., et al., (1977, 12p.) Bubbler induced melting of ice covers. Keribar, R., et al., [1978, p. 162-366] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, 12p.) Case study: fresh water supply for Point Hope, Alaska, McFadden, T., et al., [1979, p. 1029-1040] Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) MP 1222 Point source bubbler systems to suppress ice. Ashten, G.D., (1979, p. 93-100) Mattinum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska. Bidello, M.A., 1980, 1860, p. 187-189. Freshwater ice growth, motion, and decay. (1980, p. 181-104) CR 19-02 Alatinum sea see model for a global climate model. Ling. C.H., et al., (1980, p. 187-189) Alatinon seasons of arctic and antarctic sea ice. L., et al., (1982, p. 140-447) Sea ice drag laws and boundary layer during rapid melting. MCPber, M.G., (1982, 17p.) Performance of a point source bubbler under thick ice. Hajnes, F.D., et al., (1982, p. 111-124) Developing a water well for the see backfilling of DYE 2. Rand, J.H., (1983, p. 11, (1983, p. 409-414). Lake ice decay. Ashten, G.D., (1983, p. 83-56).

See melting (cont.)	Numerical simulation of Northern Hemisphere sea see varia-	Design and model testing of a river ice prov. Tatinchus,
On the decay and retreat of the ice cover in the summer MIZ	bility, 1951-1980. Walsh, J.E., et al. (1985, p.4847-	J C., 1966, p.137-159- MP 2132
Maykut, G.A., (1984, p.15-22) MP 1780 Temperature and interface morphology in a melting ice-water	MP 1862 Modeling sea-ice dynamics. Hilder, W.D., III, (1985)	International Offshore Mechanics and Arctic Engineering Symposium, 1987, (1987, 4 vols.) MP 2189
system. Yen, YC., [1984, p.305-325] MP 1727	p.549-579 ₃ MP 2001	Effect of ice-flor size on propelies torque in skip-model tests.
lce cover melting in a shallow river. Calkins, D.J., 1984, p.255-265 ₂ MP 1763	Role of plastic ice interaction in marginal ice zone dynamics. Leppkranta, M., et al. [1985, p.11,899-11,909]	Tatmelaux, J.C., (1987, p.291-298) MP 2309
Ice deterioration. Ashton, G D., 1984, p.31-71	MP 1544	DOD firsting ice problems. Cos., G F.N., (1987, p.151- 154) MP 2414
MP 1791	lee interaction with the U.S. Army ribbon bridge Conter- marsh, B.A., [1986, 189.] CR 86-01	Ice conditions along the Obio River, 1972-1965. Game,
Deterioration of floating ice covers. Ashton, G D., 1985, p.177-182 ₁ MP 2122	Coupled ice-mixed layer model for the Greenland Sea.	L.W., (1988, 162p.) SR 88-01 Inventory of ice problem sites and remedial ice control struc-
Chemical solutions to the chemical problem. Minsk, L.D.,	Hossais, M.N., [1986, p.225-260; MP 2143	tures. Perkam, R.E., (1968, 9p.) SR 88-07
[1985, p.238-244] MP 2224 Heat transfer in water over a melting ice sheet. Lunardoni,	Electromagnetic properties of sea see. Koraes, A., et al., [1956, p.57-133] MP 2197	Development of a river ice provs. Totalcloux, J.C., et al., (1918, 26p.; CR 88-69
V.J., (1986, p.227-236; MP 2033	Coupled air-ice-ocean models. Hibler, W.D., III, 11987,	Water quality during winter river navigation seasons. Slet-
MIZEX-a program for mesoscale air-ice-ocean interaction	p.131-137; MP 2412 Growth of EG/AD/S model see in a small tack. Borland,	ten, R.S., (1968, 56p.) SR 88-10
experiments in Arctic marginal see zones. MIZEX bulletin 7, g1986, 88p.; SR 86-03	S.L. (1988, p.47-5); MP 2319	Development of a river sce-peow. Part 2. Takinchon, J.C., (1918, p.44-52) MP 2097
Bubblers and pumps for melting ice Ashton, G D., (1986,	Fractise toughness of wea model ice Bentley, D.L. et al.	Ice control in river harbors and fleeting areas. Perham, R.E.,
p.223-234j MP 2133 Convective heat transfer in water over melting ice sheet.	[1988, p.289-297] MP 2348 Effect of stratigraphy on radar-altimetry data collected over	(1911, 7p.) SR 80-12
Lucardini, V.J., (1986, p.42-51) MP 2600	ice sheets. lezek. K.C., et al. [1988, p.40-4];	Deployment of flooting bridges in see-covered rivers. Mel- loc, M., et al. (1988, 35p.) SR 88-20
Preliminary study of friction between ice and sled runners. Itagaki, K., et al., e1917, p.297-301; MP 2358	MP 2458 Can reliet crevause plumes on antarctic see shelt as reveal a	lee observations on the Allegheny and Monongohela rivers.
International Symposium on Cold Regions Heat Transfer,	history of ice-stream fluctuation. MrcAycal, D.R., et al.	Bdelle, M.A., et el. (1918, 43p.) SR 88-25 Proceedings, (1919, 475p.) SR 89-39
1967, ¿1967, 270p.; MP 2302	[1988, p.77-82] MP 2440 Fracture experiments on freshwater and seea model see.	Models of the mechanical properties of ice. Richter-Menge,
Exothermic cutting of frozen materials. Garfield, D.E., et al., 1987, p.181-183; MP 2264	Bestley, D.L., et al. (1988, 152p.) MP 2502	JA, et al. (1989, p.87-99; MP 2087
On the effect of the 4 C density maximum on melting heat	Profile properties of undeferred first-year sea he. Cos.	Comparative model tests in ice of a Canodian Copy: Guard Re- class sceleralier. Tat nelsus, J.C., et al. (1990, p.31-52)
transfer. Yen, YC., (1918, p.362-367) MP 2302 Flow developers for melting ice—experimental results. Ash-	G F.N., et al. (1918, 57p.) CR 88-13 Ship model testing in level ice: accordence. Taxinidaes, J.C.,	MP 2162
ton, G.D., (1989, p.151-160) MP 2465	(1988, 30p.) Cr 36-15	lee needles Small-scale testing of soils for frost action. Soyumá, I.M.,
Oceanic heat flux to the Fram Strait measured by a deifting	Model study of uplifting see forces: the instrumentation, Zahilansky, L.J., 1988, p.745-748; MP 2467	(1979, p.223-231 ₃ 36P 1309
buoy. Perovich, D.K., et al. (1990, p.291-296) MP 2740	On medeling the energenes of the ridging process. Hopkins,	Soil tests for frost action and water migration. Supresed, J.M., (1979, 17 p.; SR 79-17
Shortwave radiation and open water in models of sea ice	M.A., et al. (1989, p.175-178) 34P 2483	lee medei
decay Perovick, D.K., et al. (1990, p.242-246) MP 2759	Francework for control of dynamic ice breakup by mer regu- lation. Ferrick, M.G., et al. (1989, 14p.) CR 89-12	Elemental analyses of ice crystal modes and aerosals.
See models	Effect of see pressure on marginal see tone dynamics. Plate,	Kunzi, M., (1977, 5p.) SIP 1191 Frant ice formation in turbulent flow. Miller, A., et al.
Structures in ice infested water. Assur, A., (1972, p.93-97) MP 1016	G.M., et al. (1989, p.514-521) MP 2522 Penetration of floating ice sheets with cylindrical indenties.	(1978, p.219-234) MP 1136
Classification and variation of sea ice ridging in the Arctic	Sodia, D.S., et al. (1989, p. 104) MP 2668	fer openings
busse. Hibler, W.D., III., et al. (1974, p.127-144;	Density of natural are accretions related to mondimensional	Lidar detection of leads in Aretic sea fee. Schnell, R.C., et al., (1989, p.530-532). MP 2002.
MP 1022 Remote sensing program required for the AIDJEX model.	icing parameters. Jenes, K.F., (1910), p.477-496 ₁ MP 2705	Lidar-derived particle concentrations in plants from areas
Weeks, W.F., et al. [1974, p.22-44] MP 1000	Cavitating field sea are model. Flate, G.M., et al. (1990).	leads Andreas, E.L., et al., (1990, p.9-12) SeP 2750
Modeling pack ice as a viscous-plastic continuum. Hibler, W.D., III, §1977, p.46-55; MP 1164	p.239-242 ₃ MP 2738 Ice novigation	fer optics Optical properties of salt see. Lane, J W., (1975, p.36)-
Model simulation of near shore see drift, deformation and	Arctic marine navigation and see dynamics summary find-	373 ₁ 34P 854
thickness. Hibier, W.D., III, [1972, p.33-44]	ings. Weeks, W.F., (1973, p.54-99) MP 2274	Modeling of annotropic electromagnetic reflection from sen- see. Golden, K.M., et al., (1990, n.247-294)
thickness. Hilder, W.D., III, £1972, p.33-44 ₁ MP 1010	Third International Symposium on Ice Problems, 1975. Frankenstein, G.E., ed., (1975, 427p.; MP 845.	sec. Golden, K.M., et al., (1990, p.247-294) MP 1328
thickness. Hilter, W.D., III, [1978, p.33-44] MP 1010 Sea ice pressure ridges in the Beautier Sea. Wright, B.D., et al., [1978, p.249-271] MP 1132	Third International Symposium on Ice Problems, 1975. Frankenstein, G.E., ed., (1975, 427p.; MP 845. Icebecaler simulation. Nevel, D.E., (1977, 9p.;	sce. Golden, K.M., et al., [1990, p.247-294] MP 1328 lee and soon optics in the polar occum, P.I. Perovich.
thickness. Hilter, W.D., III, [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfort Sea. Wright, B.D., et al. [1972, p.249-271] Arching of model ice floes at bridge piers. Callins, D.J.,	Third International Symposium on Ice Problems, 1975. Frankenstein, G.E., ed., [1975, 227p. MP 845 Icelecular simulation. Nevel, D.E., [1977, 9p.) CR 77-16	sec. Golden, K.M., et al., (1990, p.247-294) MP 1325 Ice and snow optics in the polar oceans, Pt.1. Perovich, D.K., et al., (1996, p.272-241) MP 2326 Ice and snow optics in the polar oceans, Pt.2. Grenfell, T.C.,
thickness. Hilter, W.D., III, §1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfort Sea. Wright, B.D., et al. §1978, p.249-271] Arching of model ice floes at bridge piers. Callinx, D.J., §1972, p.495-507; MP 1134 lee arching and the drift of pack ice through channels. Sod-	Third International Symposium on Lee Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Icebeaker simulation. Nevel, D.E., (1977, 9p.; CR 77-16. Ice and navigation related sedimentation. Wordbeat, J.L., et al., (1978, p.191-401; MP 1133.	ice. Golden, K.M., et al. (1990, p.247-294) MP 1325 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al. (1996, p.272-241) Ice and snow optics in the polic oceans, Pt.2. General, T.C., et al. (1994, p.242-251) MP 2256
thickness. Hilter, W.D., III, [1978, p.33-44] MP 1010 Sea ice pressure ridges in the Beaufort Sea. Wright, B.D., et al., [1978, p.249-271] Arching of model ice floes at bridge poers. Calkins, D.J., [1978, p.495-507] MP 1134 les arching and the drift of pack see through channels. Sodba, D.S., et al., [1978, p.415-432] MP 1136	Third International Symposium on Ice Problems, 1975. Frankensten, G.E., ed., [1975, 257p. MP 845] Iceleculer simulation. Nevel, D.E., [1977, 9p.] CR 77-16. Ice and navigation related seclimentation. Worlden, J.L., et al., [1978, p.393-403]. Report of the ITTC punction testing in sec., 1978. Frankes-	sec. Golden, K.M., et al., (1990, p.247-294) MP 1325 Ice and snow optics in the polar oceans, Pt.1. Perovich, D.K., et al., (1996, p.272-241) MP 2326 Ice and snow optics in the polar oceans, Pt.2. Grenfell, T.C.,
thickness. Hilter, W.D., III, §1978, p.33-44] MP 1010 Sea ice pressure ridges in the Beaufset Sea. Wright, B.D., et al. §1978, p.249-271] Arching of model ice floes at bridge poers. Callins, D.J., §1978, p.495-507] Ice arching and the drift of pack ice through channels. Sod-hi, D.S., et al. §1978, p.415-412] Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III, et al. §1979, p.293-304]	Third International Symposium on Lee Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Icebeaker simulation. Nevel, D.E., (1977, 9p.; CR 77-16. Ice and navigation related sedimentation. Wordbeat, J.L., et al., (1978, p.191-401; MP 1133.	ice. Golden, K.M., et al., §1990, p.247-294. MP 1328 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al., §1996, p.225-243. Ice and snow optics in the polic oceans, Pt.2. Gerafell, T.C., et al., §1996, p.223-251. Optical properties of sea ice structure. Gow, A.J., §1996, p.244-271. Effects of water and see layers on the scattering properties of
thickness. Hilder, W.D., III, [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1132 Arching of model ice flors at bridge poers. Callium, D.J., [1978, p.495-507] Ice neching and the drift of pack see through channels. Sod. Mp 1134 ht. D.S., et al. [1978, p.415-412] MP 1138 Some results from a linear-viscous model of the Arctic see cover. Hilber, W.D., III, et al. [1979, p.293-304] MP 1241	Third International Symposium on Ice Problems, 1975. Frankenstein, G.E., ed., (1975, 2079.) MP 845 letherakers simulation. Nevel, D.E., (1977, 993) letheraker simulation. Nevel, D.E., (1977, 993) letheraker simulation. Nevel, D.E., (1977, 993) letheraker simulation. Worthers, J.L., et al., (1978, p. 1978-1978) MP 1140 MP 1140 Performance of the St. Marys River see bosons, 1976-77 Perham, R.E., (1978, 1374) CR 78-24	ice. Golden, K.M., et al., §1990, p.247-2943 MP 1328 Ice and snow optics in the police occums, Pt.1. Persolich, D.K., et al., §1996, p.232-2433 Ice and snow optics in the police occums, Pt.2. Gerafell, T.C., et al., §1996, p.242-2533 Optical properties of sea for structure. Gow, A.J., §1996, p.244-2713 MP 2326
thickness. Hilter, W.D., III, §1978, p.33-44] MP 1010 Sea ice pressure ridges in the Beaufset Sea. Wright, B.D., et al. §1978, p.249-271] Arching of model ice floes at bridge poers. Callins, D.J., §1978, p.495-507] Ice arching and the drift of pack ice through channels. Sod-hi, D.S., et al. §1978, p.415-412] Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III, et al. §1979, p.293-304]	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.). MP 845. Icebenker simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Morbbea, J.L., et al., (1978, p.393-803). MP 1133. Report of the HTTC panel on testing in sec, 1975. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140. Performance of the St. Marys River see bosons, 1976-77. Perham, R.E., (1978, 13p.). Recal-up dates for the Vision River, Pt.1. Rampart to White-	ice. Golden, K.M., et al., §1990, p.247-294. MP 1328 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al., §1996, p.225-243. Ice and snow optics in the polic oceans, Pt.2. Gerafell, T.C., et al., §1996, p.225-251. Optical properties of sea ice structure. Gow., A.J., §1996, p.244-271. Effects of water and see layers on the scattering properties of define reflectors. Jerek, K.C., et al., §1917, p.5143- 5147. Two-stream imultilayer, spectral radiance transfer model for
thickness. Hilder, W.D., III, [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1132 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507) MP 1134 lee neching and the drift of pack ice through chaenets. Sodies, D.S., et al. [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III, et al. [1979, p.293-304] MP 1241 Numerical modeling of sea ice in the seasonal sea we rose. Hilber, W.D., III, [1980, p.299-356] MP 1296 Some promising trends in ice mechanics. Assum, A., [1980,	Third International Symposium on Ice Problems, 1975. Frankenstein, G.E., ed., [1975, 2579. MP 845] Iceleculer simulation. Nevel, D.E., [1977, 9p.] Iceleculer simulation. Nevel, D.E., [1977, 9p.] CR 77-16. Ice and nassignism related seclimentation. Worthers, J.L., et al., [1978, p.39)-403] MP 1333. Report of the IITC panel on testing in sec., 1978. Frankenstein, G.E., et al., [1978, p.157-179] MP 1340. Performance of the St. Marys River sec bosons, 1976-77. Perham, R.E., [1978, 13p.] CR 78-24. Break-up dates for the Yukon River, Pt. I. Ramquetto White-bosic, 1896-1978. Stephens, C.A., et al., [1979, c50.]	ice. Golden, K.M., et al. (1998, p.247-294) MP 1328 Ice and snow optics in the polic occurs, Pt.1. Persolch, D.K., et al. (1994, p.232-241) Ice and snow optics in the polic occurs, Pt.2. Geriddi, T.C., et al. (1994, p.232-251) Oynical properties of sea fee structure. Gow, A.J., (1996, p.244-271) Effects of water and see layers on the scattering properties of define reflections. Jerek, K.C., et al., (1917, p.514)-5147 Two-stream multilayer, spectral radiance transfer model for sea see. Personch, D.K., (1999, 17p.) CR 89-18
thickness. Hiller, W.D., III, [1978, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfact Sea. Wright, B.D., et al. [1978, p.249-271] MP 1132 Arching of model ice floes at bridge peers. Callans, D.J., [1978, p.455-507] Ice arching and the drift of pack see through channels. Sod. hs. D.S., et al. [1978, p.415-42] MP 1134 Some results from a linear-viscous model of the Archic see cover. Hiller, W.D., III, et al. [1979, p.293-304] Numerical modeling of sea ice in the seasonal sea we rose Haller, W.D., III, [1940, p.293-354] Some promising trends in see mechanics. Assur, A., [1940, p.1356] MP 1300	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Icebenker simulation. Nevel, D.E., (1977, 9p.) Ice and manipation related sedimentation. Wordben, J.L., et al., (1978, p.193-80); MP 1133. Report of the HTTC panel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.197-175). MP 1140. Performance of the St. Marya River see bosons, 1976-77. Ferham, R.E., (1978, 1)p.; CR 78-24. Betal-op dates for the Vision River, Pt. I. Rampart to Whenchesic, 1896-1978. Stephens, C.A., et al., (1979, e50. Investigation of see deflection on the USCG serbessier Polar	ice. Golden, K.M., et al., §1990, p.247-294. MP 1328 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al., §1996, p.223-245] Ice and snow optics in the polic oceans, Pt.2. Genefili, T.C., et al., §1996, p.223-251] Optical properties of sea let structure. Gow, A.J., §1996, p.244-271] Effects of water and see layers on the scattering properties of define reflectors. Jerek, K.C., et al., §1917, p.5143- 5147] Two-stream multilayer, spectral radiance transfer model for sea nee. Personick, D.K., §1999, §17p.; Theoretical estimates of light reflection and transmission by syntally subsempersons and temporally surpling nee covers.
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfort Sea. Wright, B.D., et al. [1978, p.249-271] Arching of model ice floes at bridge poers. Calkins, D.J., [1972, p.455-507] Ice arching and the drift of pack see through chaenets. Sodba, D.S., et al. [1978, p.415-412] MP 1134 Some results from a linear-viscours model of the Arctic see cover. Hilbler, W.D., III., et al. [1979, p.293-304] MP 1241 Numerical modeling of sea ice in the seasonal sea are rose, Haller, W.D., III., [1980, p.293-356] Some promising trends in see mechanics. Assum A., [1980, p.1-15] MP 1300 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al. [1981, p.867-872]	Third International Symposium on Inc. Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Inchesiler simulation. Nevel, D.E., (1977, 9p.; CR 77-16. Inc. and nassipation related sedimentation. Workbea, J.L., et al., (1978, p.39)-803; MP 1133. Report of the ITTC purel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140. Performance of the St. Marys Rever see bosons, 1976-77. Perham, R.E., (1979, 13p.; British Perham, R.E., (1978, 13p.; British Perham, C.A., et al., (1979, co.) Cavero, MP 1317. Explanation of see deflectors on the USCG serbecular stolar Vance, G.P., (1980, 77p.; S.R. 8048. Star. Vance, G.P., (1980, 77p.; S.R. 8048. Star. Vance, G.P., (1980, 77p.;	see. Golden, K.M., et al., [1996, p.247-294] MP 1325 lee and snow optics in the polar oceans, Pt.1. Personich, D.K., et al., [1996, p.232-245] MP 2326 lee and snow optics in the polar oceans, Pt.2. Gerafeli, T.C., et al., [1996, p.242-251] Optical properties of sea lee structure. Goor, A.J., [1996, p.244-271] MP 2326 Effects of water and see layers on the scattering properties of define reflectors. Ferch, K.C., et al., [1917, p.514)- 5147] Two-stream multilayer, spectral radiances transfer model for sea new Personich, D.K., [1999, 1792 Theoretical estimates of light reflection and transmission by syntally inhomogeneous and temporally surplus use covers, Personich, D.K., [1990, p.45-69] MP 2329
thickness. Hiller, W.D., III., [1978, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfact Sea. Wright, B.D., et al., [1978, p.249-271] Arching of model ice floes at bridge peers. Callins, D.J., (1978, p.455-507] Ice arching and the drift of pack see through channels. Sodba, D.S., et al., [1978, p.415-42] Nome results from a linear-viscous model of the Arctic see cover. Hiller, W.D., III., et al., [1979, p.293-304] Numerical modeling of sea ice in the seasonal sea we rose. Hiller, W.D., III., [1980, p.299-356] Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1300 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-875] MP 1456	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 848 letheraker simulation. Nevel, D.E., (1977, 9p.) Let and navigation related sedimentation. Wordben, J.L., et al., (1978, p.193-80); MP 1133. Report of the HTC pixel on testing in sec. 1978. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140. Performance of the St. Marys River sec. bosons, 1976-77. Ferham, R.E., (1978, 1)5p.; CR 78-24. Retail-op dates for the Vishon River, Pt. I. Rampart to White-boson, 1896-1978. Seephens, C.A., et al., (1979, eto. lexico). Linearismo of sec deflections on the USCG serbessiae Adar Star. Vance, G.P., (1980, 37p.). SR 86-64. Cost of sec damage to shorefine structures domag navigation. Care, K.L., (1980, 37p.). SR 86-22.	ice. Golden, K.M., et al., §1990, p.247-294. MP 1328 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al., §1996, p.223-245] Ice and snow optics in the polic oceans, Pt.2. Genefili, T.C., et al., §1996, p.223-251] Optical properties of sea let structure. Gow, A.J., §1996, p.244-271] Effects of water and see layers on the scattering properties of define reflectors. Jerek, K.C., et al., §1917, p.5143- 5147] Two-stream multilayer, spectral radiance transfer model for sea nee. Personick, D.K., §1999, §17p.; Theoretical estimates of light reflection and transmission by syntally subsempersons and temporally surpling nee covers.
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfort Sea. Wright, B.D., et al., [1978, p.249-271] Arching of model ice floes at bridge poers. Calkins, D.J., [1972, p.455-507] MP 1134 Ice arching and the drift of pack see through chaenets. Sodbab, D.S., et al., [1978, p.415-412] MP 1136 Some results from a linear-viscours model of the Arctic see cover. Hilbler, W.D., III., et al., [1979, p.293-304] MP 1241 Numerical modeling of sea ice in the seasonal sea are rose. Hilbler, W.D., III., [1980, p.293-356] Some promising trends in see mechanics. Assum, A., [1980, p.1-15] MP 1300 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-872] Numerical solutions for a rigid-see model of secondary frost beave. O'Neell, R., et al., [1982, 1193] CR 82-13.	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Inchender simulation. Nevel, D.E., (1977, 9p.) Ice and nassiption related sedimentation. Wordbea, J.L., et al., (1978, p.393-03); MP 1133. Report of the HTTC pixel on testing in sec, 1978. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140. Performance of the St. Marys River see bosons, 1976-77. Perham, R. E., (1978, 13p.). GR 78-24. Retail-up dates for the Vislon River, Pt. I. Rampart to White-bosic, 1896-1978. Stephens, C.A., et al., (1979, c)0. [Carvel]. MP 1317. Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.). SR 88-04. Cost of see damage to shorefine structures during navigation. Carey, K.L., (1980, 33p.). Ice inhoratory technicas for solving see problems. SR 80-22. Ice inhoratory technicas for solving see problems. MP 1301.	see. Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and snow optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.232-245) De Cand snow optics in the polar oceans, Pt.2. Gerafeli, T.C., et al. (1994, p.242-251) Optical properties of sea let structure. Goss, A.J. (1996, p.244-271) Effects of water and see layers on the scattering properties of define reflectors. Jerek, K.C., et al. (1997, p.514)- 5147; Tuo-stream multilayer, specific radiances transfer model for sea see. Personick, D.K., (1999, 1792) Theoremial estimates of light reflection and transmission by syntally inhomogeneous and temporally surplus excesser. Personich, D.K., (1990, p.85-20) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.9557-9547) MP 2781 Ice override
thickness. Hiller, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beaufiert Sen. Wright, B.D., et al., [1978, p.239-271] MP 1132, Arching of model (see floes at bridge poers. Calkins, D.J., [1978, p.495-507] Ice arching and the drift of pack see through channels. Sodies arching and the drift of pack see through channels. Sodies residts from a linear-viscous model of the Arctic see cover. Hilber, W.D., III., et al., [1979, p.293-304] MP 1241 Numerical modeling of sea ice in the seasonal sea we rose Halter, W.D., III., [1980, p.299-356] MP 1296 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1300 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.567-878] MP 1458 Numerical solutions for a rigid-see model of secondary frost heave. O'Neell, K., et al., [1982, 1193] On modeling the Wieldell Sea pack see. Hilber, W.D., III.,	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 848 letheraker simulation. Nevel, D.E., (1977, 9p.) Let and assignment related sedimentation. Wordbea, J.L., et al., (1978, p.193-803). MP 1133 Report of the HTC pixel on testing in sec. 1978. Frankenstein, G.E., et al., (1978, p.197-175). MP 1140 Performance of the St. Marys River sec bosons, 1976-77 Ferham, R.E., (1978, 1)57-175. CR 78-24 Recal-op dates for the Vishon River, Pt. I. Rampart to White-boson, 1896-1978. Seephens, C.A., et al., (1970, etc. lexico). Linearing of sec deflections on the USCG sectional Services of the damage in shortering structures during analysisms. Care, K.L., (1980, 17p.). SR 80-22 let inboratory furnitures during analysisms. Care, K.L., (1980, 17p.). SR 80-22 let inboratory furnitures during surgamon. Care, K.L., (1980, 17p.). SR 80-22 let inboratory furnitures during surgamon. Care, K.E., (1980, 197-10).	ice Golden, K.M., et al. (1998, p.247-294) MP 1328 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al. (1996, p.223-243) Ice and snow optics in the polic oceans, Pt.2. Genefili, T.C., et al. (1996, p.223-253) Optical properties of sea ice structure. Gow., A.J., (1996, p.244-273) Effects of water and see layers on the scattering properties of define reflections. Jerek, K.C., et al. (1997, p.314-5147) Theoretical multilayer, spectral radiance transfer model for sea nee. Personich, D.K., (1999, 17p.) Theoretical estimates of light reflection and transmission by spannily inhomogeneous and temporally surpling see overs. Personich, D.K., (1990, p.85-49) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.9557-9567) MP 2081
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfact Sea. Wright, B.D., et al., [1978, p.249-271] Arching of model ice floes at bridge peers. Calkins, D.J., [1978, p.455-507] Ice arching and the drift of pack see through chaenets. Sodhin, D.S., et al., [1978, p.415-412] MP 1134 Some results from a linear-viscous model of the Archic see cover. Hilder, W.D., III., et al., [1979, p.293-104] Numerical modeling of sea ice in the seasonal sea see rose Habler, W.D., III., [1980, p.293-354] MP 1241 Numerical modeling of sea ice in the seasonal sea see rose Habler, W.D., III., [1980, p.293-354] MP 1240, p.1-152 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-873] MP 1456 Numerical solutions for a rigid-see model of secondary from heave. O'Ne2I, K., et al., [1982, 1183. [The CR 28-13] On modeling the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.125-176]. MP 1549 Application of a numerical sea see model to the East Green-	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Icebenker simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Wordben, J.L., et al., (1978, p.393-803). MP 1133. Report of the HTC purel on testing in sec., 1973. Frankenstein, G.E., et al., (1978, p.393-175). MP 1140. Performance of the St. Marys River see bosons, 1976-77. Perham, R.E., (1978, 1374). Dy.; CR 736-24. Recal-up dates for the Vision River, Pt.1. Rampart to Whenchesic, 1896-1978. Stephens, C.A., et al., (1979, e.50. leaver). MP 1317. Evaluation of see deflections on the USCG sechecides season. SR 80-04. Cost of see damage to shoreful structures during manipalma. Carey, K.L., (1980, 33p.). SR 89-22. Ice laboratory fundates for solving see problems. Frankeisens, G.E., (1980, 33p.). MP 1301. Clearing see-diagoid shapping channels. Vanice, G.P., (1980, 13p.). Modeling hydrologic impacts of matter navigation. Date.	see: Golden, K.M., et al. (1998, p.247-294) MP 1325 Ice and snow optics in the polic oceans, Pt.1. Personich, D.K., et al. (1996, p.227-245) Ice and snow optics in the polic oceans, Pt.2. Gerafeli, T.C., et al. (1996, p.242-251) Optical peoperities of sea ice structure. Gow, A.J. (1996, p.242-251) Effects of water and see layers on the scattering properties of define reflectives. Jerek, R.C., et al. (1997, p.518)-5147; Invostream multilayer, spectral radiances transfer model for sea see. Personich, D.K., (1999, 179) Theoretical estimates of light reflection and transmission by synthally subsempeneous and temporally varying the covers, Personich, D.K., (1990, p.9557-964) Light reflection and transmission by sea see covers. Proscied, D.K., (1990, p.9557-964) Ice override Esperiments on see ride-up and pile-up. South, D.S., et al. (1983, p.266-270) Allaski's Resident See count see role-up and pile-up features.
thickness. Hiller, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beaufiert Sen. Wright, B.D., et al., [1978, p.29-271] MP 1132, Arching of model ice floes at bridge poers. Calkins, D.J., (1978, p.495-507) MP 1134 Ice arching and the drift of pack see through channels. Sodhan, D.S., et al., [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic see cover. Hilber, W.D., III., et al., [1979, p.29-3-504] Numerical modeling of sea ice in the seasonal sea we rose Häher, W.D., III., [1980, p.299-356] MP 1296 Some promising trends in see mechanics. Assur, A., [1990, p.1-15] MP 1296 Some promising trends in see mechanics. Assur, A., [1990, p.1-15] MP 1296 Some promising trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.367-878] MP 1456 Numerical solutions for a rigid-see model of secondary frost heave. O'Nell, K., et al., [1982, 11p.) CR 82-10 Application of a numerical sea see model to the East Greenland area. Tucker, W.B., [1982, 40p.) Application of a numerical sea see model to the East Greenland area. Tucker, W.B., [1982, 40p.) CR 82-16	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 848 letheraker simulation. Nevel, D.E., (1977, 9p.) Let and navigation related sedimentation. Wordbea, J.L., et al., (1978, p.193-803). MP 1133 Report of the HTC puted on testing in sec. 1978. Frankenstein, G.E., et al., (1978, p.197-175). MP 1140 Performance of the St. Marys River sec bosons, 1976-77. Ferham, R.E., (1978, 1)57-175. CR 78-24 Recal-up dates for the Vision River, Pt. I. Rampart to White-boson, 1986-1978. Seephens, C.A., et al., (1970, etc.) lexics. Evaluation of sec deflections on the USCG sechecides Adar Star. Vance, G.P., (1980, 37p.). SR 80-04 Cost of see damage to shorethe structures during navigation. Care, St. L., (1980, 37p.). SR 80-02 Let inboratory furnities for solving see problems. Frankensen, G.E., (1910, p.93-103). MP 1301 Cleaning see-diagged shapping channels. Vance, G.P., (1980, 13p.). CR 80-28 Modeling hydrologic impacts of smiter navigation. Day, S.F., et al., (1981, p. 1073-1080). MP 1445	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.272-241) D.K., et al. (1996, p.272-241) Ice and saom optics in the polar oceans, Pt.2. Genefiel, T.C., et al. (1994, p.242-251) Optical peoperities of sea ice structure. Gow., A.J., (1996, p.244-271) Effects of water and ice layers on the scattering properties of define reflection. Jerek, K.C., et al. (1997, p.514)-5147; Two-stream multilayer, spectral radiance transfer model for sea ice. Personich, D.K., (1999, 17p.) Tho-octical estimates of light reflections and transmission by synthilly inhomogeneous and temporally surying ice covers. Personich, D.K., (1990, p.45-49) Light reflection and transmission by sea ice covers. Personich, D.K., (1990, p.9557-9547) Ice override Esperiments on ice ride-up and pile-up. Sodits, D.S., et al. (1981, p.244-276). MP 1427 Alaska's Periolet Sea coust ice ride-up and pile-up and pile-up and pile-up and pile-up. (P.834-0).
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfact Sea. Wright, B.D., et al., [1973, p.249-271] Arching of model ice floes at bridge poers. Calkins, D.J., [1973, p.455-507] MP 1134 Ice arching and the drift of pack see through chaenets. Sodha, D.S., et al., [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Archic see cover. Hilbler, W.D., III., et al., [1979, p.29-3-304] MP 1241 Numerical modeling of sea ice in the seasonal sea are rose. Hilbler, W.D., III., [1980, p.299-356] MP 1240 Some promising trends in see mechanics. Assum, A., [1980, p.1-15] MP 1300 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-873] Numerical solutions for a rigid-see model of secondary from heave. O'Neell, R., et al., [1982, 1], [1982, 1] On modeling the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.125-130] Application of a numerical sea see model to the East Greenland area. Tucker, W.R., [1982, 60]. CR 82-16 Modeling fluctinations of arctic sea see. Hilber, W.D., III., et al., [1982, p.1514-1523] MP 1579	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845. Icebenker simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Wordben, J.L., et al., (1978, p.393-803). MP 1133. Report of the HTC purel on testing in sec., 1973. Frankenstein, G.E., et al., (1978, p.393-175). MP 1140. Performance of the St. Marys River see bosons, 1976-77. Perham, R.E., (1978, 1374). Dy.; CR 736-24. Recal-up dates for the Vision River, Pt.1. Rampart to Whenchesic, 1896-1978. Stephens, C.A., et al., (1979, e.50. leaver). MP 1317. Evaluation of see deflections on the USCG sechecides season. SR 80-04. Cost of see damage to shoreful structures during manipalma. Carey, K.L., (1980, 33p.). SR 89-22. Ice laboratory fundates for solving see problems. Frankeisens, G.E., (1980, 33p.). MP 1301. Clearing see-diagoid shapping channels. Vanice, G.P., (1980, 13p.). Modeling hydrologic impacts of matter navigation. Date.	ice Golden, K.M., et al. (1998, p.247-294) MP 1325 Ice and snow optics in the police oceans, Pt.1. Personich, D.K., et al. (1996, p.227-245) D.K., et al. (1996, p.227-245) Ice and snow optics in the police oceans, Pt.2. Gerafeli, T.C., et al. (1996, p.247-251) Optical peoperities of sea ice structure. Gow., A.J. (1996, p.248-271) Effects of water and see layers on the scattering properties of define reflectives. Jerek, R.C., et al. (1997, p.518)-5147; Supp. 2001 Tunostream multilayer, spectral radiance transfer model for sea see. Personich, D.K., (1999, 179) Theoretical estimates of light reflection and transmission by synthally inhumogeneous and temporally varying use covers. Personich, D.K., (1990, p.95)7-9547; Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95)7-9547; Ice override Figuriants on see indesiry and pilessys. South, D.S., et al. (1981, p.264-270) Alisala's Reinfert See coust see relevany and pilessy Seatness. A., (1993, 519) Sea see on the Norton Sound and adjacent Bering See coust. Kovace, A., (1993, p.853-464) MP 1407 MP 1407
thickness. Hilder, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1978, p.239-271] MP 1134 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507) Ice neching and the drift of pack see through channels. Sod. MP 1136 No. D.S., et al., [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic see cover. Hilder, W.D., III., et al., [1979, p.293-304] MP 1206 Numerical modeling of sea ice in the seasonal yea we rose Hilder, W.D., III., [1980, p.293-356] MP 1206 Some promising trends in see mechanics. Assur, A., [1980, p.11-15] MP 1206 Some promising trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] MP 1456 Numerical solutions for a rigid-see model of secondary frost heave. O'Nell, K., et al., [1982, 11p] CR 82-10. On modeling the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.125-130] Application of a numerical sea see model to the East Greenland area. Tucker, W.R., [1982, 40p.] Modeling fluctuations of arctic sea see. Hilber, W.D., III., et al., [1982, p.151-152] Numerical simulations of the Weddell Sca pack see. Hilber, W.D., III., et al., [1982, p.151-152] Numerical simulation of the Weddell Sca pack see. Hilber,	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 2079; MP 848] Iceleculer simulation. Nevel, D.E., (1977, 993). CR 77-16. Ice and navigation related sedimentation. Merbhea, J.L., et al., (1972, p.39)-803; MP 3133. Report of the HTC punction testing in sec. 1978. Frankenstein, G.E., et al., (1978, p.157-179). MP 1140. Performance of the St. Marys River sec. bossess, 1976-77. Perfum, R.E., (1973, 1379). CR 78-24. Read-up dates for the Vishon River, Pt. I. Rampart to White-bosse, 1896-1978. Scrphens, C.A., et al., (1970, etc.) Icases. MP 1341. States of sec. dates for the Vishon River, Pt. I. Rampart to White-bosse, 1896-1978. Scrphens, C.A., et al., (1970, etc.) Icases. MP 1341. States of sec. dates of sec. defectors on the USCG secretaries Adar Star. Vance, G.P., (1980, 379). SR 80-94. Cost of see datases a scheecing structures during navigation. Care, K.L., (1980, 379). SR 80-94. Cost of see datases to solving see problems. SR 80-95. (1990, 1991). CR 80-28. MP 1391. CR 80-28. MP 1391. SF, et al., (1981, p. 1073-1080). MP 1345. Ice control at navigation locks. Hamamoto, R., (1981, p. 1088-1095).	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.272-241) D.K., et al. (1996, p.272-241) Ice and saom optics in the polar oceans, Pt.2. Genefiel, T.C., et al. (1994, p.242-251) Optical properties of sea ice structure. Gow., A.J., (1996, p.244-271) Effects of water and ice layers on the scattering properties of define reflection. Jerek, K.C., et al. (1997, p.514)-5147; MP 2291 Townstream multilayer, spectral radiance transfer model for sea ice. Personich, D.K., (1999, 17p.) Theoretical estimates of light reflections and transmission by synthilly inhomogeneous and temporally surying ice concean. Personich, D.K., (1990, p.45-40) Leght reflection and transmission by sea ice concean. Personich, D.K., (1990, p.9557-9547) Ice override. Experiments on ice ride-up and pile-up. Soillit, D.S., et al. (1981), p.264-270; Alaska's Bezifiert Sea coust ice ride-up and pile-up Seatons Seatons, Konaci, A., (1981), 51p.; CR 83-09 Force astiocitical with ice pile-up and pile-up. Soillit, D.S., et al. (1981), p.264-270; Force astiocitical with ice pile-up and pile-up. Soillit, D.S., et al., p. (1981), p.
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfact Sea. Wright, B.D., et al., [1973, p.249-271] Arching of model ice floes at bridge poers. Calkins, D.J., [1973, p.455-507] MP 1134 Ice arching and the drift of pack see through chaenets. Sodha, D.S., et al., [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Archic see cover. Hilbler, W.D., III., et al., [1979, p.29-3-304] MP 1241 Numerical modeling of sea ice in the seasonal sea are rose. Hilbler, W.D., III., [1980, p.299-356] MP 1240 Some promising trends in see mechanics. Assum, A., [1980, p.1-15] MP 1300 Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-873] Numerical solutions for a rigid-see model of secondary from heave. O'Neell, R., et al., [1982, 1], [1982, 1] On modeling the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.125-130] Application of a numerical sea see model to the East Greenland area. Tucker, W.R., [1982, 60]. CR 82-16 Modeling fluctinations of arctic sea see. Hilber, W.D., III., et al., [1982, p.1514-1523] MP 1579	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845 lecheculer simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Worbbea, J.L., et al., (1978, p.393-803); MP 1133 Report of the HTTC purel on testing in sec, 1978. Frankenstein, G.E., et al., (1978, p.157-175); MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1978, 1374); MP 1307. Persham, R. E., (1978, 1374); MP 1307. Persham, R. E., (1978, 1374); MP 1317. Persham dates for the Vislon River, Pt. I. Rampart to White-bosic, 1896-1978. Stephens, C.A., et al., (1979, c)0. leaves; MP 1317. Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 37p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 13p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 13p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 13p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 13p.) Evaluation of see deflections on the USCG sechecular Foliar Star. Vance, G.P., (1980, 13p.) Evaluation of sechecular Star. Vance, G.P.,	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.222-245) D.K., et al. (1996, p.222-245) Ice and saom optics in the polar oceans, Pt.2. Gensfell, T.C., et al. (1996, p.242-251) Optical peoperities of sea ice structure. Gows, A.J. (1996, p.242-251) Effects of water and see layers on the scattering properties of define reflectives. Jerek, R.C., et al. (1997, p.514)-5147] Two-stream multilayer, spectral radiance transfer model for sea nee. Personich, D.K., (1999, 17p) Theo-etical estimates of light reflection and transmission by spatially inhumogeneous and temporally varying see covers. Personich, D.K., (1990, p.45-4-5) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.9537-9547) Lee override Figeriments on see ride-up and pile-up. Soffin, D.S., et al. (1993, p.26-276) Allaka's Reinfort Sea coust see ride-up and pile-up features. Kovacs, A., (1993, 53-9) Sea nee on the Norion Somind and adjacent Berng Sea coust. Kovacs, A., (1993, p.84-444) MP 1009 Forces associated with see pile-up and ride-up. Soffin, D.S., et al. (1994, p.374-193) Sheet nee override and pile-up features, Resident Sea.
thickness. Hiller, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1978, p.249-271] MP 1131 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507) MP 1134 lee neching and the drift of pack see through channels. Sod. MP 1136 No. D.S., et al., [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic see cover. Hilder, W.D., III., et al., [1979, p.293-104] MP 1206 Numerical modeling of sea ice in the seasonal yea we rose Hilder, W.D., III., [1980, p.299-356] MP 1206 Some promising trends in see mechanics. Assur, A., [1980, p.11-15] MP 1206 Some promising trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] MP 1456 Numerical solutions for a rigid-see model of secondary frost heave. O'NoEll, K., et al., [1982, 11p] CR 82-13 Application of a numerical sea see model to the East Greenland area. Tucker, W.R., [1982, 20p.] MP 1509 Application of a numerical sea see model to the East Greenland area. Tucker, W.R., [1982, 20p.] CR 82-16 Modeling fluctuations of arctic sea see. Hiller, W.D., III., et al., [1982, p.151-152] Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, p.2873-2887] Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, p.2873-2887] Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, p.2873-2887] Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, p.2873-2887] Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, 1869]. CR 83-17	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 848 Iceleculer simulation. Nevel, D.E., (1977, 9p.) Ice and assignment related sedimentation. Worbben, J.L., et al., (1972, p.)9-103. MP 1133 MP 1133 MP 1133 MP 1133 MP 1133 MP 1134 MP 1135 MP 1135 MP 1135 MP 1135 MP 1135 MP 1136 MP 1137 MP 1136 MP 1137 MP 1138 MP 1138 MP 1138 MP 1138 MP 1138 MP 1138 MP 1139	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.272-241) D.K., et al. (1996, p.272-241) Ice and saom optics in the polar oceans, Pt.2. Genefiel, T.C., et al. (1994, p.242-251) Optical peoperities of sea ice structure. Gow., A.J., (1996, p.244-271) Effects of water and ice layers on the scattering properties of define reflection. Jerek, K.C., et al. (1997, p.514)-5147. Two-stream multilayer, spectral radiance transfer model for sea ice. Personich, D.K., (1999, 17p.) Thosetical estimates of light reflections and transmission by synthilly inhumogeneous and temporally surying ice coners. Personich, D.K., (1990, p.45-40) Light reflection and transmission by sea ice coners. Personich, D.K., (1990, p.45-40) Lee override Experiments on ice ride-up and pile-up. Sodits, D.S., et al. (1981, p.264-270) Alaska's Bezifiert Sea coust ice ride-up and pile-up. Sea coner. Kowaca, A., (1981, p.54-464) Sea ice on the Norton Sound and adjucent Bering Sea coner. Kowaca, A., (1981, p.564-464) Force associated with ice pile-up and ride-up. Sodits, D.S., et al. (1984, p.249-20) Shore ice override and pile-up features, Besslow, Sodie, D.S., et al. (1984, p.249-20) Shore ice override and pile-up features, Besslow, Sealor, A., (1984, 23) over ice. CR 88-36.
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1973, p.249-271] MP 1132 Arching of model ice floes at bridge poers. Callains, D.J., (1972, p.459-507) Ice arching and the drift of pack ice through channels. Sodies, D.S., et al., [1973, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III., et al., [1979, p.29-3-304] MP 1241 Numerical modeling of sen ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-356] MP 1246 Numerical modeling of sea ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] Preliminary results of ice modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.367-872] MP 1458 Numerical solutions for a rigid-ice model of secondary frost heave. O'Neill, K., et al., [1982, 1193] On modeling the Weddell Sea pack ice. Hilber, W.D., III., et al., [1982, p.151-1519] Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1982, 049] Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1982, 049] MP 1579 Numerical summitation of the Weddell Sea pack ice. Hilber, W.D., III., et al., [1982, p.151-1523] Numerical summitation of the Weddell Sea pack ice. Hilber, W.D., III., et al., [1982, p.1873-2887] MP 1592 Sea ice model in wind forcing fields. Tucker, W.B., [1983, 1783-178] First-generation model of ice determoration. Addoor. O.	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845 Inchenker simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Wordbea, J.L., et al., (1978, p.393-803). MP 1133 Report of the HTTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.357-175). MP 1140 Performance of the St. Marys River see bosons, 1976-77 Perham, R.E., (1978, p.37). MP 130-77 Perham, R.E., (1978, p.37). MP 130-77 Perham, R.E., (1978, p.37). MP 130-77 Perham, R.E., (1978, p.37). SR 80-80 Resaloop dates for the Vislon River, Pt. I. Rampart to White-bosic, 1396-1378. Stephens, C.A., et al., (1970, c)0 lexics; MP 1317 Evaluation of see deflectors on the USCG stehender folia- Star. Vance, G.P., (1980, 37p.). SR 80-80. Cest of see damage to shorefule structures during navigation. Carej, K.L., (1980, 33p.) Ice inhoratory facilities for solving see problems. Frankeistein, G.E., (1980, p.85-103). MP 1300 Clearing see-degged shapping channels. Vance, G.P., (1980, 13p.) Melistic, p. (1981, p. 1073-1080). MP 1305. In control at navigation locks. Hamamoto, R., (1981, p.1098-1095). MP 1408 lice control arrangement for winter mavigation. Perham, R.E., (1981, p.1098-1104). MP 1408 R.E., (1981, p.1098-1104). MP 1409 Histrania model study of Port Hurson are control structure. Callans, D.J., et al., (1992, 59p.). CR 82-34 Marginal lee Jone Experiment, Fram Stran Geregoind Sea.	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.222-245) D.K., et al. (1996, p.222-245) Ice and saom optics in the polar oceans, Pt.2. Gensfell, T.C., et al. (1996, p.242-251) Optical peoperities of sea ice structure. Gows, A.J. (1996, p.242-251) Effects of water and see layers on the scattering properties of define reflectives. Jerek, R.C., et al. (1997, p.514)-5147] Two-stream multilayer, spectral radiance transfer model for sea nee. Personich, D.K., (1999, 17p) Theo-etical estimates of light reflection and transmission by spatially inhumogeneous and temporally varying see covers. Personich, D.K., (1990, p.45-4-5) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.9537-9547) Lee override Figeriments on see ride-up and pile-up. Soffin, D.S., et al. (1993, p.26-276) Allaka's Reinfort Sea coust see ride-up and pile-up features. Kovacs, A., (1993, 53-9) Sea nee on the Norion Somind and adjacent Berng Sea coust. Kovacs, A., (1993, p.84-444) MP 1009 Forces associated with see pile-up and ride-up. Soffin, D.S., et al. (1994, p.374-193) Sheet nee override and pile-up features, Resident Sea.
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1973, p.239-271] MP 1132 Arching of model ice floes at bridge poers. Callams, D.J., (1973, p.495-507) Ice necking and the drift of pack see through chaenets. Sodies, D.J., et al., [1973, p.415-412] MP 1134 Some results from a hinest-viscous model of the Arctic see cover. Hilber, W.D., III., et al., [1979, p.29-1-104] Numerical modeling of sea ice in the seasonal sea see rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Numerical modeling of sea ice in the seasonal sea see rose. Hilber, W.D., III., [1980, p.299-356] Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1240 Some promising trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-875] MP 1340 Numerical solutions for a rigid-see model of secondary frost leave. O'Neil, K., et al., [1982, 11p.; CR 82-13] On modeling the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, p.135-110] Mp 1540 Application of a sumicrical sea see model to the East Greenland area. Tocker, W.B., [1982, 40p.; CR 82-13] Mp 1540 Numerical somilation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.1373-283] Numerical somilation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.2873-2837] Sea ice model in wind forcing fields. Tucker, W.B., [1981, 11p.] CR 83-17 First-generation model of see determention. Abston. G. D., [1983, p.2373-283] MP 2000 MP 2000	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.) MP 845 Inchenker simulations. Nevel, D.E., (1977, 9p.) Inchenker simulations. Nevel, D.E., (1977, 9p.) Inc. and nassipation related sedimentation. Morbbea, J.L., et al., (1978, p.39)-803. MP 1133 Report of the HTTC purel on testing in sec, 1978. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140 Performance of the St. Marys River sec bosons, 1976-77 Persham, R. E., (1978, 13p.) Retail-up dates for the Vishon River, Pt. I. Rampart to White-hoise, 1896-1978. Stephens, C.A., et al., (1979, c5). Increase of sec deflectors on the USCG sechecular Polar Star. Vance, G.P., (1980, 37p.) Evaluation of sec deflectors on the USCG sechecular Polar Star. Vance, G.P., (1980, 33p.) Ice laboratory facilities the solving see problems. SR 80-22 Ice laboratory facilities for solving see problems. MP 1301. Cleaning see-degged shopping channels. Vance, G.P., (1980, 13p.) Modeling hydrologic impacts of winter nassignmen. Day, S.F., et al., (1981, p.1073-1086). MP 1446 Ice control arrangement for winter nassignmen. Perham, R.E., (1981, p.1094-1107). MP 1449 Hydrania model strady of Port Huron see control structure Callinn, D.J., et al., (1982, 349). Marginal Ice Jone Experiment, Fram Strain Greenond Sea, 1983. Johannessen, O.M., ed., (1983, 47p.) S.R. 83-12.	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the police oceans, Pt.1. Personich, D.K., et al. (1996, p.272-241) D.K., et al. (1996, p.272-241) Ice and saom optics in the police oceans, Pt.2. Genefiel, T.C., et al. (1996, p.242-251) Optical peoperium of sea ice structure. Gow., A.J., (1992, p.244-271) Effects of water and ice layers on the scattering properties of define reflection. Jerek, K.C., et al. (1997, p.514)-5147. Two-stream multilayer, spectral radiance transfer model for sea ice. Personich, D.K., (1999, 17p.) Thosetical estimates of light reflections and transmission by synthilly inhumogeneous and temporally surying ice onesis. Personich, D.K., (1990, p.45-49) Light reflection and transmission by sea ice covers. Personich, D.K., (1990, p.9557-9547) Ice override Experiments on ice ride-up and pile-up. Sodits, D.S., et al. (1981, p.264-276) Alaska's Bezifiert Sea coust ice ride-up and pile-up. CR 83-49 Sea ice on the Norton Sound and adjucent Bering Sea coust. Konaci, A., (1991, 515), 5153 Sheet ice override and pile-up sad ride-up. Sodits, D.S., et al. (1982, p.248-263) Shoet ice override and pile-up features, Besifier, Sea. Konaci, A., (1994, 23), 240, 251 Oustbert ice pile-up and override. Konaci, A., et al. (1982, p. 190-142) Ice physics.
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sea ice pressure ridges in the Beamfort Sea. Wright, B.D., et al., [1973, p.249-271] MP 1132 Arching of model ice floes at bridge poers. Callans, D.J., [1972, p.459-507] Ice arching and the drift of pack ice through channels. Solub., D.S., et al., [1973, p.415-412] MP 1134 Some results from a linear-viscous model of the Arche ice cover. Hilber, W.D., III., et al., [1979, p.29-3-504] Numerical modeling of sea ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-3-50] MP 1240 Numerical modeling of sea ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-3-50] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] Preliminary results of ice modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-872] Numerical solutions for a rigid-ice model of secondary frost heave. O'Neill, K., et al., [1982, 11p.] CR 82-13 On modeling the Weddell Sea pack ice. Hilber, W.D., III., et al., [1982, p.215-100] Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., et al., [1982, 40p.] Roseling fluctuations of arctis era see. Hilber, W.D., III., et al., [1982, p.215-253] NP 1579 Numerical sumulation of the Weddell Sea pack ice. Hilber, W.D., III., et al., [1981, p.287-283] MP 1992 Sea ice model in wind foreing fields. Tucker, W.B., [118, p. 119, p. 119, p. 117, p. 119, p.	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845 lecheraker simulation. Nevel, D.E., (1977, 9p.) Lec and navigation related sedimentation. Wordben, J.L., et al., (1978, p.193-803). MP 1133 Report of the HTC purel on testing in sec., 1973. Frankenstein, G.E., et al., (1978, p.197-175). MP 1140-185. Mp 1140-1878. p.197-175. MP 1140-1878. Persham, R.E., (1978, p.197-175). MP 1140-1878. Stephens, C.A., et al., (1979, e.50 leaver). MP 1317. Persham, R.E., (1978, p.197-187). MP 1317. Persham, R.E., (1978, p.197-187). MP 1317. Persham, R.E., (1978, p.197-187). MP 1317. MP 1340-1878. Stephens, C.A., et al., (1979, e.50 leaver). MP 1317. Standards of see deflections on the USCG sechecolar stear. Get. (1980, 37p.). SR 80-04. Cost of see demage to shortene structures during navigation. Carey, K.L., (1980, 33p.). SR 80-02. Ice laboratory furnitures for solving neighbor stears, G.E., (1980, 33p.). MP 1340. Carey, K.L., (1980, 33p.). SR 80-02. Ice laboratory furnitures for solving see problems. Frankeisens, G.E., (1981, p.1013-10160). MP 1345. Ice control at navigation locks. Hammota, R., (1981, p.1033-1004). MP 1346. Ice control at navigation locks. Hammota, R., (1981, p.1033-1004). MP 1346. Ice control at navigation locks. Hammota, R., (1981, p.1033-1004). MP 1349. Ice control at navigation locks. Hammota, R., (1981, p.1033-1004). MP 1349. MP 1349. Mp 1340. Ice control at navigation locks. Hammota, R., (1981, p.1033-1004). MP 1349. MP 1349. Mp 1340. Ice control at navigation locks. Hammota, R., (1981, p.1033-1004). MP 1349. MP 1349. Mp 1349. Johannessen, O.M., ed., (1983, 47p.). SR 83-12. Methods of see control. Frankenstein, G.E., et al., (1981). SR 83-12. Methods of see control. Frankenstein, G.E., et al., (1981).	sec. Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and snow optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.222-245) D.K., et al. (1996, p.222-245) Ice and snow optics in the polar oceans, Pt.2. Gerafeli, T.C., et al. (1996, p.242-251) Optical peoperities of sea ice structure. Gow., A.J., (1996, p.242-251) Effects of unter and see layers on the scattering properties of define reflectors. Jerek, K.C., et al. (1997, p.516)-5147] Thousteram multilayer, spectral radiances transfer model for sea see. Personich, D.K., (1999, 179) Theoretical estimates of light reflection and transmission by synthly inhomogeneous and temporally varying see covers. Personich, D.K., (1990, p.9557-967) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.9557-967) MP 2081 Ite override Esperiments on see redesig and pilesig. Soulla, D.S., et al. (1981, p.204-270) Aliska's Bezufiert Sea coost see relesig and pilesig Seators on the Norton Sound and adjacent Bering Sea cost. Konacs, A., (1981, 5193) Sea see on the Norton Sound and adjacent Bering Sea cost. Konacs, A., (1984, p.259, o. map; CR 83-89 From the Seaton Sound and adjacent Bering Sea cost. Konacs, A., (1984, p.259, o. map; CR 83-80 Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259, o. map; CR 83-80 Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259, o. map; CR 83-80 Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259, o. map; CR 83-80 Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259, o. map; CR 83-80 Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259, o. map; CR 83-80 Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259) Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984, p.259) Dishort see pilesig and override. Konacs, A., et al. (1984, p. 1984,
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1973, p.249-271] MP 1132 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507] Ice necking and the drift of pack ice through chaenets. Sodies, D.J., et al., [1973, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III., et al., [1979, p.29-1-104] Numerical modeling of sen ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Numerical modeling of sea ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] MP 1240 Some promising trends in ice modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost leave. O'Neel, K., et al., [1981, p.867-878] Numerical solutions for a rigid-see model to the East Greenland area. Tucker, W.B., et al., [1982, 113-] CR 82-13 On modeling the Weelded Sea pack see. Hilber, W.D., III., et al., [1982, p.151-152] Mp 1540 Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1982, 40p.] Mp 1540 Mp 1540 Numerical somilation of the Weelded Sea pack see. Hilber, W.D., III., et al., [1983, p.287-2887] Sea ice model in wind forcing fields. Tucker, W.B., [1983, p.1992, 113-1520] Mp 2001 Let ensitance tests on two models of the WTGB secheraker Tarmellant, J.C., et al., [1984, p.827-418] MP 1716	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.) MP 845 Inchenker simulation. Nevel, D.E., (1977, 9p.) Inchenker simulation. Nevel, D.E., (1977, 9p.) Inchenker simulation. Nevel, D.E., (1977, 9p.) Inchenker simulation. Neurobea, J.L., et al., (1978, p.193-803) Report of the ITTC purel on testing in sec, 1978. Frankenstein, G.E., et al., (1978, p.157-175) MP 1103 Performance of the St. Marys River sec bosons, 1978-77 Perham, R. E., (1978, 137s.) Perham, R. E., (1978, 137s.) Recaloup dates for the Vislon River, Pt. I. Rampart to White-bosis, 1898-1978. Stephens, C.A., et al., (1979, c)0. Increased a fact of deflectors on the USCG sechecular Policy. Star. Vance, G.P., (1980, 37p.) Inc. Inhoratory deflects for solving see problems. SR 80-82. Inc. Inhoratory technical for solving see problems. SR 80-82. Inc. Inhor	ice Golden, K.M., et al. (1996, p.247-294) MP 1325 Ice and saom optics in the police oceans, Pt.1. Personich, D.K., et al. (1996, p.272-241) D.K., et al. (1996, p.272-241) Ice and saom optics in the police oceans, Pt.2. Genefiel, T.C., et al. (1996, p.242-251) Optical peoperium of sea ice structure. Gow., A.J., (1992, p.244-271) Effects of water and ice layers on the scattering properties of define reflection. Jerek, K.C., et al. (1997, p.514)-5147. Two-stream multilayer, spectral radiance transfer model for sea ice. Personich, D.K., (1999, 17p.) Thosetical estimates of light reflections and transmission by synthilly inhumogeneous and temporally surying ice onesis. Personich, D.K., (1990, p.45-49) Light reflection and transmission by sea ice covers. Personich, D.K., (1990, p.9557-9547) Ice override Experiments on ice ride-up and pile-up. Sodits, D.S., et al. (1981, p.264-276) Alaska's Bezifiert Sea coust ice ride-up and pile-up. CR 83-49 Sea ice on the Norton Sound and adjucent Bering Sea coust. Konaci, A., (1991, 515), 5153 Sheet ice override and pile-up sad ride-up. Sodits, D.S., et al. (1982, p.248-263) Shoet ice override and pile-up features, Besifier, Sea. Konaci, A., (1994, 23), 240, 251 Oustbert ice pile-up and override. Konaci, A., et al. (1982, p. 190-142) Ice physics.
thickness. Hiller, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1978, p.249-271] MP 1132 Arching of model ice floes at bridge poers. Calkins, D.J., (1978, p.495-507) Ice arching and the drift of pack see through channels. Sodies, D.J., (1978, p.495-412) MP 1134 Ice arching and the drift of pack see through channels. Sodies, D.J., (1978, p.495-412) MP 1136 Some resides from a linear-viscous model of the Arctic see cover. Hilder, W.D., III., (1980, p.299-356) MP 1241 Numerical modeling of sea ice in the seasonal sea we rose Hilder, W.D., III., (1980, p.299-356) MP 1296 Some promising trends in see mechanics. Assur, A., (1980, p.1-15) Preliminary resolts of see modeling in the East Greenland area. Tucker, W.B., et al., (1981, p.367-373) MP 1456 Numerical solutions for a rigid-see model of secondary frost heave. O'Neill, K., et al., (1982, 1193) MP 1456 Numerical solutions for a rigid-see model of secondary frost heave. O'Neill, K., et al., (1982, 1193) Application of a numerical sea see model to the East Greenland area. Tucker, W.R., (1982, 2094) Mp 1599 Application of a numerical sea see model to the East Greenland area. Tucker, W.R., (1982, 2094) Mp 1599 Nomerical summitation of the Weddell Sea pack see. Hilber, W.D., III., et al., (1982, p.154-1523) Mp 1597 Sea ice model in unid foreing fields. Tucker, W.R., (1983, p.273-2781) MP 2001 MP 2001 MP 2001 MP 2001 Calkins, D.J., (1983, p.273-2781) MP 2001 Let resistance tots on two models of the WTGB sechesiker Tannelsins, J.C., et al., (1984, p.273-6)31 MP 1716 Modeling the marginal see rose. Hilber, W.D., III., ed.	Third International Symposium on Lice Problems, 1975. Frankenstein, G.E., ed., (1975, 2079; MP 345. Icelevaler simulation. Nevel, D.E., (1977, 99). Ice and navigation related sedimentation. Wordben, J.L., et al., (1978, p.193-803); MP 1133. Report of the HTC panel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.197-175); MP 1140. Performance of the St. Marya River are bosons, 1976-77. Perham, R.E., (1978, p.197-175); MP 1140. Performance of the St. Marya River are bosons, 1976-77. Perham, R.E., (1978, p.197-175); MP 1140. Performance of the St. Marya River are bosons, 1976-77. Perham, R.E., (1978, p.197-175); MP 1141. Perham, R.E., (1978, p.197-175); MP 1141. Established dates for the Vishon River, Pt. I. Rampart to White-boson, 1896-1978. Seephens, C.A., et al., (1970, e.50. Icentry. International of the deflections on the USCG serbesolar Polarians. Carey, K.L., (1980, 17p.) SR 86-64. Cost of use damage to a shortene stimutures during navigation. Carey, K.L., (1980, 17p.) SR 86-22. Ice Inboratory Inclines for solving are problems. Frankeisens, G.E., (1980, 198-1). Clearing acco-dogged shapping channels. Vasice, G.P., (1980, 17p.) Clearing acco-dogged shapping channels. Vasice, G.P., (1980, 17p.) Modeling hydrologic impacts of winter navigation. Daty, S.F., et al., (1981, p.1073-1080). MP 1445. Ice control arrangement for winter navigation. Perfam, R.E., (1981, p.1094-110). Migrandia model study of Port Huton are control structure Calams, D.J., et al., (1982, 59p.) Migrandia model study of Port Huton are control structure Calams, D.J., et al., (1982, 199). MP 1445. Methods of acc control. Frankenstein, G.E., et al., (1981, p.200-215). MP 1446. MP 2008.	ice Golden, K.M., et al. (1998, p.247-294) MP 1325 Ice and snow optics in the police occumi, Pt.1. Personich, D.K., et al. (1996, p.222-243) D.K., et al. (1996, p.222-243) Ice and snow optics in the police occumi, Pt.2. Gerafeli, T.C., et al. (1996, p.242-251) Optical peoperities of sea ice structure. Gow., A.J. (1996, p.242-271) Effects of water and see layers on the scattering proporties of define reflections. Jerek, R.C., et al. (1997, p.518)-5147] Two-stream multilayer, spectral radiances transfer model for sea see. Personich, D.K., (1999, 179) Two-stream multilayer, spectral radiances transfer model for sea see. Personich, D.K., (1990, p.45-26) Theoretical estimates of light reflection and transmission by synthally subsempersous and temporally surying see conest. Personich, D.K., (1990, p.9557-967) Light reflection and transmission by sea see conest. Pros- sch, D.K., (1990, p.9557-967) Ite override Experiments on see refer-up and pile-up. South, D.S., et al. (1983, p.264-270) Alisala's Reanfort See coust see relevany and pile-up features. Koracs, A., (1983, p.54-464) Sea see on the Norten Sound and adjuscent Bering Sea coust. Koracs, A., (1983, p.54-464) Shore the override and pile-up features, Beaufort Sea. Koracs, A., (1984, 23), p. maq. Onther are pile-up and override. Koracs, A., et al. (1984, p. 104-142) Ice physics Physics of see. Glea, J.W., (1974, 81p.) MP 2036 Magnings on mentatic simbiliance as a mechanism for sea see
thickness. Hiller, W.D., III., [1972, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1973, p.249-271] MP 1132 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507] Ice necking and the drift of pack ice through chaenets. Sodies, D.J., et al., [1973, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III., et al., [1979, p.29-1-104] Numerical modeling of sen ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Numerical modeling of sea ice in the seasonal sea ice rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] MP 1240 Some promising trends in ice mechanics. Assum, A., [1980, p.1-15] MP 1240 Some promising trends in ice modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost leave. O'Neel, K., et al., [1981, p.867-878] Numerical solutions for a rigid-see model to the East Greenland area. Tucker, W.B., et al., [1982, 113-] CR 82-13 On modeling the Weelded Sea pack ice. Hilber, W.D., III., et al., [1982, p.151-152] Mp 1540 Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1982, 40p.] Mp 1540 Mp 1540 Numerical somilation of the Weelded Sea pack ice. Hilber, W.D., III., et al., [1983, p.287-2887] Sea ice model in wind forcing fields. Tucker, W.B., [1983, p.1992, 113-1520] Mp 2001 Let ensitance tests on two models of the WTGB secheraker Tamodism, J.C., et al., [1984, p.827-418] MP 1716	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.) MP 845 Icelevaler simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Wordbea, J.L., et al., (1978, p.393-803) Report of the HTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.371-75) MP 1133 Report of the HTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.371-75) MP 1140 Performance of the St. Marys River see bosons, 1976-77 Perham, R.E., (1978, 1374) Recalong dates for the Vishon River, Pt.1 Ramquirt to White-boson, 1896-1978. Stephens, C.A., et al., (1970, e50, lexic) MP 1317 Evaluation of see deflectors on the USCG sterbesher Jedin Star. Vance, G.P., (1980, 37p.) SR 80-02 Ice laboratory Inclines for solving see problems. Frankenstein, G.E., (1980, 35p.) SR 80-22 Ice laboratory Inclines for solving see problems. Frankenstein, G.E., (1980, 35p.) MP 1340 Clearing see-deaged shapping channels. Vance, G.P., (1980, 13p.) Modeling hydrologic impacts of winter navigation. Day, S.F., et al., (1981, p.1073-1080). MP 1445 Ice control at navigation locks. Hamamoto, R., (1881, p.1084-109). MP 1446 Ice control at navigation locks. Hamamoto, R., (1881, p.1084-109). MP 1447 Marginal Re. John 1004-1107. Mr 1448 Ice control arrangement for winter navigation. Perham, R.E., (1881, p.1084-110). Mr 1449 Marginal Re. John 1004-1107. Mr 1449 Mr 1449 Mr 1449 Mr 1449 Mr 1449 Mr 1449 Mr 1441 Mr 1441 Mr 1441 Mr 1441 Mr 1441 Mr 1442 Mr 1441 Mr 1442 Mr 1444 Mr 1441 Mr 1444	Ice and soom optics in the polic oceans, Pt.1. Personich, D.K., et al., [1996, p.223-261] 30P 2288 Ice and soom optics in the polic oceans, Pt.1. Personich, D.K., et al., [1996, p.223-261] 30P 2288 Ice and soom optics in the polic oceans, Pt.2. Genefiel, T.C., et al., [1996, p.263-251] 30P 2288 Optical peoperium of sea ice structure. Gow., A.J., [1996, p.264-271] 30P 2287 Effects of water and ice layers on the scattering properties of define reflection. Jerek, K.C., et al., [1997, p.5143-5147] 30P 2291 Two-stream multilayer, spectral radiance transfer model for sea ice. Personich, D.K., [1999, 179] CR 89-15 Theoretical estimates of light reflections and transmission by synthally inhumogeneous and temporally surying ice onesis. Personich, D.K., [1990, p.45-49] 30P 2792 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.9557-9567] 30P 2781 Ice overtide. Experiments on ice ride-up and pile-up. Sodits, D.S., et al., [1981, p.264-276] 30P 1647 Alaska's Bezifiert Sea coust ice ride-up and pile-up. Sodits, D.S., et al., [1981, p.264-276] 30P 1647 Alaska's Bezifiert Sea coust ice ride-up and pile-up. Sodits, D.S., et al., [1981, p.264-276] 30P 1647 Shee ice overtide with ice pile-up and ride-up. Sodits, D.S., et al., [1981, p.278-262] Shee ice overtide and pile-up features, Bezifiert Sea Konaci, A., [1981, p.554-664] Dishber ice pile-up and overtide. Konaci, A., et al., [1981, p.101-142] Ice physics Physics of ice. Glex, J.W., [1974, S.1p.] 30P 304 Soom and ice. Colleck, S.C., et al., [1975, p.455-441, 255-447] Supp. 247-247
thickness. Hiller, W.D., III., [1978, p.33-44] Sen ice pressure ridges in the Beaufact Sen. Wright, B.D., et al., [1978, p.249-271] Arching of model ice floes at bridge poers. Callium, D.J., (1978, p.459-507) Ice arching and the drift of pack see through channels. Sodham, D.S., et al., [1978, p.415-412] Some results from a linear-viscous model of the Arctic see cover. Hilber, W.D., III., et al., [1979, p.29-364] Numerical modeling of sea ice in the seasonal sea we rose Hilber, W.D., III., [1980, p.299-356] NP 1294 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] Performinary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.367-878] Numerical solutions for a rigid-see model of secondary frost heave. O'NeEL, K., et al., [1982, 113-1] On modeling the Weddell Sea pack see. Hilber, W.D., III., et al., [1992, p.135-130] Application of a numerical sea see model to the East Greenland area. Tucker, W.B., [1982, 409-1] Modeling fluctinations of arctic sea see. Hilber, W.D., III., et al., [1982, p.1514-1523] Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.1514-1523] Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.1514-1523] Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.154-1523] NP 1980 Some ded in wind forcing fields. Tucker, W.B., [1983, P.176, 1793, p.235-279] MP 2001 Modeling of ice discharge in river models. Callius, D.J., [1983, p.235-279] MP 2001 Modeling the marginal see rose. Hilber, W.D., III., ed., [1984, p.981-9] East Greenland Sea see variability in large-scale model simultaness. Walch, J.E., et al., [1984, p.927-615] MP 1779 East Greenland Sea see variability in large-scale model simultaness. Walch, J.E., et al., [1984, p.927-615] MP 1779	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 2079; MP 845 Rebenker simulation. Nevel, D.E., (1977, 293) Report of the HTC panel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.193-803); MP 1133 Report of the HTC panel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.197-175); MP 1140-8 Performance of the St. Marys River sec bosons, 1978-77 Perham, R.E., (1978, 1)57-1 MP 110-77 Perham, R.E., (1978, 1)57-1 MP 110-78 Recal-op dates for the Vishon River, Pt.I. Rampart to White-bosic, 1896-1978. Stephens, C.A., et al., (1979, e50-1874); MP 110-78 Star-Vance, G.P., (1980, 1791). SR 80-84 Cost of see deflections on the USCG serbeoleet Polar Star-Vance, G.P., (1980, 1792). SR 80-84 Cost of see damage to shorehine stimetures during mirigation. Carey, K.L., (1980, 1792). SR 80-82 (c) theoretical facilities for solving see problems. Frankeisens, G.E., (1980, 9-8)-103-105. MP 110-105. MP 110-10	ice Golden, K.M., et al. (1998, p.247-294) MP 1328 Ice and snow optics in the police oceans, Pt.1. Personich, D.K., et al. (1996, p.227-245) D.K., et al. (1996, p.227-245) Ice and snow optics in the police oceans, Pt.2. Gerafiel, T.C., et al. (1996, p.247-251) Optical peoperities of sea ice structure. Gow., A.J. (1996, p.248-273) Effects of water and see layers on the scattering properties of define reflections. Jerek, R.C., et al. (1997, p.518)-5147] Two-stream multilayer, spectral radiance transfer model for sea nee. Personich, D.K., (1999, 179) Theoretical estimates of light reflection and transmission by synthally inhomogeneous and temporally varying see covers. Personich, D.K., (1990, p.95)7-9547. Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95)7-9547. Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95)7-9547. Light reflection and transmission by sea see covers. Personich, D.K., (1991, p.85)7-9547. MP 238 Light reflection and transmission by sea see covers. Personich, D.K., (1991, p.85)7-9547. Light reflection and transmission by sea see covers. Personich, D.K., (1991, p.85)7-9547. MP 1427 States on the Norton Sound and adjuscent Bering Sea count. Kovace, A., (1991, 51p.) Sea see on the Norton Sound and adjuscent Bering Sea count. Kovace, A., (1991, 25), 453-464. MP 1097 Shore see override and pleup features, Bensfort Sea Kovace, A., (1994, 23), 4 may. CR 83-48 Light, p. 108-1427. MP 2306 Sound and see Collect, S.C., et al., (1975, p.455-441, 475, 417) MP 2306 MP 1379 Grounded see along the Alistkan Bensfor-Sea count. Kovace, A., (1994, S.F., et al., (1974, p.85-94) MP 1379 Grounded see along the Alistkan Bensfor-Sea count. Kovace, Events.
thickness. Hilder, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1134 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507) Ice necking and the drift of pack see through characts. Sod. MP 1134 Ice necking and the drift of pack see through characts. Sod. MP 1136 Some results from a linear-viscous model of the Arctic see cover. Hilder, W.D., III., et al., [1979, p.29-1-104] Numerical modeling of sea ice in the seasonal sea are rosse. Hilder, W.D., III., [1980, p.299-1564] Numerical modeling of sea ice in the seasonal sea are rosse. Hilder, W.D., III., [1980, p.299-1564] MP 1206 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1206 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] Preliminary results of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost heave. O'Noëll, K., et al., [1981, p.187-878] MP 1509 Application of a numerical sea neemodel to the East Greenland area. Tucker, W.B., [1982, 109]. CR 82-10 Modeling fluctinations of arctic sea see. Hilber, W.D., III., et al., [1982, p.151-152); Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.151-152); Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.253-259] Sea ice model in wind forcing fields. Tucker, W.B., [1981, p.253-279] MP 1200 Modeling of ice discharge in river models. Callans, D.J., [1983, p.253-279] MP 1200 Modeling of ice discharge in river models. Callans, D.J., [1983, p.253-279] East Greenland Sea see variability in large-scale model simulations. Walsh, J.E., et al., [1984, p.927-038] East Greenland Sea see variability in large-scale model simulations. Walsh, J.E., et al., [1984, p.927-038] East Greenland Sea see variability in large-scale model simulations. Walsh, J.E., et al., [1984, p.927-038] East Greenland Sea see vari	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.) MP 845 Icelevaler simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Wordbea, J.L., et al., (1978, p.393-803) Report of the HTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.371-75) MP 1133 Report of the HTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.371-75) MP 1140 Performance of the St. Marys River see bosons, 1976-77 Perham, R.E., (1978, 1374) Recalong dates for the Vishon River, Pt.1 Ramquirt to White-boson, 1896-1978. Stephens, C.A., et al., (1970, e50, lexic) MP 1317 Evaluation of see deflectors on the USCG sterbesher Jedin Star. Vance, G.P., (1980, 37p.) SR 80-02 Ice laboratory Inclines for solving see problems. Frankenstein, G.E., (1980, 35p.) SR 80-22 Ice laboratory Inclines for solving see problems. Frankenstein, G.E., (1980, 35p.) MP 1340 Clearing see-deaged shapping channels. Vance, G.P., (1980, 13p.) Modeling hydrologic impacts of winter navigation. Day, S.F., et al., (1981, p.1073-1080). MP 1445 Ice control at navigation locks. Hamamoto, R., (1881, p.1084-109). MP 1446 Ice control at navigation locks. Hamamoto, R., (1881, p.1084-109). MP 1447 Marginal Re. John 1004-1107. Mr 1448 Ice control arrangement for winter navigation. Perham, R.E., (1881, p.1084-110). Mr 1449 Marginal Re. John 1004-1107. Mr 1449 Mr 1449 Mr 1449 Mr 1449 Mr 1449 Mr 1449 Mr 1441 Mr 1441 Mr 1441 Mr 1441 Mr 1441 Mr 1442 Mr 1441 Mr 1442 Mr 1444 Mr 1441 Mr 1444	ice Golden, K.M., et al. (1996, p.247-294) MP 1328 Ice and soom optics in the police occumi, Pt.1. Personich, D.K., et al. (1996, p.272-241) D.K., et al. (1996, p.272-241) Certal common optics in the police occumi, Pt.2. Genefiel, T.C., et al. (1996, p.242-221) Optical peoperium of sea ice structure. Good, A.J. (1996, p.242-221) Effects of water and ice layers on the scattering properties of define reflectors. Jerek, K.C., et al. (1997, p.514)-5147. Theoretical estimates of infer reflection and transmission by squittly inhomogeneous and temporally varying ice owers. Personich, D.K., (1990, p.45-89) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1990, p.9557-9547) Light reflection and transmission by sea ice owers. Personich, D.K., (1991, p.954-444) Foreital and the control of the control of the properties of the p
thickness. Hibler, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beaufact Sen. Wright, B.D., et al., [1978, p.23-2-27] Arching of model ice floes at bridge poers. Calkins, D.J., (1978, p.495-507) Ice arching and the drift of pack see through characts. Sod. MP 1134 Ice arching and the drift of pack see through characts. Sod. MP 1138 Some results from a linear-viscous model of the Arctic see cover. Hibler, W.D., III., et al., [1979, p.29-3-04] Numerical modeling of sea ice in the seasonal sea see rose. Hibler, W.D., III., [1980, p.299-356] MP 1296 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1296 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1296 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1296 Numerical solutions for a rigid-see model of secondary from heave. O'Nell, K., et al., [1981, p.867-878] MP 1458 Numerical solutions for a rigid-see model of secondary from heave. O'Nell, K., et al., [1982, 119] CR 82-13 On modeling the Weddell Sea pack see. Hibler, W.D., III., et al., [1982, p.135-130] Modeling fluctuations of arctic sea see. Hibler, W.D., III., et al., [1982, p.1516-1523] Numerical simulation of the Weddell Sea pack see. Hibler, W.D., III., et al., [1982, p.23-233] Numerical simulation of the Weddell Sea pack see. Hibler, W.D., III., et al., [1982, p.23-233] MP 1992 Sea ice model in wind forcing fields. Tucker, W.B., [1982, p.816-152] MP 1993 Sea ice model in wind forcing fields. Tucker, W.B., [1981, p.816] MP 1994 Sea ice model in wind forcing fields. Tucker, W.B., [1981, p.816] MP 1995 Sea ice model in wind forcing fields. Tucker, W.B., [1981, p.816] MP 1995 Sea ice model in wind forcing fields. Tucker, W.B., [1981, p.816] MP 1996 Sea ice model in wind forcing fields. Tucker, W.B., [1981, p.816] MP 1997 First-generation model of see determoration. Albieno, G.D., [1993, p.23-2523] MP 1998 MP 1998 Some fields. Tucker, W.B., [1998, p.87-4518] MP 1998 Some fields. Tucker, W.	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 2079; MP 845 Inchesher simulation. Nevel, D.E., (1977, 293) Ice and assignment related sedimentation. Wordbea, J.L., et al., (1978, p.193-803) MP 1133. Report of the HTC panel on testing in sec. 1975. Frankenstein, G.E., et al., (1978, p.197-175) MP 1140. Performance of the St. Marys River are bosons, 1976-77. Ferham, R.E., (1978, 1)79. Retailong dates for the Vishon River, Pt. I. Rampart to White-boson, 1896-1978. Stephens, C.A., et al., (1979, e50. Investigation of are deflection on the USCG steheniste Adar Star. Vance, G.P., (1980, 1791). St. 80-64. Cost of use damage to shoretime structures during anxiquition. Care, K.L., (1980, 1791). General steedings to shoretime structures during anxiquition. Care, K.L., (1980, 1991). General steedings of shoping are problems. Frankensien, G.E., (1910, p.45-103). MP 1361. General steedingsed shoping channels. Vanc., G.P., (1980, 1891). General steedingsed shoping channels. Vanc., G.P., (1980, 1891). MP 1345 for control at assignment locks. Hammota, R., (1981, p.1038-1095). MP 1346. Ice control at assignment for winter missignmen. Daby, S.F., et al., (1981, p.1038-1103). MP 1348. Ice control at assignment for winter missignmen. Perfam., R.E., (1981, p.1038-1104). MP 1348. In third of ore the Histon are control structure. Cafam., D.J., et al., (1982, 593). MP 1348. In third of ore control. Frankenstein, G.E., et al., (1981, p.204-215). MP 1349. Marginal for Jone Experiment, Frank Strait Generational Sea. 1982. Johannessen, O.M., ed., (1983, 477). MP 1349. Marginal for Jone Experiment, Frank Strait Generational Sea. 1982. Johannessen, O.M., ed., (1983, 477). MP 1349. Marginal for Jone Experiment, Frank Strait Generational Sea. 1982. Johannessen, O.M., ed., (1983, 477). MP 1349. Marginal for Jone Experiment, Frank Strait Generational Sea. 1982. Johannessen, O.M., ed., (1983, 477). MP 1349. Marginal for Jone Experiment, Frank Strait Generational Sea. 1984. MP 1349. Marginal for Jone Experi	ice Golden, K.M., et al. (1996, p.247-294) MP 1328 Ice and soom optics in the police oceans, Pt.1. Personich, D.K., et al. (1996, p.227-245) D.K., et al. (1996, p.227-245) Ice and soom optics in the police oceans, Pt.2. Gerafell, T.C., et al. (1996, p.247-251) Optical peoperities of sea ice structure. Good, A.J. (1996, p.248-273) Effects of water and see layers on the scattering properties of define reflections. Jerek, R.C., et al. (1997, p.518)-5147] Townstream multilayer, spectral radiance transfer model for sea nee. Personich, D.K., (1999, 179) Theoretical estimates of light reflection and transmission by spatially inhomogeneous and temporally varying see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and transmission by sea see covers. Personich, D.K., (1990, p.95) Light reflection and procupate for the process of the procupation of the process of
thickness. Hilder, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1134 Arching of model ice floes at bridge poers. Callams, D.J., (1978, p.495-507) Ice necking and the drift of pack see through channels. Sod. MP 1136 Ice necking and the drift of pack see through channels. Sod. MP 1136 Some results from a linear-viscous model of the Arctic see cover. Hilder, W.D., III., et al., [1979, p.29-1-104] Numerical modeling of sea ice in the seasonal sea are rosse. Hilder, W.D., III., [1980, p.299-1564] Numerical modeling of sea ice in the seasonal sea are rosse. Hilder, W.D., III., [1980, p.299-1564] MP 1206 Some promiting trends in see mechanics. Assur, A., [1980, p.1-15] MP 1206 Some promiting trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost heave. O'Neell, K., et al., [1981, p.187-878] Numerical solutions for a rigid-see model to the fast Greenland area. Tucker, W.B., et al., [1982, 113] CR 82-110 on modeling the Weddell Sea pack see. Hiller, W.D., III. et al., [1982, p.135-110] Mp 1509 Application of a sumitrical sea see model to the East Greenland area. Tucker, W.B., [1982, 200] Mp 1509 Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III. et al., [1982, p.131-152]; Numerical simulation of the Weddell Sea pack see. Hiller, W.D., III., et al., [1982, p.287-288] Sea ice model in wind foreing fields. Tucker, W.B., 1892, 113; First-generation model of see determoration. Ashton, G.D., (1983, p.287-289) Me 1000 Me 2000 Me 200	Third International Symposium on Ince Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.) MP 845 Inchenker simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Morbbea, J.L., et al., (1978, p.393-803) Report of the HTC purel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.393-803) Report of the HTC purel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.371-72) MP 1103 Report of the HTC purel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.371-72) Perham, R. E., (1978, p.371-72) Recaloup dates for the Vislon River, Pt. I. Rampart to White-horse, 1396-1578. Stephens, C.A., et al., (1979, c.50) Investigation of sec deflectors on the USCG serbeculer Policy. MP 1317 Evaluation of sec deflectors on the USCG serbeculer Policy. Ser. Vance, G.P., (1980, 17p.) SR 80-02 Cost of sec destings to showing sec problems. SR 80-22 Ice inhoratory tendencis for solving sec problems. SR 80-22 Ice inhoratory tendencis for solving sec problems. MP 1301 Clearing sec-degged shipping channels. Vance, G.P., (1990, p.39-103) Modeling hydrologic impacts of winter navigation. Day, S.F., et al., (1981, p.1073-1080). MP 1348 Ice control at navigation locks. Hamamoto, R., (1981, p.1081, p.1081-1093). MP 1449 Highrania model strady of bort Huron sec control structure Calim, D.J., et al., (1982, 50-p.) Mr 1349 Marginal lee Jone Experiment, Frankerson, G.E., et al., (1981, p.204-125). p. 204-215, p. 204-215, p. 204-215, p. 204-215. Mr 1348, p. 1391-1347 Mr	see. Golden, K.M., et al. (1996, p.247-294) MP 1328 Ice and saom optics in the polar oceans, Pt.1. Personich, D.K., et al. (1996, p.232-245) Be 2326 Ice and snow optics in the polar oceans, Pt.2. Gerafeli, T.C., et al. (1994, p.242-251) Optical properties of sea ice structure. Gow, A.J., (1996, p.242-251) Effects of water and ice layers on the scattering properties of define reflectors. Ferch, K.C., et al. (1997, p.514)-5147; Effects of water and ice layers on the scattering properties of define reflectors. Ferch, K.C., et al. (1997, p.514)-5147; Thousteram multilayer, spectral radiants transfer model for sea see. Personich, D.K., (1999, 17p.) Thousteram multilayer, spectral radiants transfer model for sea see. Personich, D.K., (1999, 17p.) Theoretical extinutes of light reflection and transmission by spatially subsemplements and temporally surpling consenses. D.K., (1990, p.9557-967) Light reflection and transmission by sea see convex. Personich, D.K., (1990, p.9557-967) Ite override Experiments on see ride-up and pile-up. Soullin, D.S., et al. (1981, p.246-276) Altitude's Bernfert Sea coast see ride-up and pile-up Seawes. Konze, A., (1991, p.651-664) Forces associated und see pile-up and ride-up. Soullin, D.S., et al. (1991, p.651-664) Forces associated und see pile-up and ride-up. Soullin, D.S., et al. (1994, p.279-262) Show the override and pile-up factories, Bernfort Sea. Konze, A., (1994, 23p. o. mar) Orshort see pile-up and override. Konzes, A., et al. (1998, p.104-122) Inspired of see. Glex, J.W., (1974, 81p.) MP 1305 Some and see. CoDeck, S.C., et al. (1975, p.85-64) MP 1307 Sea see respectives and geometry. See as see contents of the content of the pile-up and override. Konzes, A., et al. (1976, 275) Son and see. CoDeck, S.C., et al. (1976, p.85-64) MP 1307 Sea see respectives and geometry. See as see contents of the pile-up. Although the pile-up. See as the content of the pile-up. See as the pile-up. Although the pile-up. See as the pile-up. See as the pile-up. See as the pi
thickness. Hilder, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1134 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507) Ice necking and the drift of pack see through characts. Sod. M.P. 135, et al. [1978, p.415-412] MP 1134 Some results from a linear-viscours model of the Arctic see cover. Hilder, W.D., III., et al. [1979, p.293-106] MP 1241 Numerical modeling of sea ice in the seasonal yea we rose Hilder, W.D., III., [1980, p.293-356] MP 1296 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] MP 1296 Some promising trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] MP 1306 Numerical solutions for a rigid-see model of secondary frost heave. O'NCEL K., et al., [1981, p.867-878] MP 1458 Numerical solutions for a rigid-see model to the East Greenland area. Tucker, W.B., et al., [1982, 11p] CR 82-13 On modeling the Weddell Sea pack see. Hilber, W.D., III. et al., [1982, p.125-130] Modeling fluctuations of arctic sea see. Hilber, W.D., III. et al., [1982, p.1514-1523] Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III. et al., [1982, p.1514-1523] Numerical simulation of the Weddell Sea pack see. Hilber, W.D., III. et al., [1982, p.273-283] MP 1509 Some defined with offering fields. Tucker, W.B., [1981, p.273-283] MP 1509 Modeling of ice discharge in river models. Callens, D.J., [1983, p.273-283] MP 2000 MP 2000 MP 1206 MP 1206 MP 1206 MP 1206 MP 1207 Sea ice model in wind foreing fields. Tucker, W.B., [1981, p.273-283] MP 1208 Modeling of ice discharge in river models. Callens, D.J., [1983, p.273-283] MP 1206 Meddeng the marginal see rose. Hilber, W.D., III., et al., [1984, p.273-283] East Greenland Sea see variabolity in large-scale model simulations. Walsh, J.E., et al., [1984, p.274-284] MP 1709 Meddel sunsistance of 20 years of neethers hermophore sea-see fluctuations. Walsh, J.E., et al., [1984, p.	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845 lecheculer simulations. Nevel, D.E., (1977, 9p.) [CR 77-16] [CR 37-16]	Ice and soom optics in the polic oceans, Pt.1. Personich, D.K., et al. [1996, p.222-261] SP 2286 Ice and soom optics in the polic oceans, Pt.2. Genefic, T.C., et al. [1996, p.242-251] SP 2286 Ice and soom optics in the polic oceans, Pt.2. Genefic, T.C., et al. [1996, p.242-251] SP 2286 Optical peoperities of sea ice structure. Good, A.J. [1996, p.242-251] SP 2286 Optical peoperities of sea ice structure. Good, A.J. [1992, p.244-271] SP 2286 Effects of water and ice layers on the scattering properties of define reflection. Jerek, R.C., et al. [1997, p.518]- 5167] Two-stream multilayer, spectral radiances transfer model for sea nee Personich, D.K., [1999, 179] CR 89-15 Theoretical estimates of light reflection and transmission by spatially inhumogeneous and temporally varying ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich December (1990, p.953-962) SP 2299 Light reflection and transmission by sea ice covers. Personich D.K., [1991, p.954-96] SP 2299 Light reflection and transmission by sea ice covers. Personich Sea ice of ice
thickness. Hilder, W.D., III., [1972, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1973, p.249-271] MP 1134 Arching of model ice floes at bridge poers. Callans, D.J., (1978, p.495-507] Ice arching and the drift of pack ice through chaenets. Sodies, D.J., et al. [1978, p.415-412] MP 1136 Some results from a linear-viscous model of the Arctic ice cover. Hilber, W.D., III., et al., [1979, p.29-1-104] Numerical modeling of sen ice in the seasonal sea are rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Numerical modeling of sea ice in the seasonal sea are rose. Hilber, W.D., III., [1980, p.299-356] MP 1240 Some promising trends in nec mechanics. Assum, A., [1980, p.1-15] MP 1240 Some promising trends in nec mechanics. Assum, A., [1980, p.1-15] Preliminary results of ice modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost leave. O'Neel, K., et al., [1981, p.867-878] Numerical solutions for a rigid-see model to the East Greenland area. Tucker, W.B., et al., [1982, 113-] CR 82-13 On modeling the Weelded Sea pack see. Hilber, W.D., III. et al., [1982, p.151-1152] Modeling fluctimations of arctic sea see. Hilber, W.D., III. et al., [1982, p.151-1152] Numerical similation of the Weelded Sea pack see. Hilber, W.D., III. et al., [1982, p.251-253] MP 1599 Sea ice model in wind forcing fields. Tucker, W.B., [1983, p.251-205] In p. CR 83-17 First-generation model of see deterioration. Alshoo, G.D., [1983, p.255-205] In p. 285-280, MP 2806 Ice rematince rests on two models of the WTGB secheraker Tamedians, J.C., et al., [1982, p.827-815] MP 2806 Ice rematince rests on two models of the WTGB secheraker Tamedians, J.C., et al., [1983, p.827-815] MP 2807 East Greenland Sea see watchels with an see margim. Lep-paranta, M., [1984, p.31-36] MP 1798 Modeling the marginal see rose. Hilber, W.D., III., ed., [1984, p.31-36] MP 1799 Model somulations of 20 years of northern hem	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p; MP 845 Icelevaler simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Morbbes, J.L., et al., (1978, p.393-803) Report of the HTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.393-803) Report of the HTC purel on testing in sec., 1975. Frankenstein, G.E., et al., (1978, p.377-77) Perham, R.E., (1978, p.377-77) Perham, R.E.	see: Golden, K.M., et al. [1996, p.247-294] MP 1328 Ice and soom optics in the polar oceans, Pt.1. Personich, D.K., et al. [1996, p.232-245] Be 2326 Ice and soom optics in the polar oceans, Pt.2. Gerafeli, T.C., et al. [1996, p.242-251] Optical peoperities of sea ice structure. Gow., A.J., [1986, p.242-251] Optical peoperities of sea ice structure. Gow., A.J., [1982, p.244-271] Effects of unter and ice layers on the scattering properties of define reflectors. Jerek, K.C., et al. [1997, p.516)-5147] Thousteram multilayer, spectral radiantive transfer model for sea ice. Personich, D.K., [1999, 1792. CR 93-19] Theoretical estimates of light reflection and transmission by synthly inhomogeneous and temporally surpling in content. Personich, D.K., [1990, p.9557-9567] Light reflection and transmission by sea ice content. Personich, D.K., [1990, p.9557-9567] MP 2081 Ite override Esperiments on ice ride-up and pile-up. Soulli, D.S., et al. [1981, p.264-270] Alaska's Beaufiert Sea coust ice ride-up and pile-up Seatures. Lowaci, A., [1993, 519, 1997
thickness. Hilder, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1134 Arching of model ice floes at bridge poers. Callams, D.J., (1978, p.495-507) Ice necking and the drift of pack see through channels. Sod. MP 1136 Ice necking and the drift of pack see through channels. Sod. MP 1136 Numerical modeling of sen ice in the seasonal sen are rose Hiller, W.D., III., et al., [1979, p.29-1504] Numerical modeling of sen ice in the seasonal sen are rose Hiller, W.D., III., [1980, p.299-1564] Numerical modeling of sen ice in the seasonal sen are rose Hiller, W.D., III., [1980, p.299-1564] MP 1206 Some promiting trends in see mechanics. Assur, A., [1980, p.1-15] MP 1206 Some promiting trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost heave. O'Neell, K., et al., [1981, p.867-878] Numerical solutions for a rigid-see model to the fast Greenland area. Tucker, W.B., et al., [1982, 119] CR 82-13 On modeling the Weddell Sen pack see. Hiller, W.D., III. et al., [1982, p.151-152] Mp 1509 Application of a numerical sen see model to the East Greenland area. Tucker, W.B., [1982, 40p.] CR 82-13 Mp 1509 Numerical somitation of the Weddell Sen pack see. Hiller, W.D., III. et al., [1982, p.255-259] Numerical somitation of the Weddell Sen pack see. Hiller, W.D., III., et al., [1983, p.255-259] Modeling of ice discharge in river models. Callams, D.J., [1983, p.255-259] Modeling of ice discharge in river models. Callams, D.J., [1983, p.255-259] East Greenland Sen see samples of the WTGB sechender Tannelsin, J.C., et al., [1984, p.27-038] Mp 1709 East Greenland Sen see samples of the WTGB sechender Tannelsin, J.C., et al., [1984, p.27-038] Mp 1712 East Greenland Sen see samples with an see margin. Lephanita, M., [1984, p.213-253] Mp 1712 East Greenland Sen see samples with an even margin. Lephanita, M., [1984, p.213-253] Mp 1709 Mod	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845 lecheculer simulations. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Morbbea, J.L., et al., (1978, p.39)-803. MP 1133 Report of the HTTC purel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1978, 1374). MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1979, 1374). MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1979, 1374). MP 1317. Perham, R. E., (1979, 1374). MP 1317. Perham, R. E., (1979, 1374). MP 1317. Stephens, C.A., et al., (1979, e5). Invited by the control of the deflectors on the USCG sechecular Policy. Str. Vance, G.P., (1980, 37p.). SR 80-02. Invited by the control of the shortene structures during navigation. Carey, K. L., (1980, 33p.). SR 80-22. Ice laboratory facilities for solving see problems. SR 80-22. Ice laboratory facilities for solving see problems. MP 1301. Cleaning see-degged shapping channels. Vance, G.P., (1980, 13p.). MP 1301. Cleaning see-degged shapping channels. Vance, G.P., (1981, 13p.). MP 1301. SR 80-22. Ice laboratory facilities for winter navigation. Day, S.F., et al., (1981, p.1073-1086). MP 1346. Ice control at navigation locks. Hammoto, R., (1981, p.1084-109). MP 1349. Perfam, R. E., (1981, p.1084-110). MP 1349. MP 1349	Ice and soom optics in the polic oceans, Pt.1. Personich, D.K., et al. [1996, p.222-261] SP 2286 Ice and soom optics in the polic oceans, Pt.2. Genefic, T.C., et al. [1996, p.242-251] SP 2286 Ice and soom optics in the polic oceans, Pt.2. Genefic, T.C., et al. [1996, p.242-251] SP 2286 Optical peoperities of sea ice structure. Good, A.J. [1996, p.242-251] SP 2286 Optical peoperities of sea ice structure. Good, A.J. [1992, p.244-271] SP 2286 Effects of water and ice layers on the scattering properties of define reflection. Jerek, R.C., et al. [1997, p.518]- 5167] Two-stream multilayer, spectral radiances transfer model for sea nee Personich, D.K., [1999, 179] CR 89-15 Theoretical estimates of light reflection and transmission by spatially inhumogeneous and temporally varying ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich, D.K., [1990, p.953-962] SP 2299 Light reflection and transmission by sea ice covers. Personich December (1990, p.953-962) SP 2299 Light reflection and transmission by sea ice covers. Personich D.K., [1991, p.954-96] SP 2299 Light reflection and transmission by sea ice covers. Personich Sea ice of ice
thickness. Hilder, W.D., III., [1978, p.33-44] Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al., [1978, p.249-271] Arching of model (see floes at bridge poers. Calkins, D.J., [1978, p.895-507] Ice arching and the drift of pack see through channels. Sodium, D.S., et al., [1978, p.415-412] Some residts from a linear-viscom model of the Arctic see cover. Hilder, W.D., III., et al., [1979, p.29-3-604] Numerical modeling of sea ice in the seasonal sea see rose Hilder, W.D., III., [1980, p.299-356] MP 1296 Some promising trends in see mechanics. Assur, A., [1980, p.1-15] Preliminary resolts of see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-873] MP 1308 Numerical solutions for a rigid-see model of secondary frost heave. O'Neill, K., et al., [1982, 1193] Application of a numerical sea see model to the East Greenland area. Tucker, W.B., et al., [1982, 1193] Application of a numerical sea see model to the East Greenland area. Tucker, W.B., [1982, 40p4] Modeling fluctimisous of arctic sea see. Hilber, W.D., III., et al., [1982, p.155-152] Mp 1579 Numerical summitation of the Weddell Sea pack see. Hilber, W.D., III., et al., [1982, p.151-1523] Mp 1592 Sea ice model in unid foreing fields. Tucker, W.B., [1983, p.273-278] Sea ice model on unid foreing fields. Tucker, W.B., [1983, p.273-278] MP 2001 Ice resistance tots on two models of the WTGB sechesaler Tannelson, J.C., et al., [1984, p.273-28], MP 1701 Modeling the marginal see rose. Hilber, W.D., III., ed., [1984, p.283-283] MP 1779 Analyses of innear sea see models with an see margin. Lep-sparsation. W.J., [1984, p.210-15], MP 1779 Analyses of innear sea see models with an see margin. Lep-sparsation. W.J., [1984, p.210-15], MP 1779 Analyses of innear sea see models with an see margin. Lep-sparsation. W.J., [1984, p.210-16] MP 1789 Model summittion of 20 years of northern hermsphere sea-see fluctuations. Watsh, J.E., et al., [1984, p.241-255] MP 1785 MP 1785 MP 1785 MP 1785 MP 1785 MP 1787 Cry	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.) MP 845 Icelevaler simulation. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Wordbes, J.L., et al., (1978, p.193-803) Report of the HTC purel on testing in sec., 1973. Frankenstein, G.E., et al., (1978, p.197-175) MP 1133 Report of the HTC purel on testing in sec., 1973. Frankenstein, G.E., et al., (1978, p.197-175) MP 1140 Performance of the St. Marys River sec bosons, 1976-77 Perham, R.E., (1978, 137s.) Recalong dates for the Vishon River, Pt.1 Rampart to White-besie, 1896-1978. Stephens, C.A., et al., (1970, e50, leaver) MP 1317 Evaluation of see deflections on the USCG sechecoler John Str. Vance, G.P., (1980, 37p.) SR 80-64 Cost of see damage to shortene structures during navigation. Carey, K.L., (1980, 33p.) SR 80-22 Ice laboratory Inclines for solving see problems. Frankeisens, G.E., (1980, 33p.) SR 80-22 Ice laboratory Inclines for solving see problems. Frankeisens, G.E., (1980, 39-10) Cleaning see-diagoid shapping channels. Vance, G.P., (1980, 13p.) SR 80-22 Ice laboratory Inclines for solving see problems. Bright- John, J. (1981, p.103-1040). MP 1405 Ice control at navigation locks. Hamamoto, R., (1981, p.108-1005). MP 1406 Ice control at navigation locks. Hamamoto, R., (1981, p.108-1005). MP 1409 Hydranke model study of Port Heron see control structure Calams, D.J., et al., (1981, p.109-110). MP 1409 Hydranke model study of Port Heron see control structure Calams, D.J., et al., (1981, p.109-110). MP 1409 Hydranke model study of Port Heron see control structure Calams, D.J., et al., (1981, p.109-110). MP 1409 Hydranke model study of Port Heron see control Sea, 1981. Johannessen, O.M., ed., (1981, 47p.) See gate for problems on the St. Marys Rev. et al., (1981, p.109-110). MP 1409 Hydranke to see control. Frankenstein, G.E., et al., (1981, p.1991, 1991.) New 1409 Hydranke to see a description of attack-occurs metrative processes, models and planned experiments. Johannessen, O.M., et al., (198	Ice and snow optics in the polar oceans, Pt.1. Personich, D.K., et al. [1996, p.222-261] MP 1325 lee and snow optics in the polar oceans, Pt.2. Gerafel, T.C., et al. [1996, p.242-251] MP 2236 lee and snow optics in the polar oceans, Pt.2. Gerafel, T.C., et al. [1996, p.242-251] MP 2236 Optical properties of sea ice structure. Gow., A.J., [1996, p.242-251] MP 2237 Effects of unter and see Injury me the scattering properties of define reflections. Jerch, K.C., et al. [1997, p.516]. Effects of unter and see Injury me the scattering properties of define reflection. Jerch, K.C., et al. [1997, p.516]. Thousteram multilayer, spectral radiances transfer model for sea see. Personach, D.K., [1999, 179]. CR 93-19. Theoretical enhances of light reflection and transmission by synthly militomoperation and temporally varying see context. Personach, D.K., [1990, p.9557-9567] MP 2761. Ide override Esperiments on act ride-up and pile-up. Soulla, D.S., et al., [1981, p.204-170] MP 1647. Aliska's Bernfeet Sea coost see ride-up and pile-up features. Konacs, A., [1993, p.854-664] MP 1669. Focci associated with see pile-up and pile-up. Soulla, D.S., et al., [1984, p.2194, p.5]. Sonce see the Norten Sound and adjacent Bering Sea coast. Konacs, A., [1994, p.854-664] MP 1669. Focci associated with see pile-up and pile-up. Soulla, D.S., et al., [1994, p.854-66] MP 1669. Short see override and pileup features, Bernfeet Sea. North, A., [1994, p.854-66] MP 1669. Short see pileup and override. Konacs, A., et al., [1994, p.854-81]. Dishort see pileup and override. Konacs, A., et al., [1994, p.854-82]. MP 2336 Mosprings on installer simbalance as a mechanism for sea see cracking. Ackley, S.F., et al., [1975, p.85-84]. MP 2376 Sea see override and generaty. Weeks, W.F., [1976, p.177, p.1776]. All [1976] Sea see conditions in the Article. Weeks, W.F., [1976, p.1776]. Sea see properties and generaty. Weeks, W.F., [1976, p.1776]. All [1976] Sea see conditions in the Article. Weeks, W.F., [1976, p.1776]. MP 910 Internal state.
thickness. Hilder, W.D., III., [1978, p.33-44] MP 1010 Sen ice pressure ridges in the Beamfort Sen. Wright, B.D., et al. [1978, p.249-271] MP 1134 Arching of model ice floes at bridge poers. Callams, D.J., (1978, p.495-507) Ice necking and the drift of pack see through channels. Sod. MP 1136 Ice necking and the drift of pack see through channels. Sod. MP 1136 Numerical modeling of sen ice in the seasonal sen are rose Hiller, W.D., III., et al., [1979, p.29-1504] Numerical modeling of sen ice in the seasonal sen are rose Hiller, W.D., III., [1980, p.299-1564] Numerical modeling of sen ice in the seasonal sen are rose Hiller, W.D., III., [1980, p.299-1564] MP 1206 Some promiting trends in see mechanics. Assur, A., [1980, p.1-15] MP 1206 Some promiting trends in see modeling in the East Greenland area. Tucker, W.B., et al., [1981, p.867-878] Numerical solutions for a rigid-see model of secondary frost heave. O'Neell, K., et al., [1981, p.867-878] Numerical solutions for a rigid-see model to the fast Greenland area. Tucker, W.B., et al., [1982, 119] CR 82-13 On modeling the Weddell Sen pack see. Hiller, W.D., III. et al., [1982, p.151-152] Mp 1509 Application of a numerical sen see model to the East Greenland area. Tucker, W.B., [1982, 40p.] CR 82-13 Mp 1509 Numerical somitation of the Weddell Sen pack see. Hiller, W.D., III. et al., [1982, p.255-259] Numerical somitation of the Weddell Sen pack see. Hiller, W.D., III., et al., [1983, p.255-259] Modeling of ice discharge in river models. Callams, D.J., [1983, p.255-259] Modeling of ice discharge in river models. Callams, D.J., [1983, p.255-259] East Greenland Sen see samples of the WTGB sechender Tannelsin, J.C., et al., [1984, p.27-038] Mp 1709 East Greenland Sen see samples of the WTGB sechender Tannelsin, J.C., et al., [1984, p.27-038] Mp 1712 East Greenland Sen see samples with an see margin. Lephanita, M., [1984, p.213-253] Mp 1712 East Greenland Sen see samples with an even margin. Lephanita, M., [1984, p.213-253] Mp 1709 Mod	Third International Symposium on lice Problems, 1975. Frankenstein, G.E., ed., (1975, 627p.; MP 845 lecheculer simulations. Nevel, D.E., (1977, 9p.) Ice and navigation related sedimentation. Morbbea, J.L., et al., (1978, p.39)-803. MP 1133 Report of the HTTC purel on testing in sec., 1978. Frankenstein, G.E., et al., (1978, p.157-175). MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1978, 1374). MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1979, 1374). MP 1140. Performance of the St. Marys River sec bosons, 1976-77. Perham, R. E., (1979, 1374). MP 1317. Perham, R. E., (1979, 1374). MP 1317. Perham, R. E., (1979, 1374). MP 1317. Stephens, C.A., et al., (1979, e5). Invited by the control of the deflectors on the USCG sechecular Policy. Str. Vance, G.P., (1980, 37p.). SR 80-02. Invited by the control of the shortene structures during navigation. Carey, K. L., (1980, 33p.). SR 80-22. Ice laboratory facilities for solving see problems. SR 80-22. Ice laboratory facilities for solving see problems. MP 1301. Cleaning see-degged shapping channels. Vance, G.P., (1980, 13p.). MP 1301. Cleaning see-degged shapping channels. Vance, G.P., (1981, 13p.). MP 1301. SR 80-22. Ice laboratory facilities for winter navigation. Day, S.F., et al., (1981, p.1073-1086). MP 1346. Ice control at navigation locks. Hammoto, R., (1981, p.1084-109). MP 1349. Perfam, R. E., (1981, p.1084-110). MP 1349. MP 1349	see: Golden, K.M., et al. (1996, p.247-294) MP 1335 lee and soom optics in the polic oceans, Pt.1. Personich, D.K., et al. (1996, p.232-245) D.K., et al. (1996, p.232-245) lee and soom optics in the polic oceans, Pt.2. Gerafeli, T.C., et al. (1994, p.242-251) Optical properties of sea ict structure. Gow, A.J. (1996, p.242-251) Effects of water and ice layers on the scattering properties of define reflectors. Jerek, K.C., et al. (1997, p.514)-5147; Effects of water and ice layers on the scattering properties of define reflectors. Jerek, K.C., et al. (1997, p.514)-5147; Thousteram multilayer, speciful radiantse transfer model for sea ice. Personich, D.K., (1999, 17-p.) Thousteram multilayer, speciful radiantse transfer model for sea ice. Personich, D.K., (1999, 17-p.) Thousteram multilayer, speciful radiantse transfer model for sea ice. Personich, D.K., (1990, p.83-69) Thousteram multilayer, speciful radiantse transfer model for sea ice. Personich, D.K., (1990, p.83-69) Leph reflection and transmission by sea ice control. Personich, D.K., (1990, p.957-967) Leph reflection and transmissions by sea ice control. Personich, D.K., (1990, p.957-967) Leph reflection and transmissions by sea ice control. Personich, D.K., (1990, p.957-967) Leph reflection and transmissions by sea ice control. Personich, D.K., (1993, p.93-964) Lee override Esperiments on sea cride-up and pile-up. Soulli, D.S., et al. (1993, p.204-276) Allatha's Berinfert Sea const ice role-up and pile-up. Seatwes. Newson, A., (1994, p.1993, 1993. MP 1007 Shore ice on terride and pile-up factoris, Berinfert Sea ice. Kowaca, A., (1994, 23p. o. mary. Onthere ice pile-up and override. Kowaca, A., et al. (1994, p.1994, p.1994) Dishore ice pile-up and override. Kowaca, A., et al. (1994, p.1994) Dishore ice pile-up and override. Kowaca, A., et al. (1994, p.1994) Dishore ice pile-up and override. Kowaca, A., et al. (1994, p.1994) Dishore ice pile-up and override. Kowaca, A., et al. (1994, p.1994) Leph 104-11223 MP 1007 Shore ice overri

Abasemal mermal fraction penks at suspenceyatal act. Stati- man, P.E., et al. (1977, 157) SR 77-23	Passer microwave in sicu observations of water Weddell Sea ice. Commo, J.C., et al., (1999, p. 10,391-10,905)	Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1990, 33p.] SR 80-22
Some elements of icelery technology Weeks, W.F., et al.	MP 2655	Working group on ice forces on structures. Carstens, T., ed.
[1978, p.45-96; MP 1616 Internal properties of the use sheet at Care Folger by radio	Proceedings. §1919, 475p.; SR 89-39 Models of the mechanical properties of see. Richter-Menge.	[1900, 1449.] SR 80-36 Review of buckling analyses of see skeets. Sodii. D.S. et al.
echo soundag. Keliber, T.E., et al. 1973, 1282	J.A., et al., [1949, p.17-99; MP 2667	[1920, p. 131-146; MP 1322
Computer modeling of atmospheric ice accretion. Ackley,	W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1911. Acties, S.F., ed. (1910, 291p.) M 90-01	Skip resistance in thick braskice. Mellor, M., g1900, p.305- 321; MP 1329
S.F., et al. (1979, 749) CR 79-44	Physical properties of brackish see, Bay of Botham. Weeks,	Lee facce measurement on the Yukon River bridge. McFad-
Some results from a linear-viscous model of the Arche see cover. Hiller, W.D., III, et al., (1979, p. 293-704)	W.F., et al., (1910, p.5-15) MP 2725 Physical programs of sea see from the Weddell Sea. Eaches.	den, T., et al. (198), p.749-777; MF 1396 Dynamic sce-structure interaction analysis for nerrow vertical
MP 1241	H ₁ et al. (1990, p.21-32) MP 2727	structures. Eranti, E., et al. (1981) p.472-479; MP 1456
Overview on the seasonal sea see rome. Weeks, W.F., et al., [1979, p.320-337] MP 1320	for pileop International Workshop on the Sensonal Sea for Zone, Mon-	State of the set of ship model testing in ice. Vance, G.P.,
ler sheet internal reflections. Ackley, S.F., et al., (1979, p.5475-5440) MP 1319	terry, Calderna, Feb. 26-Mar.1, 1979 Andersea, B.G., ed., (1980, 357p.) MP 1292	(1931, p.693-706; MP 1973 Sea ice rubble formations in the Bering Sea and Norton
Crystal alignments in the fact see of Acetic Aliska. Weeks,	Shice see piersp and ride-up field observations, models,	Sound, Alaska. Korack, A., (1981, 23p.) SR 81-34
W.F., et al. (1930, p.1177-1144) MP 1277 Conference on Computer and Physical Modeling in Hydran	theoretical analyses. Kovacs, A., et al., (1990, p.209- 298 ₁ MP 1295	Force measurements and analysis of river ice break up. Deck, D.S., §1962, p.303-336; MP 1739
Se Engineering, 1910 Ashton, G.D., ed. (1950, 492), MP 1/21	Sea see paint at Farmay Rock, Bering Stract, Alaska.	Bering Strait sea see and the Facusty Rock seefast. Kornes,
Heat and man transfer from freely falling deeps at how tem-	Katara, A., et al., [1981, p.985-1000] MP 1460 Dynamics of activishee see. Katara, A., et al., [1981,	A. et al. (1912, 40p.) CR 82-31 Dynamic ice-structure interaction during continuous crush-
perstures. Zurling, 17., (1965, 147.) CR 90-18	\$ 125-135; MP 1999	mg. Militiaca, M., (196), 48p.) CR 83-65
Sea ice: the patential of remote sensing. Works, W.F., [1981, p.39-48]. MP 1466	Modeling pressure radge buildop on the geophysical scale Hilder, W.D., III, (1962, p. 141-155; MP 1990	Ice forces on model marine structures. Haynes, F.D., et al., 1983, p.278-787; MP 1406
Modeling pressure refer budden on the geophysical scale Hilder, W.D., III, §1912, p.141-155; MP 1590	On Secrement mesoscience dynamics and build-up. Hiller, W.D., Hi, et al., §1963, p. 110-115; MP 1625	Dynamic bucking of flooting are sheets. Southe, D.S.,
Physical properties of the ice cover of the Geresland Sea	Experiments on see ride-up and pie-up. Soulis, D.S., et al.	[1903, p.822-833] MF 1607 See Sorces on model bridge poers. Haynes, F.D., et al., (1903).
Weeks, W.F., 1982, 27p.; SR \$2-28 Chemical fractionation of bette in the McMusta-fee Shell	(195), p.266-270; MP 1627 Alaska's Beaufiet Sea count ice ride-up and pile-up features.	11p; CR 83-19
Crapin, J.H., et al., [195], 169: CR 83-46	Keraci, A., (1963, 51p.) CR 83-09	Measurement of see forces on structures. Sodiii, D.S., et al., [198], p.139-155; MP 1641
Thermal patterns in ice under dynamic loading. Fish, A.M., et al., §1983, p.240-243. MP 1742	Sea feet on the Notion Sound and adjacent Being Sea court Korners, A., (1963, p.654-466) MP 1099	for action on two cylindrical structures. Kate, K., et al.
Steen measurements in sec. Con. GFN, et al. (1983).	Method of detecting wolfs in rubbled see. Tucker, W.R., et	(198), p.159-166; MP 1003 Characteristics of multi-year pressure ridges. Konacs, A.,
II p.; CR 83-23 Prophility of mountains relatation due to the charged dislo-	st. (1984, p. 183-188) MP 1772 Forces associated with see pile-up and role-up. Softii, D.S.	(196), p.17)-182 ₂ MP 1096
cation process. Empir, K., (1983), p.4761-4264; MP 1449	Ci al. (1944, p.239-262) MP 1967	Ice forces on a bridge pier, Ostanquecher Rever, Verment. Southi, D.S., et al. (1983, 69.) CR 83-32
Effect of X-ray artification on internal fraction and dielectric	Sheet see override and pileup festices, Bendort Sen Konnes, A., (1964, 289. o map; CR 84-26	for action on two cylindrical structures. Kato, K., et al., 1984, p. 107-112. MP 1741
relaxation of ice. Itagala, K., et al., (1983), 7 4314-4317; MP 1670	Ombore see pilesp and everride. Kovacs, A., et al. (1915, p. 100-147). MP 2336	Dependence of crushing specific energy on the sepect ratio
Army research could reduce dangers posed by seriet. Tech-	p. 104-1423 MF 2336 Rec planticity	and the structure velocity. Sollie, D.S., et al. (1984, p.363-374) MP 1788
er, W.B., (1984, p.20-24) MP 2166 Atherpret of morting group on tector; methods in sec. Earle,	Sennic exploration in cold regions. Roethfisherger, H., (1972, 1398) M. H-Ažu	Crishing are forces on cylindrical structures. Morris, C.E.,
EN_03_1994_2.411 MP 1886	(1972, 139g.) M 11-A2n Preference: results of see modeling in the East Greenland	et at, (1984, p.179) MP 1836 lee forces on inclined model bridge piers. Haynes, F.D., et
Messende niesee-seem unterseiss experiments. John- nessen, O.M., e.d. [1914, 1769]. SR 84-29	zera Tucker, W.B., et al., (1984), p.347-173; MP 1458	ni, (1984, p.1167-117); 36F 34FT
Sea ice properties. Tucket, W.R., et al., (1994, p.92-87). MP 2134	Making managic see dynamics. Hiller, W.D., III, C.S.	Preistings investigation of thermal for pressures. Con. GFN_g1994, p.221-229; MP 1708
	[162], 2.1317-1329; MP 1526	ler forces on rigid, vertical, cylindrical structures. Sollid.
Darriche reflectiones from their digers of show and are never never.	Les Summers 1860er, W.D., 111, 41794, 3284	
Discrete reflections from this layers of snow and see Jezek, K.C., et al. (1994, p.32)-331; MP 1871	lee dynamics. Hibler, W.D., III, (1984, 52p.) 38 84-03	D.S., et al. (1984), 16p.; CR 80-33 for black scalables Dale: S.F., (1984), 9.544-548;
K.C., et al., [1944, p.323-331] MP 1871 for uland fragment in Sociation Sound, Alinka Kortoc, A., [1945, p.101-115] MP 1900	M 84-03 Defective properties of strained see: 1 Effect of plants	D.S., et al., [1964, 1963] CR 80-33 for block stability Daly, S.F., [1964, p.544-548] MP 1972
K.C., et al., (1994, p.323-331) MP 1871 for atland fragment on Sociatasson Sound, Alaska Korses, A., (1994, p. 101-115) MP 1990 Physical properties of sea see on the Gerealand Sea. Torker,	M 8443 Differenc geopernes of strained see. 1 Effect of plante straining. Itagaki, K., [1987, p.143-147]. MP 2356 ICE PRESSURE	D.S., et al. (1984), 16p.; CR 80-33 for black scalables Dale: S.F., (1984), 9.544-548;
K. C., et al., (1944, p.)25-351; MP 1871 K. Gland fragment in Stefansion Sound, Alaska Konaca, A., (1945, p. 101-115; MP 1900 Physical properties of sea see in the Gerenfund Sea Tecker, WR., et al., (1965, p. 177-115; MP 1903 President sides are properties Gerenfund Sea. Tucker, Sea Tucker, Sea	M 8443 Directors properties of strained are. 1 Effect of plants straining linguist, K., [1987, p.145-147] MP 2356 ICE PRESSURE Ice pressure on engineering structures. Michel, B., [1970,	D.S., et al., [1944, Jup.; CR 80-33 fee block stability Day, S.F., [1964, p.544-548] MP 1972 Shert see forces on a comeal structure an experimental study. South, D.S., et al., [1965, p.46-54] MP 1915 Shert see forces on a conseal structure; an experimental study.
K.C., et al., (1944, p.)23-331; MP. 1871 for atland fragment in Sociations on Sound, Alanka A., (1945, p. 101-115; MP. 1900 Physical properties of sea see as the Greenland Sea. Tracker, W.R., et al., (1945, p. 177-115; MP. 1900 Pressure ridge and sea are properties Greenland Sea. Tracker, W.B., et al., (1945, p. 214-225; MP. 1935	Difference properties of stranded see. I Effect of plants stranding. Impair, K., [1987, p.143-147]. MP 2366 ICE PRESSURE Let pressure on engineering structures. Michel, B., [1970, 717.] In pressure on the complete of the pressure of the pressure.	D.S., et al., [1944, Jup.] Ice Moch stability Duly, S.F., [1944, p.544-548] MP 1972 Sheet see Society on a council structure: an experimental study, South, D.S., et al., [1965, p.46-54] MP 1995 Shrett see Society on a conical structure; an experimental study, Smith, D.S., et al., [1985, p.46-565] MP 1986 Experience with a bassal see stress sensor. Co., G.F.N.,
K. C., et al., (1944, p.)25-331; MP 1871 Ke takent frequence in Sociations on Sound, Alaska. A., (1945, p.)01-115; MP 1900 Physical properties of sea use in the Generalised Sea. MP, et al., (1965, p.)17-131; MP 1903 Pressure ridge and sea are properties Greenland Sea. Turker, WB, et al., (1965, p.)16-215; MP 1905 Climitic factors in order regions surface conditions. MA., (1965, p.)06-517; MP 1901	Defective properties of structed see. 1 Effect of plants structure. Englis, K., (1987, p.143-147). MP 2356 ICE PRESSURE. Ice pressure on engineering structures. Michel, B., (1910, 712). Ide pressure. Ice forces on vertical piles. Nevel, D.E., et al., (1972, p.164-116). MP 1026	D.S., et al., [1944, Jup.; CR 80-33] for block stability. Dady, S.F., [1944, p.544-548]. MP 1972. Short for forces on a comeal structure an experimental study. South, D.S., et al., [1945, p.46-54]. MP 1915. Short for forces on a consical structure; an experimental study. South, D.S., et al., [1945, p.463-655]. MP 1966. Experience with a hearst for stress sensor. [c. 6]. F.N., [1945, p.252-259]. MP 1997.
K.C., et al., (1944, p.325-331) MP 1871 lee ulanel fragment in Seclassion Sound, Aliaka Kosto, A., (1945, p.101-115; MP 1900 Physical properties of sea see in the Generalised Sea. Techn. W.R., et al., (1945, p. 177-131) Pressure ridge and sea see properties Generalised Sea. Tucker, W.R., et al., (1945, p. 216-223) Climatic factors in orde regions surface conditions. M.A., (1945, p. 508-517) Physical properties of the sea see conset. Weeks, W.F., (1946, p. 237-102) MP 2047	Defective properties of strusted see. 1 Effect of plants strusting. Itagals, K., (1987, p.14)-147; MP 236 ICE PRESSURE Let pressure on engineering structures. Michel, B., (1970, 712). Bet pressure let forces on vertical piles. Nevel, D.E., et al., (1972, p.164- 1161. Structures as scendenced water. Amor, A., (1972, p. 93-97).	D.S., et al., [1944, Jup.] Ice Mock stability. Duly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al., [1965, p.46-54] Sheet see forces on a councal structure; an experimental study, Soulhi, D.S., et al., [1965, p.463-655] MP 1965 Experiment with a husual see stress sensor. God, G.F.N., [1965, p.252-258] Instrumentation for an upfoling ice force model. L.J., [1965, p. 264-6455] MP 2091
K.C., et al., (1944, p.)25-331; MP 1871 lee ulimit fregment in Seclassion Sound, Alinka Kosaci, A., (1945, p. 101-115; MP 1900 Physical properties of seasor in the Gerenfund Sea. Tenter, MR., et al., (1965, p. 177-184; MP 1903 Pressure ridge and sea are properties Gerenfund Sea. Tunker, WR., et al., (1965, p. 216-215; MP 1905 Climatic factors in cold regions surface conditions. Bidello, MA., (1965, p. 366-517; MP 1901 Physical properties of the sea are cover. Weeks, W.F., (1966, p. 37-102); MP 2007 Winner integral are rome experiments, Fram Strain Gerenfund.	Defective geogenies of strained see. 1 Effect of plantic straining. Engals, K., (1987, p.143-147). MP 2356 ICE PRESSURE. Ice pressure on engineering structures. Michel, B., (1910, 712). Ide pressure Ice forces on seriousliptics. Nevel, D.E., et al., (1972, p.164-115). MP 1014 Structures in scendenced water. Asser, A., (1972, p. 93-97). MP 1016 Depth of water-failed creations of glaciers. Territoria, J.	D.S., et al., [1942, Jup.] Ice Moch stability Duly, S.F., [1944, p.544-548] MP 1972 Sheet see forces on a conscal structure an experimental study. South, D.S., et al., [1945, p.46-54] MP 1915 Sheet see forces on a conscal structure; an experimental study. South, D.S., et al., [1945, p.46-565] MP 1946 Experience with a basial see stress senone (1945, p.252-258) [1945, p.252-258] Instrumentation for an updating ice force model. Zabbandy, L.J., [1945, p.1436-1435] MP 2091 Ice cover research—present state and finance meeds. Kerr.
K.C., et al., (1944, p.323-331) MP 1871 Lee ultimat frequency on Scelarisason Sound, Almika Koraco, A., (1943, p.101-115) MP 1900 Physical properties of sea ace on the Gereniand Sea. Techen, W.R., et al., (1945, p.177-114) Pressure ridge and sea ace prosperties Gereniand Sea. Tracker, W.R., et al., (1945, p.216-213) Chimatic factors on onlit regions surface conditions. MC 1975, p.506-517 Physical properties of the sea ace content (1746, p.37-162) Winner marginal see zone experiment, Frant Serial Gereniand Sea, 1987-189. Distribution, K., ed., (1954, 572) NR 56-69	Defective geogeties of strained see. 1 Effect of plants straining. Ingold, K., (1987, p.14)-147; MP 236 ICE PRESSURE Ice pressure on engineering structures. Michel, B., (1970, 772) Ice pressure Ice forces on vertical piles. Nevel, D.E., et al., (1972, p.164-116) Sensorium in scendented unter. Amer, A., (1972, p. 93-97) MP 1014 Depth of unter-filled cressures of glacers. The crimina, J., (1972, p. 135-145) MP 1064	D.S., et al., [1942, Jup.] Ice Mock stability. Duly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al., [1965, p.46-54] Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al., [1965, p.46-365] Experiment until a husual net stream sensor. Gou, G.F.N., [1965, p.252-258] Institute content of an appliching ice force model. L.J., [1965, p.164-1635] AD, et al., [1966, p.364-993] Impact see force and pressure. An experimental study with
K.C., et al., (1944, p.323-331). MP 1871 lee ulanel fragment in Scelatione Sound, Alinka Exist. A., (1945), p.101-115; MP 1940 Physical properties of sea see in the Gecenland Sea. Tucker, W.R., et al., (1945, p. 177-131). MP 1940 Pressure ridge and sea nee properties Gerenland Sea. Tucker, W.R., et al., (1945), p.126-273; MP 1945 Climitate factors in cold regions surface conditions. Blockin, M.A., (1945, p. 505-517). MP 1941 Physical properties of the sea see conset. Weeks, W.F., (1746, p.37-105). Winner marginal see some experiments, Frant Scratt Greenland Sea. 1947:189. Davidson, K., ed., (1944, 57);	Defective geogenies of strained see. 1 Effect of plantic straining. Impali, K., (1987, p.14)-147; MP 236 ICE PRESSURE Let pressure on engineering structures. Michel, B., (1970, 77)-2. Hill-Bib. Ice pressure Let forces on vertical piles. Nevel, D.E., et al., (1972, p. 66- 1164; MP 1014 Structures in scendented outer. Anon, A., (1972, p. 93-97), MP 1016 Depth of water-felfed creagues of glaciers. Recriming, J., (1972, p. 136-165). Let al., (1972, p. 136-165). MP 1066 Classification and variations of sea are rulping in the Arches Josen. Hibler, W.D., III, et al., (1974, p. 127-166).	D.S., et al., [1944, 1693] Ice Moch stability Daly, S.F., [1964, p.544-548] MP 1972 Sheet tee forces on a content structure: an experimental study, South, D.S., et al., [1965, p.46-54] MP 1915 Sheet tee forces on a content structure: an experimental study, South, D.S., et al., [1985, p.46-34] MP 1906 Experience with a bassail see stress sensor (1965, p.252-258) Instrumentation for an upfolding ice force model. L.J., [1985, p.1436-1435] MP 2001 Ice cover research—present state and future media. Kerr, A.D., et al., [1986, p.184-199) MP 2004
K.C., et al., (1994, p.)25-331; MP 1871 Lee ultimat frequence in Scelariston Sound, Almia Konaci, A., (1993, p. 101-115; MP 1900 Physical properties of sea ace in the Gereniand Sea Tenfer, W.R., et al., (1995, p. 177-119; MP 1903 Pressure ridge and sea are properties Gereniand Sea Tucker, W.R., et al., (1995, p. 216-213), MP 1905 Climatic factors in outle reposes surface conditions. Biolitic, MA., (1995, p. 568-511), MP 1901 Physical properties of the sea ace context. Weeks, W.F., (1994, p. 37-162). MP 2007 Winner susceptial see some experiments, Fram Serial Gereniand Sea, 1907:189. Davidson, K., ed., (1994, p. 57-204). See 56-69 River and bike we empreceing. Ashton, G.D., ed., (1994, 165-2).	Defective geogenies of structed see. 1 Effect of plants structure, Ingola, K., (1987, p.163-187). MP 2396 ICE PRESSURE Lee pressure on empirering structures. Michel, B., (1970, 717). Ide pressure Lee forces on vertical piles. Nevel, D.E., et al., (1972, p.164-114). Structures in scendenced outer. Assoc, A., (1972, p. 93-97). MP 1046 Dejek of uncerdified creament of glacies. The estimate, J., (1972), p.136-145). Classification and variation of sea are religing in the Actual Joseph. History, W.D., III, et al., (1974, p. 127-146). MP 1042 lee forces on model structures. Labilatoly, L.J., et al.	D.S., et al., [1944, 369.] Ice Moch stability. Duly, S.F., [1944, p.544-548] MP 1972 Sheet see foeces on a conneal structure an experimental study. South, D.S., et al., [1945, p.46-54] MP 1915 Sheet see foeces on a conneal structure; an experimental study. South, D.S., et al., [1945, p.463-655] MP 1945 Experience with a based see stress scenor. Con., G.F.N., [1955, p.252-158] Instrumentation for an updifring ice foece model. Zublanday, L.J., [1945, p.140-1455] Ice cover research—present state and finance meeds. Kerr, A.D., et al., [1946, p.344-394] Impact see foece and pressure. An experimental study with sera see: South, D.S., et al., [1946, p.564-576] MP 2017 Personal and bucking failure of footning ice sheets against
K.C., et al., (1944, p.323-331) MP 1871 lee ulanel fragment in Scelassion Sound, Alinka. Exist. A., (1943, p.101-115; MP 1940 Physical properties of sea see in the Gerenfund Sea. Tucker, W.R., et al., (1945, p. 177-131) MP 1940 Pressure ridge and sea see properties Gerenfund Sea. Tucker, W.R., et al., (1945, p. 216-213) MP 1941 Chimizic factors in ends regions surface conditions. Ricker, M.A., (1945, p. 508-517) Weeks, W.F. 1945, p. 308-517; Physical properties of the sea see conset. Weeks, W.F. 1946, p. 327-107; Winner surgual net rome experiment, Fram Stran. Gerenfund Sea., 1947-89. Davidson, K., ed., (1944, 577) River and hise we empireering. Ashion, G.D., ed., (1944, 457); lee Societs on bridge piers. Haynes, F.D., (1948, p. 36-101) Chemical fractionation of being in McMatdo-lee Shell. Sep.	Defective geogenies of structured use. 1 Effect of planting linguist, K., (1987, p.143-147). MP 2356 ICE PRESSURE Ice pressure on engineering structures. Michel, B., (1970, T1p.) Responses Ice forces on vertical piles. Nevel, D.E., et al., (1972, p.164-116). Structures in scendenced water. Amer, A., (1972, p.31-97). MP 1016 Depth of water-falled circumses of glaciers. The entire at the post of the circumstance of scenarios. The certains, J., (1973, p.135-145). Uniformized and samitions of scance indeping in the Arctic bosts. Hibder, W.D., III, et al., (1974, p.127-146). MP 1022 Ice forces on model structures. Tabilantis, L.J., et al., (1975, p.400-407).	D.S., et al., [1942, Jup.; Ice Moch stability. Duly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a conneal structure: an experimental study, Soulhi, D.S., et al., [1965, p.46-54] Sheet see forces on a conical structure; an experimental study, Soulhi, D.S., et al., [1965, p.46-555] MP 1965 Experience with a bassad see stress sensor. Con., G.F.N., [1965, p.252-258] Issurimencation for an upfoling ice force model. Tablanday, L.J., [1965, p.164-1635] MP 2001 Ice cover research—present state and future needs. Kerr, A.D., et al., [1966, p.164-169] MP 2004 Impact see force and pressure. An experimental study with stress to: Soulhi, D.S., et al., [1966, p.504-576] MP 2017 Personal and bucking failure of floating ice sheets against structures. Soulhi, D.S., et al., [1966, p.379-359] MP 2017 Medel study, of ne forces on a single pile. Zabilanday, L.L. Medel study, of ne forces on a single pile. Zabilanday, L.L.
K.C., et al., (1994, p.323-331) MP 1871 lee ulimit fregment in Seclassion Sound, Almia Konaci, A. (1993, p.101-115) MP 1900 Physical properties of sea ace in the Gerenland Sea. Tender, MP 2003 Pression endge and aca are properties Gerenland Sea. Tender, W.B., et al., (1995, p.316-213) MP 1905 Chimitic factors in could repions surface conditions. Recta, MA., (1995, p.366-517) MP 1907 Physical properties of the sea ace content. Weeks, W.F. (1994, p.37-162) MP 2007 Winter starginal ace rome experiment, Fram Serial Gerenland Sea, 1907:189 Davidson, K., ed., (1994, 57-2) Reset and lake are empireering. Ashnon, G.D., ed., (1994, 455-2) lee forces on budge poers. Haynes, F.D., (1994, p.57-101) MP 2100 Chemical fractionations of bester in McMatch-lee Shell. Comp., 311, et al., (1974, p.56-11).	Defective properties of structured use. 1 Effect of plantic structure, Impali, K., (1987, p.163-187). MP 2356 ICE PRESSURE Les pressure on empirering structures. Michel, B., (1970, 719). Re pressure Les forces on vertical ples. Nevel, D.E., et al., (1972, p.164-116). Structures in scendenced union. Assoc, A., (1972, p.94-97). MP 1014 Depth of union-falled cres pases of glaciers. Me 1046, (1971), p.136-165. Cressformer and variations of sea not redging in the Archivers in Holes, W.D., III., et al., (1974, p. 127-1464). MP 1022 les forces on model structures. Labitatoly, L.J., et al., (1975, p. 200-107). MP 283 Standard variations in Archive was not religing and deformation rates. Holest, W.D., III., (1987, p. 211-115). MP 284	D.S., et al., [1944, Jup.] Ice Moch stability Duly, S.F., [1964, p.544-548] MP 1972 Sheet see focces on a conneal structure an experimental study. South, D.S., et al., [1965, p.46-54] MP 1975 Sheet see focces on a conneal structure: an experimental study. South, D.S., et al., [1965, p.46-54] Experiment with a basial see stream experimental study. South, D.S., et al., [1965, p.643-655] MP 1997 Experiment with a basial see stream scance Con., G.F.N., [1965, p.252-258] Institute state and supfifing ice force model. Tablanally, L.J., [1965, p. 140-1405] Institute over research—present state and future meeds. Kere, A.D., et al., [1966, p. 184-199] Impact see force and pressure. An experimental study with streamer. South, D.S., et al., [1964, p. 364-576] MP 2007 Personal and bucklang failure of flooting ice sheets against structures. South, D.S., [1964, p. 379-559] MP 2106 Model study of see Socces on a single pile. Zabitansky, L.J., [1964, p. 75-557] MP 2108
K.C., et al., (1994, p.323-331) MP 1871 lee ulined fragment in Seclassion Sound, Almia. Essace, A., (1993, p.101-115; MP 1900 Physical properties of sea see in the Gereniand Sea. Techer, W.R., et al., (1905, p.177-131) MP 1903 Pressure ridge and sea see properties Gereniand Sea. Tucker, W.R., et al., (1905, p. 216-213) MP 1903 Chimzale factors in ordit regions surface conditions. MA, (1995, p.505-517) MP 1904 Physical properties of the sea nee conser. Weeks, W.F., (1904, p.37-102) Winner surginal set some experiments, Fram Seam Gereniand Sea, 1907:89 Davidson, K., ed., (1904, 57); MP 2007 Rivert and lake see engineering. Ashion, G.D., ed., (1904, 455); Lee Socces on bridge piers. Hayner, F.D., (1908, p.50-107) Chemical fractionation of besine in McMardo-lee Shelt. Cropn, J.H., et al., (1976, p.367-313) Perspecience in see technology. Ashion, G.D., (1954, 5); Properties in see technology. Ashion, G.D., (1954, 5); Properties in see technology. Ashion, G.D., (1954, 5); Properties in see technology. Ashion, G.D., (1954, 5); 2209	Defective geogenies of structured use. 1 Effect of plantic structure, Ingula, K., (1987, p.14)-147; MP 236 ICE PRESSURE Les pressure on engineering structures. Michel, B., (1970, 717); He pressure on engineering structures. Michel, B., (1970, 717); He pressure Les forces on vertical piles. Nevel, D.E., et al., (1972, p.31-97); MP 1014 Structures in see infested uniter. Anon, A., (1972, p.31-97); MP 1016 Depth of water-folied creations of glacers. Meritania, J., (1973, p.13-145); Classification and variations of sea see infigure in the Arcine Josen. Hibler, W.D., III, et al., (1974, p.127-146); MP 1022 les forces on model structures. Labilancia, L.J., et al., (1975, p.400-407); MP 263 Structured variations in Arcine sea see infigure and defensation races. Hibler, W.D., III, (1975, p.11-13); MP 263 Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); MP 263 Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); MP 263 Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Labilancia, L.J., et al., (1975, p.11-13); Les forces on minifered structures. Lab	D.S., et al., [1942, Jup.] Ice Mock stability. Daly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al. [1965, p.46-54] Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al. [1965, p.46-555] MP 1965 Experiment until a husual see stress sensor. Con., G.F.N., 1965, p.252-258] Instrumentation for an upfolding ice force model. Tabilanuly, L.J., [1965, p.184-1635] L.J., [1965, p.184-1635] Instrumentation for an upfolding ice force model. Kerr, A.D., et al., [1966, p.384-969] Instrumentation for an upfolding ice force model. Kerr, A.D., et al., [1966, p.384-969] Impact see force and pressure: An experimental study with strease: Soulhi, D.S., et al., [1966, p.394-556] MP 2087 Persural and bucklang failure of floating ice sheets against structures. Soulhi, D.S., et al., [1966, p.374-356] MP 2087 Persural and bucklang failure of floating ice sheets against structures. Soulhi, D.S., (1966, p.374-356) MP 2087 Persural and bucklang failure of floating ice sheets against structures. Soulhi, D.S., (1966, p.374-356) MP 2087 Persural and bucklang failure of floating ice sheets against structures. Soulhi, D.S., (1966, p.374-356) MP 2088 Copp of expensers seek see solutions. Frankessten, G.E., [1967, p.5-7] MP 2108
K.C., et al., (1994, p.323-331) MP 1871 lee ulimit fregment in Seclassion Sound, Almia Konac, A., (1993, p.101-115) MP 1900 Physical properties of sea are in the Gerenland Sea. Tender, MP 2003 Pression endge and aca are properties Gerenland Sea. Tender, W.B., et al., (1995, p.316-213) MP 1905 Chamile factors in could repose surface conditions. Recta, MA., (1995, p.366-511) MP 1901 Physical properties of the sea are content. Weeks, W.F. (1994, p.37-102) Winers stargmalize rome experiment, Fram Serial Gerenland Sea, 1907-189 Davidson, K., ed., (1994, p.37-104) River and lake are empireering. Ashnon, G.D., ed., (1994, 455-24) lee forces on budge poers. Haynes, F.D., (1994, p.56-104) MP 2100 Chemical fractionation of bester in McMittol- lee Shell. Comp., 111, et al., (1994, p.56-11). MP 2100 Chemical fractionation of bester in McMittol- lee Shell. Comp., 111, et al., (1994, p.56-11). MP 2100 Field techniques for obtaining expineering characteristics of	Defective properties of structured use. 1 Effect of plantic training. Engals, K., (1987, p.163-187). MP 2396 ICE PRESSURE Ice pressure on empiricing structures. Michel, B., (1970, 717). Re pressure Ice forces on serrical piles. Nevel, D.E., et al., (1972, p.164, 116). Structures in scendenced water. Asser, A., (1972, p.34-97). MP 1016 Depth of water-failed cressures of glaciers. MP 1046. Classification and samitions of sea are rulging in the Areas (1972, p.184-185). MP 1022. Ice forces on model structures. Labilately, L.J., et al., (1973, p. 400-407). Structures is an included structures. Labilately, L.J., et al., (1973, p. 387-196). Ice forces on minufaced structures. Labilately, L.J., et al., (1973, p. 387-196). Ice forces on minufaced structures. Labilately, L.J., et al., (1973, p. 387-196). Ice forces on minufaced structures. Labilately, L.J., et al., (1973, p. 387-196). Freces on an acto-boson on the Ecothamoro Canal. Perlam,	D.S., et al., [1942, 3693] Ice Moch stability. Daly, S.F., [1944, p.544-548] MP 1972 Sheet see forces on a conscal structure: an experimental study. South, D.S., et al., [1945, p.46-54] MP 1915 Sheet see forces on a conscal structure: an experimental study. South, D.S., et al., [1945, p.46-54] Experience with a basial see stress senore. Con., G.F.N., [1945, p.252-259] Instrumentation for an updoing ice force model. Zahdanday. L.J., [1945, p.1640-1635] Ice cover research—present state and future mechs. Kerr, A.D., et al., [1946, p.194-199] Impact see force and pressure. An experimental study with stressee. South, D.S., et al., [1946, p.304-579] Pleyseal and bucking failure of floating ice sheets against structures. South, D.S., [1946, p.374-379] MP 2114 Model study of the forces on a single pile. Zahdanday, L.J., [1946, p.77-87] Corp. of engineers seek see solutions. Frankessiem, G.E.,
K.C., et al., (1994, p.323-331). MP 1871 lee ulined fragment in Seclassion Sound, Almia. Kosses, A., (1993, p.101-115). MP 1900 Physical properties of sea see in the Gereniand Sea. Techer, W.R., et al., (1995, p.177-118). MP 1903 Pressure ridge and sea are properties Gereniand Sea. Tucker, W.R., et al., (1995, p. 216-213). MP 1905 Climatic factors in ordi regions surface conditions. Refere, M.A., (1995, p. 508-517). MP 1901 Physical properties of the sea nee owner. Weeks, W.F., (1796, p. 327-102). MP 2007 Winner integral net root experiment, Fram Serial Gereniand Sea, 1997:89. Davidson, K., ed., (1994, 57); Sea, 1907:89. Davidson, K., ed	Defective properties of structured use. 1 Effect of plantic transing. Engals, K., (1987, p.163-187). MP 2396 ICE PRESSURE Lee pressure on empirering structures. Michel, B., (1970, 717). Lee pressure on empirering structures. Michel, B., (1970, 717). Lee pressure Lee forces on vertical piles. Nevel, D.E., et al., (1972, p.166, 116). MP 1016 Structures in scendenced water. Asser, A., (1972, p.34-97). MP 1016 Dejeth of water-failed cressures of glaciers. Mercurian, J., MP 1016 Circulationers and variations of sea are rulging in the Areas when Holler, W.D., III., et al., (1973, p.171-184). MP 1022 Lee forces on model structures. Labilately, L.J., et al., (1975, p.360-807). MP 2405-807. MP 2406-807. MP	D.S., et al., [1942, Jup.] Ice Moch stability. Daly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al. [1965, p.46-54] Sheet see forces on a councal structure: an experimental study, Soulhi, D.S., et al. [1965, p.46-555] MP 1965 Experiment with a basial see stress sensor. Con., G.F.N., [1965, p.252-258] Intertrumentations for an upfolding ice force model. Tabilanuly, L.J., [1965, p.164-1635] Intertrumentations for an upfolding ice force model. Tabilanuly, L.J., [1965, p.164-1635] Intertrumentations for an upfolding ice force model. Ren, A.D., et al. [1966, p.384-369] Intertrumentations for an upfolding ice force model. Ren, A.D., et al. [1966, p.384-369] MP 2001 Impact see force and pressure: An experimental study with streaster. Soulhi, D.S., et al. [1966, p.394-359] MP 2017 Persural and bucklang failure of floating ice sheets against structures. Soulhi, D.S., [1966, p.374-359] MP 2018 MP 2019 Location of the forces on a sangle pile. Tabilanuly, L.J., [1964, p.77-87] Corps of expensers seek see solutions. Frankenstein, G.E., [1967, p.5-7] Kallish are stress measurement program. Cos., G.F.N., [1967, p.100-107] MP 2198 Location of the forces of the solution of the structures. John 2198 Location of the forces of the solution of the structures. John 2198 Location of the forces of the solution of the structures. John 2198 Location of the solution of the structures. John 2198 Location of the solution of the
K.C., et al., (1944, p.323-331) MP 1871 lee ulanel fragment in Seclassion Sound, Alisha. Exist. A., (1943, p.101-115; MP 1900 Physical properties of sea see in the Gerenland Sea. Tocker, W.R., et al., (1945, p. 177-131) MP 1901 Pression ridge and sea see properties Gerenland Sea. Tocker, W.R., et al., (1945, p. 176-121) MP 1905 Chamatic factors in orde regions surface conditions. RicZio, M.A., (1945, p. 508-517) MP 1905 Physical properties of the sea see conset. Weeks, W.F., (1756, p. 327-102) Winner surginal net rome experiment, Fram Stant. Gerenland Sea, 1947-89. Davidson, K., ed., (1944, 577) Sea, 1907-89. Davidson, K., ed., (1944, 577) River and like we engineering. Ashion, G.D., ed., (1944, 457-2) Ice forces on bridge piers. Haynes, F.D., (1948, p. 56-101) Chemical fractionation of bester in McMardo lee Shell. Cra- gin, J.H., et al., (1976, p. 367-313) MP 2200 Field techniques for obtaining expineering elementation of frail are accumulations. Deno, A.M., 21, (1956, p. 255- 215) Although Sea.	Defective properties of structed use. 1 Effect of plants training. Engals, K., (1987, p.163-187). MP 2396 ICE PRESSURE Ice pressure on engineering structures. Michel, B., (1970, 717). Ide pressure Ice forces on sertical ples. Nevel, D.E., et al., (1972, p.164, 116). Structures in scendenced water. Asser, A., (1972, p.93-97). MP 1016 Depth of water-failed cres pases of glaciers. MP 1046. Classification and samition of sea are engage in the Areas (1971), p.136-185. Classification and samition of sea are engage in the Areas (1972, p. 400-407). See forces on model structures. Zabilancia). LJ, et al., (1973, p. 387-196). Signaturals samitions in Arease was see relging and defensation area. Holder, W.D., III, (1975, p. 313-135). MP 260 Ice forces on models structures. Zabilancia, LJ, et al., (1975, p.37-196). Freeze on a machine of sea see relging and defensation area. Holder, W.D., III, (1975, p.31-135). MP 260 Ice forces on minufaced structures. Zabilancia, LJ, et al., (1975, p.387-196). Freeze on an act boson on the Ecothamose Canal. Perfam, R.E., et al., (1975, p.387-461). Ges inclassions in the Assistance we sheet. Good, AJ, et al., (1975, p.312-350). MP 260 Ges inclusions in the Assistance we sheet. Good, AJ, et al., (1975, p.312-350). MP 260	D.S., et al., [1942, 1693.] Ice Moch stability. Duly, S.F., [1944, p.544-548] MP 1972. Sheet see forces on a council structure an experimental study. South, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-1655] MP 1995. Experiment with a beauth see stress sensor. Con., G.F.N., (1945, p.254-1246) L.J., [1945, p.164-1675] International for an upfolding ice force model. Tubbunds, L.J., [1945, p.164-1675] MP 2091. Ice cover research—present state and future needs. Kerr, A.D., et al., [1940, p.194-199] Impact see force and pressure. An experimental study with strea see. South, D.S., et al., [1940, p.396-576] MP 2097. Personal and buckling failure of fusions (c. sheets against structure). South, D.S., (1960, p.379-376) MP 2007. MP 2008. MP 2008. South of the forces on a single pile. Tabilitanty, L.J., (1944, p.77-37) Copys of experiences seek act solutions. Frankenstein, G.E., (1947, p.57-1) Kadlish are stress measurement program. Cos., G.F.N., (1947, p.56-1) Kadlish are stress measurement program. Cos., G.F.N., (1947, p.56-1) MP 2109. Kadlish for stress measurement program. Cos., G.F.N., (1947, p.56-1) MP 2109. Results from midentinous tests on freshwater see. South, Results from midentinous tests on freshwater see.
K.C., et al., (1994, p.323-331) MP 1871 lee ulined fragment in Seclassion Sound, Alinka Kosaci, A., (1993, p.101-115) MP 1900 Physical properties of sea see in the Gerenland Sea. Techer, W.R., et al., (1995, p.177-118) MP 1903 Pressure ridge and sea are properties Gerenland Sea. Tucker, W.R., et al., (1995, p. 216-223) MP 1905 Climatic factors in orde regions surface conditions. Reference (1996, p. 216-223) MP 1905 Physical properties of the sea are conset. Weeks, W.F., (1996, p. 256-517) MP 1901 Physical properties of the sea are conset. Weeks, W.F., (1996, p. 257-102) MP 2007 Winner marginal net rome experiment. From Serial Gerenland Sea, 1997:189 Division, K., ed., (1994, 577) See p. 201-189 Division, K., ed., (1994, 577) MF 2100 River and lake we empreering. Ashon, G.D., ed., (1994, 455) Lee Socies on beidge piers. Haynes, F.D., (1998, p. 55-101) MF 2100 Chermical fractionation of beine in McMardo-lee Shell. Cergin, J.H., et al., (1978, p. 367-113) MF 2200 First techniques for obtaining expinienting characteristics of fresh are accumulations. Denn, A.M., M., (1956, p. 255-272) Alternal properties of sea are discharged from Fram Social MP 2100 Physical properties of sea are discharged from Fram Social	Defective geoperates of structured use. 1 Effect of plantic terratumg. Engold, K., (1987, p.16-1617). MP 2396 ICE PRESSURE Les personne on engineering structures. Michel, B., (1970, 717). Re pressure on temperating structures. Michel, B., (1970, 717). Re pressure Les forces on vertacul ples. Nevel, D.E., et al., (1972, p.164, 116). MP 1014 Structures in terrated outer. About, A., (1972, p. 91-97). MP 1016 Depth of uniter-filled cressures of glaciers. Me retinum, J., (1971), p.15-165). MP 1016 Classification and variations of sea ner religing in the Archive Josen. Hiller, W.D., III, et al., (1974, p.127-166). MP 1022 let forces on model structures. Labilansky, L.J., et al., (1975, p. 310-367). MP 230 Let forces on mindfeel structures. Labilansky, L.J., et al., (1975, p. 317-374). MP 230 Let forces on a new hoson in the Ecculturation Canal. Perform, R.E., et al., (1975, p. 317-367). Gas inclusions in the Astructure see sheet. Good, A.J., et al., (1975, p. 310-3169). Gas inclusions in the Astructure see sheet. Good, A.J., et al., (1975, p. 310-3169). MP 230 Frecer. deringer previous in unitary distribution, lines. McFalden, Y., (1977, p. 212-217). MP 250	D.S., et al., [1942, Jup.] Ice Mock stability. Duly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a comeal structure an experimental study. South, D.S., et al., [1965, p.46-54] Sheet see forces on a conical structure, an experimental study. South, D.S., et al., [1965, p.46-545] MP 1965 Experiment with a husual net stress scenare. Con., G.F.N., [1965, p.252-258] Institutestation for an upfoling ice force model. Tablanday, L.J., [1965, p.154-1455] MP 2091 lee cover research—present state and future meeds. Kerr, A.D., et al., [1964, p.384-399] Impact see force and pecsaure. An experimental study with strease. South, D.S., et al., [1964, p.39-576] MP 2007 Personal and buckling failure of floating ice sheets against structure. South, D.S., et al., [1964, p.39-576] MP 2007 MP 2008 MP 2008 Corps of engineers seek see southours. Frankenstern, G.E., [1967, p.57] Kallish see stress measurement program. Con., G.F.N., [1967, p.57] Kallish see stress measurement program. Con., G.F.N., [1967, p.56] In stress measurements atomod offshore structures. Johnson, J.B., [1968, p.35-59] Resilts from melecations tests on freshwater see. South D.S., et al., [1968, p.35-59] MP 2008 MP 2008 Resilts from melecations tests on freshwater see. South D.S., et al., [1968, p.35-59] MP 2008
K.C., et al., (1994, p. 23-33). MP 1871 lee ulined fragment in Seclassion Sound, Almán. Kosse, A., (1993, p. 101-115). MP 1900 Physical properties of sea see in the Gerenfund Sea. Techer, W.R., et al., (1995, p. 177-134). MP 1903 Pressure ridge and sea see properties Gerenfund Sea. Tucker, W.R., et al., (1995, p. 177-134). MP 1903 Physical properties of the sea see contents of Received MA., (1995, p. 505-517). MP 1904 Physical properties of the sea see content. Weeks, W.F., (1996, p. 37-102). MP 2007 Winner surgual see some experiment, Fram Stand. Gerenfund Sea, 1907:89. Davidson, K., ed., (1994, 57-2). MP 2007 River and links we engineering. Ashion, G.D., ed., (1994, 455-2). MP 2104 Chemical fractionaction of besine in McMando lee Shelt. Crapin, J.H., et al., (1976, p. 36-31). MP 2209 Perspectaves in see technologis. Ashion, G. D., (1994, 5p. 205-207). MP 2209 Field techniques for obtaining engineering characteristics of draft are accumulations. Deno, A.M., 21, (1996, p. 205-275). MP 2209 Facilities and sea see mechanisms in the U.S. Sockin, D.S., et al., (1997, p. 37-105). MP 2309 Physical properties of summer see see in the Fram Series. Gen., A.J., et al., (1997, p. 340-275). Physical properties of summer see, see in the Fram Series.	Defective properties of structured use. 1 Effect of plante structure, Impali, K., (1987, p.143-147). MP 2396 ICE PRESSURE Ice pressure on engineering structures. Michel, B., (1970, 717); Ide pressure on sertical piles. Nevel, D.E., et al., (1972, p.164-1116). MP 1018 Structures in secretical outer. Asser, A., (1972, p.91-97). MP 1019 Depth of sister-falled creations of glaciers. Me 1041 (1973, p.136-145). MP 1043 Classification and samition of sea are rulping in the Arctic John, I. Hole, W.D., III, et al., (1974, p.127-146). MP 1022 Ice Secres on model structures. Tabilistics, L.I., et al., (1975, p. 800-807). MP 863 Signatural samitions in Arctic sea see rulping and defensions race. Hibber, W.D., III, (1975, p.31-145). MP 863 Ice Secres on simulated structures. Tabilistics, L.I., et al., (1975, p.387-394). MP 864 Freeze on a nechosin in the Ecustiannose Canal. Perham, R.E., et al., (1975, p.397-360). MP 865 Ges inclusions in the Antarctic see sheet. Ges., A.J., et al., (1975, p.311-375). MP 867 Freeze damage precision in soliday distribution. Inter-	D.S., et al., [1942, 1693.] Ice Mock stability. Duly, S.F., [1944, p.544-548] MP 1972. Sheet see forces on a council structure an experimental study. South, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-1655] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-1655] Interconnect with a beauth see stress sensor. Con., G.F.N., L.J., [1945, p.154-1635] Interconnectation for an upfoling ice force model. Tubbunds, L.J., [1945, p.164-1635] Interconnectation for an upfoling ice force model. Tubbunds with surea see. South, D.S., et al., [1946, p.36-556] MP 2001 Interconnectation for an upfoling ice force model. Research series and pressure. An experimental study with surea see. South, D.S., et al., [1946, p.39-556] MP 2007 Personal and buckling failure of footness ice sheets against structures. South, D.S., [1946, p.37-57] MP 2008 MP 2008 MP 2008 Kaddis also stress measurement program. Con., G.F.N., L[1947, p.57-17] Kaddish are stress measurement program. Con., G.F.N., L[1947, p.36-167] Kaddish are stress measurement program. Con., G.F.N., L[1947, p.36-167] MP 2108 MP 2
K.C., et al., (1994, p.25-331) MP 1871 lee ulined fragment in Seclassion Sound, Alinkia Kosaci, A., (1993, p.101-115) MP 1900 Physical properties of sea are in the Gerenfund Sea. Techen, W.R., et al., (1995, p.177-119) MP 1901 Pressure ridge and are are properties Gerenfund Sea. Tucker, W.R., et al., (1995, p.216-223) MP 1905 Chimatic factors in orde reposes surface conditionts. Bicklin, MA., (1995, p.565-512) MP 1901 Physical properties of the sea are conset. Weeks, W.F., (1994, p.37-162) MP 2007 Winner surgical are zone experiments, Fram Serial Gerenfund Sea, 1997:189 Davidson, K., ed., (1994, 57-2) Reset and bike we emprocessing. Ashton, G.D., ed., (1994, 459-2) Reset and bike we emprocessing. Ashton, G.D., ed., (1994, 459-2) Chemical fractionation of better in McMardo-lee Shell. Copin, 3114, et al., (1994, p.36*-113) MP 2209 Perspectives in see technology. Ashton, G.D., (1994, 52-102) MP 2209 Field technoques for obtaining engineering characteristics of fracil are accommissions. Dens., A.M., 31, (1995, p.255-212) Advances in see see mechanics in the USA. South, D.S., et al., (1997, p.37-104) Physical properties of sea are discharged from Fram Strat Gen., A.J., et al., (1997, p.340-429) Physical properties of sea are discharged from Fram Strat Gen., A.J., et al., (1997, p.340-429) Physical properties of sea are discharged from Fram Strat Gen., A.J., et al., (1997, p.340-429) Physical properties of sea are faschurged town Fram Strat Gen., A.J., et al., (1997, p.340-429) Physical properties of sea are faschurged town Fram Strat Gen., A.J., et al., (1997, p.340-429) Physical properties of sea are faschurged town Fram Strat Gen., A.J., et al., (1997, p.36-25-486), use in the Fram Strat Turker, W.B., et al., (1997, p.36-25-486), use in the Fram Strat Turker, W.B., et al., (1997, p.36-25-486), use in the Fram Strat Turker, W.B., et al., (1997, p.36-25-486), use in the Fram Strat	Defective properties of structured use. 1 Effect of plantic structuring. Engals, K., (1987, p.16-167). MP 2396 ICE PRESSURE Les pressures on empireming structures. Michel, B., (1970, 717). The pressure of empireming structures. Michel, B., (1970, 717). Les pressures. Les forces on vertical ples. Nevel, D.E., et al., (1972, p.164-114). MP 1014 Structures in scendenzel outer. Assoc, A., (1972, p. 94-97). MP 1016 Depth of outer-failed creations of glaciers. Meritimes, J., MP 1016 Depth of outer-failed creations of glaciers. The entires, J., MP 1016 Depth of outer-failed creations of glaciers. The entires, J., MP 1016 Depth of outer-failed creations of glaciers. The entires, J., MP 1016 Depth of outer-failed creations of sea are religing in the Artent Josen. Hilder, W.D., III., et al., (1974, p. 127-164). MP 200 Les forces on model structures. Labilitatis, L.J., et al., (1975, p. 367-194). MP 200 Les forces on minufaced structures. Labilitatis, L.J., et al., (1975, p. 367-194). MP 200 Les forces on a net boson on the Besidhamoro Canal. Perham, R.E., et al., (1975, p. 367-194). Ges inclusions in the Artificial creations from A.J., et al., (1977, p. 367-194). Freeze deringe previousness in scalegy distribution lines. MF 207 Les forces on vertical piles. Nexel, D.E., et al., (1977, 9.7). CR 77-10 Freeze Lamage previousness en solley lines. McFaddex, T.,	D.S., et al., [1942, Jup.] Ice Mock stability. Duly, S.F., [1964, p.544-548] MP 1972 Sheet see forces on a comeal structure: an experimental study. Soulhi, D.S., et al., [1965, p.46-54] Sheet see forces on a conical structure: an experimental study. Soulhi, D.S., et al., [1965, p.46-545] MP 1965 Experiment with a husual net stream scance: Con., G.F.N., [1965, p.252-258] Institutes station for an upfoling ice force model. Tabilinally, L.J., [1965, p.164-1635] MP 2091 lete cover research—present state and future meels. Kerr, A.D., et al., [1966, p.384-399] Impact see force and pressure. An experimental study with streams: Soulhi, D.S., et al., [1964, p.59-556] MP 2007 Persural and buckling failure of floating ice sheets against structures. Soulhi, D.S., [1966, p.379-357] MP 2007 MP 2008 Model study of the forces on a sample pile. Tabilinally, L.J., [1967, p.57] Kallish are stress measurement program. Con., G.F.N., [1967, p.57] Kallish are stress measurement program. Con., G.F.N., [1967, p.160-107] Resilts from indentations tests on freshvater see. Soulh, D.S., et al., [1968, p.35-59] Resilts from measurement series on freshvater see. Soulh, D.S., et al., [1968, p.35-37] MP 2008 Mishals are stress measurement program. Con., G.F.N., [1968, p.196-2004] Mishals are stress measurement program. Con., G.F.N., MP 2008
K.C., et al., (1994, p. 232-331) Re ultand fragment in Seclassion Sound, Alinka Kosaci, A., (1993, p. 101-115) Physical properties of sea see in the Gerenfund Sea. Techer, W.R., et al., (1995, p. 177-139) Pressure ridge and sea are properties Gerenfund Sea. Tucker, W.R., et al., (1995, p. 216-223) Physical properties of the sea see conditions. Reference of the sea see conditions. Reference of the sea see conditions. Reference (1794, p. 236-317) Physical properties of the sea see conditions. Reference (1794, p. 237-102) Winner stargatulities none experiment. From Stratt Gerenfund Sea, 1997-189. Division, K., ed., (1994, 577) Kinner stargatulities none experiment. From Stratt Gerenfund Sea, 1997-189. Division, K., ed., (1994, 577) Reference and lake we empreering. Ashoot, G.D., ed., (1994, 455) Ref. (1997-199. Division, K., ed., (1994, 597) MP 2104 Chemical fractionations of better in McMardo-lee Shell. Cergin, J.H., et al., (1976, p. 367-137) MP 2209 Properties in see seemintations. Deen, A.M., M., (1984, p. 255-272) Although seeming expensions in the USA. Soulke, D.S., et al., (1997, p. 316-279) Physical properties of sea see discharged from From Stratt Gen., A.J., et al., (1997, p. 346-479) Physical properties of sea see discharged from From Stratt Gen., A.J., et al., (1997, p. 346-479) Physical properties of sea see discharged from From Scratt Gen., A.J., et al., (1997, p. 367-3460), Physical properties of sea see discharged from From Scratt Gen., A.J., et al., (1997, p. 367-3460), Physical properties of sea see of secanter and the From Scratt Gen., A.J., et al., (1997, p. 367-3460), Physical properties of characteries are one the From Scratt Gen., A.J., et al., (1997, p. 367-3460), Physical properties of characteries are one from the From Scratt Gen., A.J., et al., (1997, p. 367-3460), Physical properties of characteries are one from the From Scratt Gen., A.J., et al., (1997, p. 367-3460), Physical properties of characteries are one from the From Scratt Gen., A.J., et al., (1997, p. 36	Defective geoperises of structured use. I Effect of plantic structure, Itagaki, K., (1987, p.16)-187; MP 2396 RE PRESSURE Le pressure on engineering structures. Michel, B., (1970, 717); Re pressure Les focces on vertaculoples. Nevel, D.E., et al., (1972, p.164-116); Structures in tecnificated unter. Assoc, A., (1972, p. 91-97); MP 1014 Structures in tecnificated unter. Assoc, A., (1972, p. 91-97); MP 1016 Depth of unter-fifted cressures of glaciers. The eminim, J., (1971, p.13-165); Classification and variation of sea are rulping in the Archivation. Hilbert, W.D., III, et al., (1974, p.127-166); MP 1022 let focces on model structures. Inhibitally, L.J., et al., (1973, p. 300-807); MP 200 let focces on model structures. Inhibitally, L.J., et al., (1973, p. 300-807); MP 200 let focces on ministered structures. Inhibitally, L.J., et al., (1973, p. 300-807); MP 200 let focces on ministered structures. Inhibitally, L.J., et al., (1973, p. 300-807); MP 200 let focces on ministered structures. Inhibitally, L.J., et al., (1973, p. 300-807); MP 200 let focces on ministered structures are found for formation. MP 200 let focces on ministered structures are found formation. MP 200 let focces on ministered structures. Inhibitally, L.J., et al., (1973, p. 300-300); MP 200 let focces on ministered structures are found formation. MP 200 let focces on without formation on winding distribution. Inter- MP 200 let focces on vertical piles. Nevel, D.E., et al., (1973, p. 30) Effected farmage protection for under distribution. Inter- (1977, p. 12-16) Freeze farmage protection for under medics. Trife, F., (1977, p. 12-16) Interentions of focces arong on midmed medics. Trife, F., (1977, p. 12-16) Interention of focces arong on midmed medics. Trife, F.,	D.S., et al., [1942, 1643.] Ice Mock stability. Duly, S.F., [1944, p.544-548] MP 1972. Sheet see forces on a council structure: an experimental study. Soulh, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. Soulh, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. Soulh, D.S., et al., [1945, p.46-1655] Sheet see forces on a council structure: an experimental study. Soulh, D.S., et al., [1945, p.46-1655] In 1947. In 1945. p.251-258] In 1949. p.251-258. MP 2091. Ice cover research—present state and future needs. Keep. L.J., [1945, p.164-1675] In 1949. MP 2091. Ice cover research—present state and future needs. Keep. A.D., et al., [1940, p.194-199] Impact see force and pressure. An experimental study with strease: Soulh, D.S., et al., [1940, p.394-576] MP 2097. Personal and buckling failure of fusions (cr. sheets against structure). Soulh, D.S., et al., [1940, p.37-377] MP 2098. MP 2098. MP 2098. Rodel study of see forces on a single pile: Tabilinately, L.J., [1940, p.77-37] In 1940. p.77-377 Corps of expensers seek act solutions. Frankenstein, G.E., [1947, p.57-7] Kallish are stress measurement program. Cost, G.F.N., [1947, p.360-167] In stress measurements atound offshore structures. Johnson, J.B., [1948, p.35-59] MP 2008. MP
K.C., et al., (1944, p.323-331) Ice ulanel fragment in Scelausson Sound, Almia. Exec. A., (1943, p.101-115) Physical properties of sea see in the Gerenium Sea. Tocker, W.E., et al., (1945, p. 177-131) Pressure ridge and sea see properties Gerenium Sea. Tucker, W.E., et al., (1945, p. 177-131) Pressure ridge and sea see properties Gerenium Sea. Tucker, W.E., et al., (1945, p. 216-273) M. B., et al., (1945, p. 216-273) M. P. 1941 M. P. 1941 M. P. 1942 M. P. 1943 River and bake are engineering. Ashion, G.D., ed., (1944, 1942) River and bake are engineering. Ashion, G.D., ed., (1944, 1942) River and bake are engineering. Ashion, G.D., ed., (1944, 1942) M. P. 2144 Ice forces on bridge poers. Haynes, F.D., (1948, p. 36-101) M. P. 2146 Chemical fractionation of bester in McMardo-ker Shell. Cragin, J.H., et al., (1976, p. 36'-111) M. P. 2249 Perspectives on see technology. Ashion, G.D., (1944, p. 1948, p. 25-105) M. P. 2250 Field techniques for obtaining expiniering characteristics of frail are accommissions. Deno. A.M., M., (1948, p. 26-105) M. P. 2260 Physical properties of sea are discharged from Fram Series, d. (1987, p. 37-105) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200) Physical properties of summers are u.e. in the Fram Series (1984, M. 200)	Defective geogenies of structure to 1. Effect of plante structure, Ingala, K., (1987, p.18-1-187). MP 2396 ICE PRESSURE Le pressure on empirering structures. Michel, B., (1970, 717). Re pressure on empirering structures. Michel, B., (1970, 717). Re pressure les forces on vertical ples. Nevel, D.E., et al., (1972, p.164-114). Structures in scendencel water. Absor, A., (1972, p. 93-97). MP 1046 Depth of water-falled creasures of glaciers. Me 1046. Depth of water-falled creasures of glaciers. Me 1046. Classification and variation of sea are religing in the Arche Josen. Hiller, W.D., III., et al., (1974, p.127-166). MP 1022. Ict. Secret on model structures. Labilansky, L.J., et al., (1975, p. 18-187). MP 2306. Ict. Secret on mindled structures. Labilansky, L.J., et al., (1975, p. 387-194). MP 2306. Ict. Secret on mindled structures. Labilansky, L.J., et al., (1975, p. 387-194). MP 2306. Ict. Secret on a new boson in the Econhaction Canal. Perham. MP 2406. Grantination is the Artherite see where Good, A.J., et al., (1975, p. 387-194). MP 247 Freeze damage prevention is unitary distribution. Inter- Me 2406.P., (1977, p. 212-211). MP 250 Ict. Secrets on vertical piers. Nevel, D.E., et al., (1977, 9.2). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention or forces along on melancel wedges. Teylor, P., (1977, p. 212-21). Intercention of forces along on melancel wedges. Teylor, P., (1977, p. 212-212).	les Moch stability. Daly, S.F., [1984, p.544-548] MP 1972 Shert see Socies on a contral structure an experimental study. South, D.S., et al. [1985, p.46-54] MP 1973 Shert see Socies on a contral structure: an experimental study. South, D.S., et al. [1985, p.46-54] MP 1975 Shert see Socies on a contral structure: an experimental study. South, D.S., et al. [1985, p.46-55] MP 1976 Expertnere with a hastal see stress senate. Con., G.F.N., [1985, p.252-258] Institute of the an upfoling ice faces model. Tablanday, L.J., [1985, p.164-1645] Inc. Cost et research—present state and future mech. Kerr, A.D., et al. [1986, p.164-199] Ingust see Socies, p.184-199, Ingust see Socies, D.S., et al. [1984, p.50-576] MP 2001 Personal and buckling failure of floating ice sheets against structures. Sodin, D.S., [1984, p.379-359] MP 2017 Model study of see Socies on a unific pile. Zablanday, L.J., [1981, p.75-31] Kaffad see stress measurement program. Con., G.F.N., [1987, p.56] Kaffad see stress measurement program. Con., G.F.N., [1987, p.160-107] Ire stress measurements atomad offichere structures. Johnson, L.B., [1985, p.55-59] Modeling see restraint forces in an see boom. Perham, R.E., [1988, p.11-15] MP 2008 Modeling see restraint forces in an see boom. Perham, R.E., [1989, p.11-15] MP 2008 Meldak see stress measurement program. Con., G.F.N., [1989, p.11-15] MP 2008 Meldak see stress measurement program. Con., G.F.N., [1989, p.11-15] MP 2008 Meldak see stress measurement program. Con., G.F.N., [1989, p.11-15] MP 2008 Meldak see stress measurement program. Con., G.F.N., [1989, p.11-15] Melday p. 10-15.
K.C., et al., (1994, p. 223-231). MP 1871 lee ulined fragment in Seclassion Sound, Almán. Kosac, A., (1993, p. 101-115). MP 1900 Physical properties of sea see in the Gerenfund Sea. Tocker, W.R., et al., (1995, p. 177-118). MP 1903 Pressor ridge and sea are properties Gerenfund Sea. Tocker, W.R., et al., (1995, p. 216-223). MP 1905 Climatic factors in ordit regions surface conditions. Refere, MA, (1995, p. 508-517). MP 1901 Physical properties of the sea nee context. Weeks, W.F., (1994, p. 23-102). MP 2007 Winner integral net root experiment. From Stratt Gerenfund Sea, 1997;89. Division, K., ed., (1994, 57);2. MP 2007 River and lake see empireering. Ashion, G.D., ed., (1994, 455);2. MP 2104 Chemical fractionation of hence in McMardo lee Shell. Cropin, J.H., et al., (1976, p. 36-31); MP 2100 Chemical fractionation of hence in McMardo lee Shell. Cropin, J.H., et al., (1976, p. 36-31); MP 2209 Princetines in see technologic. Ashion, G.D., (1994, p. 25). MP 2209 Field techniques for obtaining expensering characteristics of fraith net accumulations. Deno, A.M., M., (1984, p. 26). MP 2209 Altimots in see see mechanism in the USA. South, D.S., et al., (1997, p. 31-25). MP 2209 Physical properties of sea nee discharged from Fram Series Gen., A.J., et al., (1997, p. 48-439). MP 2200 Physical properties of entireme we underectally. MP 2200 Physical properties of entireme we underectally. MP 2200 Physical properties of entireme we underectally. MP 2200 Physical properties of summer sea see in the Fram Series (1987, 1994). 1994. Gon., A.J., et al., (1987, 1972.). CR 87-11.	Defective geoperates of structured use. 1 Effect of plantic terratumg. Engals, K., (1987, p.16)-187; MP 2396 RE PRESSURE Le personne on engineering structures. Michel, B., (1970, 717); Re pressure on engineering structures. Michel, B., (1970, 717); Re pressure Les forces on vertaculoptes. Nevel, D.E., et al., (1972, p.164, 116); Structures in terrates letter. Anter, A., (1972, p. 91-97); MP 1014 Structures in terrates letter anter. Anter, A., (1972, p. 91-97); MP 1016 Depth of uniter-filled cressions of glaciers. Therminis, J., (1971, p.176-185); MP 1016 Classification and variation of sea are religing in the Article Josen. Hiller, W.D., III, et al., (1974, p. 127-146); MP 1022 let forces on model structures. Inhibitisty, L.J., et al., (1975, p. 310-30); Litter and variations in Article sea see religing and delegations rates. Hilder, W.D., III, (1975, p.31-315); MP 250 let forces on interferent structures. Inhibitisty, L.J., et al., (1975, p. 317-39); Frence and see hoom in the Econharmon Canal. Perlain, R.E., et al., (1975, p. 317-30); Gas inclusions in the Article for the exhert. Good, A.J., et al., (1975, p. 312-310); Frence damage personance in uniting distribution. Innex McFadden, Y., (1977, p. 222-231); MP 250 let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); Frence damage personance in uniting distribution. Innex McFadden, Y., (1977, p. 222-231); MP 250 let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on vertical piles. Nevel, D.E., et al., (1977, p. 23); let forces on verti	les Moch stability. Daly, S.F., [1984, p.544-548] MP 1972 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-54] MP 1973 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-54] MP 1985 Experiment with a husual see stream scenore [1985, p.252-258] MP 1997 Instrumentation for an upfoling ice force model. Tabilanday, L.J., [1985, p.184-1635] MP 2091 Ice cover research—present state and future mech. Kerr, A.D., et al. [1986, p.384-599] MP 2091 Impact see force and pressure. An experimental study with streams: South, D.S., et al. [1986, p.39-559] MP 2097 Personal and buckling failure of floating ice sheets against structures. South, D.S., et al. [1986, p.39-559] MP 2098 Model study of the forces on a single pile. Tabilanday, L.J. [1984, p.77-87] MP 2098 Kodish are stress measurement program. Cos., G.F.N., [1997, p.100-107] Kadish are stress measurement program. Cos., G.F.N., [1997, p.100-107] MP 2098 Modeling ner restraint forces in an see boom. Persham R.E., [1987, p.198-208] Meching ner restraint forces in an see boom. Persham R.E., [1987, p.198-208] Modeling ner restraint forces in an see boom. Persham R.E., [1987, p.198-208] Meching group on ner forces. 6th state-of-the-ier report. Times, G.W., ed., [1987, 188-y.] MP 2081 Meching group on ner forces. 6th state-of-the-ier report. Times, G.W., ed., [1987, 188-y.] MP 2081 MP 2082 MP 2083 MP 2083 MP 2084
K.C., et al., (1994, p. 25-33). MP 1871 lee ulaned fragment in Seclassion Sound, Almán. Kosco, A., (1993, p. 101-115). MP 1900 Physical properties of sea see in the Gerenium Sea. Techer, W.R., et al., (1995, p. 177-134). MP 1903 Pression ridge and sea see properties Gerenium Sea. Tucker, W.R., et al., (1995, p. 177-134). MP 1903 Pression ridge and sea see properties Gerenium Sea. Tucker, W.R., et al., (1995, p. 216-213). MP 1903 Physical properties of the sea see construction of MA., (1995, p. 505-517). MP 1903 Physical properties of the sea see construction MP 1904 Physical properties of the sea see construction MP 1904 Sea, 1907:89 Davidson, K., ed., (1994, 577). MP 2007 River and links we engineering. Ashion, G.D., ed., (1994, 455). MP 2104 Chemical fractionation of besire in McMardo lee Shell. Crapin, J.H., et al., (1976, p. 36-315). MP 2106 Chemical fractionation of besire in McMardo lee Shell. Crapin, J.H., et al., (1976, p. 36-315). MP 2106 First techniques for obtaining expineering characteristics of strail are accommissions. Deno, A.M., 21, (1994, p. 255-275). MP 2200 Flysical properties of sea are discharged from Fran Sease Germ, A.J., et al., (1997, p. 36-37-366). MP 2200 Physical properties of summer set us in the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets us in the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets us in the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets us in the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets us in the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets us in the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets on the Fran Sease Tucker, W.R., et al., (1997, p. 37-37-366). MP 2200 Physical properties of summer sets on the Fran Sease Tucker, W.R., et a	Defective geogenies of structed use. 1 Effect of plante utraining. Ingali, K., (1987, p.16)-1873. MP 2396 ICE PRESSURE Le personne on empirering structures. Michel, B., (1970, 717). Re pressure Le forces on vertical ples. Nevel, D.E., et al., (1972, p.164-116). Structures in terministical unter. About, A., (1972, p. 93-97). MP 1014 Depth of unter-filled creasures of glaciers. Me 1016. Depth of unter-filled creasures of glaciers. Me 1016. Classification and variation of sea are religing in the Arche Josen. Hiller, W.D., III, et al., (1974, p.127-116). MP 1022 let forces on model structures. Labilansky, L.J., et al., (1975, p.160-107). Structures uninstant structures. Labilansky, L.J., et al., (1975, p.387-198). Le forces on mindfed structures. Labilansky, L.J., et al., (1975, p.387-198). MP 230 let forces on a net boson in the flexiblation-to-Canal. Perfaint. R.E., et al., (1975, p.397-105). Gas inclusions in the Astructure is seen Goog, A.J., et al., (1975, p.397-105). MP 247 Freeze damage perfection in unitary distribution. Inter- Me 1016. Freeze damage perfection for unitary distribution. Inter- Me 1022. Freeze damage perfection for unitary distribution. Inter- Me 1027, p.12-16. Intercention for forces along on melanted unders. Tele, P., (1977, p.212-27). MP 250 let and they effects on the Sc. Marya River see boson. Per- Salm, R.E., (1975, p.212-27). MP 1017 Let and they effects on the Sc. Marya River see boson. Per- Salm, R.E., (1975, p.212-27). MP 1017 Let and they effects on the Sc. Marya River see boson. Per- Salm, R.E., (1977, p.212-27). MP 1017 Let and they effects on the Sc. Marya River see boson. Per- Salm, R.E., (1975, p.212-27). MP 1017 Let over 1 Socces on structures. Lett., A.D., (1975, p.12)- Lett. (1977, p.12)-	les Moch stability. Daly, S.F., [1984, p.544-548] MP 1972 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-54] MP 1985 Sheet see forces on a conical structure: an experimental study. South, D.S., et al. [1985, p.46-55] MP 1985 Experience with a hazard see stress sensor. Con., G.F.N., [1985, p.252-258] Instrumentation for an upfolding ice force model. Tabilmaday. L.J., [1985, p.184-1635] Les cover research—present state and future needs. Keep. A.D., et al., [1986, p.184-199] MP 2004 Impact see force and pressure. An experimental study with stres see. South, D.S., et al., [1986, p.394-576] MP 2017 Erssenl and bucking future of fusions ice sheets against structures. South, D.S., et al., [1986, p.394-576] MP 2017 MP 2017 Model study of see forces on a simple pile. Tabilmaday, L.J., [1986, p.77-37] Cosp. of exponeers seek see solutions. Frankensten, G.E., [1987, p.57-37] Kadhak see stress measurement program. Cost, G.F.N., [1987, p.306-107] Kashish kee stress measurement program. Cost, G.F.N., [1987, p.306-107] Les stress measurements atomod offshore structures. Johnson, J.B., [1988, p.381-386] Modeling see restraint forces in an see boom. Perham, R.E., [1981, p.398-208] Modeling see restraint forces in an see boom. Perham, R.E., [1981, p.3198-208] Modeling see restraint forces in an see boom. Perham, R.E., [1981, p.3198-208] Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, D.S., et al., [1988, p.381-380] Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, N.P. 2018 Modeling see restraint of section in feedbaster see. South, N.P. 2018 Mode
K.C., et. al., (1994, p.323-331). MP 1871 lee sland fragment in Seclassion Sound, Alinka. Exic. A., (1993, p.101-115). MP 1900 Physical properties of sea see in the Gerenium Sea. Tucker, W.E., et al., (1995, p.177-131). MP 1901 Pressure ridge and sea see properties Gerenium Sea. Tucker, W.E., et al., (1995, p. 177-131). MP 1903 Pressure ridge and sea see properties Gerenium Sea. Tucker, W.E., et al., (1995, p. 216-273). MP 1903 Chimizic factors in cold regions surface conditions. Bifelia, M.A., (1995, p. 508-517). MP 1901 Physical properties of the sea see conset. Weeks, W.F., (1994, p. 37-102). Winner integrals et rome experiment, Fram Serial Gerenium Sea, 1917:E9. Davidson, K., ed., (1994, p. 57-2). River and bike see engineering. Ashion, G.D., ed., (1994, p. 485-2). Ite forces on besige poers. Haynes, F.D., (1998, p. 56-101). MP 2100 Chemical fractionation of bester in McMardo-lee Shell. Cragin, J.H., et al., (1978, p. 367-311). MP 2209 Perspectives in sea technology. Ashion, G.D., (1998, p. 56-101). MP 2209 Field techniques for obtaining engineering characteristics of frail are accommissions. Deso, A.M., H., (1998, p. 56-20). 279 Abstracts in sea see mechanics in the USA. Soulks, D.S., et al., (1991, p. 371-374). MP 2200 Physical properties of sea are discharged from Fram Serial Gen., A.J., et al., (1997, p. 878-334-354). MP 2200 Physical properties of summer sea see in the Fram Serial Gen., A.J., et al., (1997, p. 878-334-354). MP 2201 Physical properties of summer sea see in the Fram Serial Mee. Meese, D.A., et al., (1997, p. 878-334-354). MP 2201 Physical properties of summer sea see in the Fram Serial. Meese, D.A., et al., (1997, p. 878-334-344). MP 2201 Physical properties of summer sea see in the Fram Serial. Meese, D.A., et al., (1997, p. 878-334-344). MP 2201 Physical properties of summer sea see in the Fram Serial and sea. Comp., A.J., et al., (1997, p. 878-334-344). MP 2201 Physical properties of summer sea see with Fram Serial sea. Gen., A.J., et al., (1997, p. 873-334-344). M	Defective geogenies of structure to 1. Effect of plantic structure, Ingala, K., (1987, p.18-1-187). MP 2396. ICE PRESSURE. Ice pressure on empiricing structures. Michel, B., (1970, 717). Ice pressure on empiricing structures. Michel, B., (1970, 717). Ice pressure les forces on vertical ples. Nevel, D.E., et al., (1972, p.164-114). MP 1014. Structures in scendencel under. About, A., (1972, p.31-97). MP 1014. Depth of underfolked creasures of glaciers. Mercettine, J., (1971), p.13-145). MP 1014. Depth of underfolked creasures of glaciers. Mercettine, J., (1971), p.13-145). MP 1014. Depth of underfolked creasures of glaciers. Mercettine, J., (1971), p.13-145). MP 1014. Depth of underfolked creasures of glaciers. Mercettine, J., (1971), p.13-145. MP 1014. Depth of underfolked creasures. Jahlansky, L.J., et al., (1972), p.30-145. MP 1015. p.11-115. MP 1015. p.11-115. MP 1016. Interfolked structures. Jahlansky, L.J., et al., (1973), p.31-146. MP 2016. Interfolked creasures are home in the Econhactures Canal. Perfolked Grandsmann in the Astructure of Scholassity, L.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP 2016. Grandsmann in the Astructure seaters. Good, A.J., et al., (1973), p.31-146. MP	D.S., et al., [1942, 1943.] Ice Moch stability. Daly, S.F., [1944, p.544-548] MP 1972. Sheet see forces on a comeal structure: an experimental study. Soffit, D.S., et al. [1945, p.46-54] Sheet see forces on a comical structure: an experimental study. Soffit, D.S., et al. [1945, p.46-545] MP 1995. Expertnere with a husual see stress scance. Con., G.F.N., [1945, p.252-258] MP 1997. Instrumentation for an upfolding ice force model. Tabilansky, L.J., [1945, p.140-1635] MP 2091. Ice cover research—present state and future mech. Kerr, A.D., et al., [1946, p.194-199] MP 2091. Impact see force and pecture. An experimental study with strea see. Soffit, D.S., et al., [1946, p.39-576] MP 2097. Personal and buckling failure of floating ice sheets against structures. Soffit, D.S., et al., [1946, p.39-576] MP 2098. Porsonal and buckling failure of floating ice sheets against structures. Soffit, D.S., et al., [1946, p.39-576] MP 2098. MP 2098. Porsonal and buckling failure of floating ice sheets against structures. Soffit, D.S., [1946, p.39-576] MP 2098. MP 2098. Rodial are stress measurement program. Con., G.F.N., [1947, p.5-7] Kadial are stress measurement program. Con., G.F.N., [1947, p. 196-107] Results from indentation tests on freshwater see. Soffit, D.S., et al., [1948, p.35-59] MP 2098. Modeling are restraint forces in an see boom. Ferham. R.E., [1958, p. 191-200] Modeling are restraint forces in an see boom. Ferham. R.E., [1958, p. 191-200] Medials control measurement program. Con., G.F.N., [1958, p. 191-200] Medials are stress measurement program. Con., G.F.N., [1958, p. 191-200] Medials are stress measurement program. Con., G.F.N., [1958, p. 191-200] Medials group on see forces. 6th state-of-the-set report. Timen, G.W., ed., [1959, p.55-59] MP 2018 Medials group on see forces. 6th state-of-the-set report. Timen, G.W., ed., [1959, p.51-519] MP 2019 Medials are stress measurement fersis are Relater-Menger. J.A., et al., [1959, p.55-59] MP 2019 MP 2019 MP 2019
K.C., et al., (1994, p. 213-314). MP 1871 lee ulanel fragment in Seclassion Sound, Almán. Kasco, A., (1993, p. 101-115). MP 1900 Physical properties of sea see in the Gerenfund Sea. Techer, W.R., et al., (1995, p. 177-134). MP 1903 Pressure ridge and sea see properties Gerenfund Sea. Tucker, W.R., et al., (1995, p. 177-134). MP 1905 Physical properties of the sea see contents. Recent MP 1905 Characte factors in orde regions surface conditions. Recent MP 1905 Physical properties of the sea see content. Weeks, W.F., (1796, p. 21-102). MP 1901 Physical properties of the sea see content. Weeks, W.F., (1796, p. 21-102). MP 1901 Physical properties of the sea see content. Weeks, W.F., (1796, p. 21-102). MP 1902 Weeks and like see engineering. Ashion, G.D., et., (1994, MP 2007). MP 2104 River and like see engineering. Ashion, G.D., et., (1994, p. 21-102). MP 2104 Chemical fractionations of bester in McMardo lee Shell. Crapin, J.H., et al., (1976, p. 167-111). MP 2100 Chemical fractionations of bester in McMardo lee Shell. Crapin, J.H., et al., (1976, p. 167-111). MP 2200 First techniques for obtaining engineering characteristics of strail are accumulations. Deno., A.M., M., (1958, p. 255-275). MP 2300 First techniques for obtaining engineering characteristics of strail are accumulations. Deno., A.M., M., (1958, p. 255-275). MP 2300 Physical properties of summer set see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical properties of summer sets see in the Fram Sease. MP 2300 Physical proper	Defective geogenies of structed use. 1 Effect of plante utraining. Ingola, K., (1987, p.16)-187; MP 2396 ICE PRESSURE Ice persone on empiricing structures. Michel, B., (1970, 717); M III-Bib Ice persone on empiricing structures. Michel, B., (1970, 717); M III-Bib Ice forces on vertical ples. Nevel, D.E., et al., (1972, p.164- 114]; Structures in scendenzel under. Amor, A., (1972, p.34-97). MP 1040 Depth of under-failed creations of glacium. Memory, J., (1971, p.15-145). MP 1040 Depth of under-failed creations of glacium. Therefore, J., MP 1040 Depth of under-failed creations of glacium. Therefore, J., (1971, p.15-145). MP 1040 Depth of under-failed creations of glacium. Therefore, J., MP 1040 Depth of under-failed creations of glacium. Therefore, J., (1971, p.15-145). MP 1040 Depth of under-failed creations of glacium. Therefore, J., (1973, p.16-145). MP 1040 Depth of under-failed creations. Jahlansky, L.J., et al., (1973, p.40-40-). MP 1040 Ice forces on model structures. Jahlansky, L.J., et al., (1973, p.357-194). MP 250 Ice forces on unsufficed structures. Jahlansky, L.J., et al., (1973, p.357-194). MP 250 Ice forces on unsufficed structures. Jahlansky, L.J., et al., (1973, p.357-194). MP 250 Ice forces on unsufficed structures. Jahlansky, L.J., et al., (1973, p.357-194). MP 250 Ice forces on unsufficed structures. Jahlansky, L.J., et al., (1973, p.357-194). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1973, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et al., (1974, p.37-146). MP 250 Ice forces on vertical piles. Nevel, D.E., et	D.S., et al., [1942, 1943.] Ice Mock stability. Daly, S.F., [1944, p.544-548] MP 1972. Sheet see forces on a comeal structure an experimental study. South, D.S., et al., [1945, p.46-54] Sheet see forces on a conical structure: an experimental study. South, D.S., et al., [1945, p.46-545] MP 1995. Sheet see forces on a conical structure: an experimental study. South, D.S., et al., [1945, p.46-1655] MP 1996. Experience with a basard see stress sensor. Con., G.F.N., (1945, p.252-1549] Incommendation for an upfoling ice force model. Tablands, L.J., [1945, p.164-1675] MP 2091. Ice cover research—present state and future needs. Kerr, A.D., et al., [1946, p.194-199] MP 2091. Impact see force and pressure. An experimental study with stress to: South, D.S., et al., [1946, p.39-576] MP 2097. Forswal and bucking failure of footning ice sheets against structures. South, D.S., et al., [1946, p.39-376] MP 2007. Personal and bucking failure of footning ice sheets against structures. South, D.S., [1960, p.39-376] MP 2007. Forswal and bucking failure of footning ice sheets against structures. South, D.S., [1960, p.39-376] MP 2007. Forswal and bucking failure of footning ice sheets against structures. South, D.S., [1960, p.39-376] MP 2008. MP 2009. Forswal and bucking failure of footning ice sheets against structures. South, D.S., [1960, p.39-376] MP 2009. Kallish are stress measurement program. Cos., G.F.N., (1961, p.36-36) MP 2009. Medials are stress measurement program. Cos., G.F.N., (1961, p.36-36) MP 2009. Medials are stress measurement program. Cos., G.F.N., (1961, p.36-36) MP 2009. Medials are stress measurement program. Cos., G.F.N., (1961, p.36-36) MP 2009. MP 2009. Medials are stress measurement program. Cos., G.F.N., (1961, p.36-36) MP 2009. MP 2009. Results because gramments secrets in an are boom. (1961, p.36-36) MP 2009. Medials are stress measurement program. Cos., G.F.N., (1961, p.36-36) MP 2009. MP 2009. MP 2009. MP 2009. MP 2009. MP 2009. MP 2009.
K.C., et al., (1994, p.323-331). MP 1871 let ulined fragment in Scelansion Sound, Almia. Exist. A., (1993, p.101-115). MP 1900 Physical properties of sea see in the Gereniand Sea. Tocker, W.R., et al., (1995, p.177-131). MP 1901 Pressure ridge and sea see properties Gereniand-Sea. Tocker, W.R., et al., (1995, p. 216-213). MP 1903 Pressure ridge and sea see properties Gereniand-Sea. Tocker, W.R., et al., (1995, p. 216-213). MP 1903 Physical properties of the sea see constructions. Biology, M.A., (1995, p. 508-512). MP 1901 Physical properties of the sea see conset. Weeks, W.F., (1996, p. 327-102). Winner surgual net rome experiment, Fram Strat. Gereniand. Sea, 197:89. Dividion, K., ed., (1994, 537). MR 56-60 River and links are engineering. Ashion, G.D., ed., (1994, 452). Lee Socces on besige poers. Haynes, F.D., (1998, p. 56-102). MP 2106 Chemical fractionation of bester in McMardo-kee Shell. Cragin, J.H., et al., (1976, p. 367-313). MP 2209 Properties in sea see technology. Ashion, G.D., (1994, p. 239-239). Erick techniques for obtaining engineering characteristics of strail are accumulations. Deno, A.M., R., (1998, p. 295-275). 2187 Alvances in sea see mechanics in the USA. Socke, D.S., et al., (1997, p. 310-230). MP 2200 Physical properties of summer sea see in the Fram Strat. Gon, A.J., et al., (1997, p. 403-240). MP 2200 Physical properties of summer sea see in the Fram Strat. Gon, A.J., et al., (1997, p. 633-340). MP 2200 Physical properties of summer sea see in the Fram Strate. Gon, A.J., et al., (1997, p. 633-340). MP 2200 Physical properties of summer sea see in the Fram Strate. June 200, 140-150. MP 2200 Physical properties of summer sea see in the Fram Strate. Gon, A.J., et al., (1997, 200-215). MP 2200 Physical properties of summer sea see in the Fram Strate. June 200, 140-150. MP 2200 Physical properties of summer sea see in the Fram Strate. Gon, A.J., et al., (1997, 200-215). MP 2200 Physical properties of summer sea see in the Fram Strate. Gon, A.J., et al., (1997, 200-215	Defective properties of strained use. I Effect of plants straining. Ingals, R., [1937, p.16]-147; MP 2366 INC PRESSURE. Its pressure. Its pressure on engineering structures. Michel, B., [1970, 71p.; M 111-816] Its pressure. Its factor on vertical ples. Nevel, D.E., et al., [1972, p.16]-116] Structures in secundented water. Anon, A., [1972, p.36]-116] Structures in secundented water. Anon, A., [1972, p.36]-116] Depth of water-diffied circumses of glaciers. Territinin, J., [1971, p.136-145] Object, p.136-145] Object, W.D., III, et al., [1974, p.127-146] MP 1046 Consideration and samition of sea are indome in the Arene Josius. Hilbert, W.D., III, et al., [1974, p.127-146] MP 1047 Structures on model structures. Labitatisty, L.J., et al., [1975, p.360-367] MP 204 Structures on model structures. Labitatisty, L.J., et al., [1975, p.360-367] MP 204 Structures on an exclusion in the Ecustiannose Canal. Perham, are to boom on the Ecustiannose Canal. Perham, R.E., et al., [1975, p.37]-360] MP 205 Gus inclusions in the Astructure we where Good, A.J., et al., [1975, p.310-1504] Freeze damage previous on unday dambusion lines. McFadden, Y., [1977, p.212-27] In Freeze damage previous on unday dambusion. Incs. McFadden, Y., [1977, p.212-27] In Freeze damage previous on the study lines. McFadden, Y., [1977, p.212-27] In gent fines on structure. Meric, D.L., et al., [1975, p.3] In and they offere on the St. Marys River we booms. Perham, R.E., [1978, p.212-276] MP 207 Internal demodel we fines at bridge poin. Calless, DJ, [1978, p.35, 287] Hempontal force secreted by fineshing we on structure. Acts., DJ, [1978, p.35, 287] Hempontal force secreted by fineshing we on structure. Acts., DJ, [1978, p.35] Hempontal force secreted by fineshing we on structure. Acts., DJ, [1978, p.37]	D.S., et al., [1942, 1643) Ice Moch stability. Daly, S.F., [1944, p.544-548] MP 1972 Sheet see forces on a comeal structure: an experimental study. South, D.S., et al., [1945, p.64-54] Sheet see forces on a comical structure: an experimental study. South, D.S., et al., [1945, p.64-545] MP 1995 Expertnere with a husual see stream scance: Con., G.F.N., [1945, p.252-258] Interminentation for an upfolding ice force model. Tabilitation, MP 1997 Interminentation for an upfolding ice force model. Tabilitation, MP 2091 Ice cover research—present state and future mech. Kerr. A.D., et al., [1946, p.38-1993] MP 2091 Impact see force and pectomer. An experimental study with streams: South, D.S., et al., [1946, p.39-576] MP 2007 Personal and buckling failure of floating ice sheets against structures. South, D.S., et al., [1946, p.39-576] MP 2008 Personal and buckling failure of floating ice sheets against structures. South, D.S., et al., [1946, p.39-376] MP 2008 Personal and buckling failure of floating ice sheets against structures. South, D.S., et al., [1947, p.57] Kadlish are stress measurement program. Con., G.F.N., [1997, p.57] Kadlish are stress measurement program. Con., G.F.N., [1997, p. 100-107] In stress measurements atomad offishere structures. John-ton, J.R., [1998, p.35-59] MP 2008 Median are restrained forces in an see boom. Ferham, R.E., [1987, p. 198-2004] Median greet peasure on securement program. Con., G.F.N., [1998, p. 11-156] MP 2018 Results from indentations tests on freshwater see. South, [1998, p. 11-156] MP 2019 Median group on see forces. 4th state-of-the-art report. Timen, G.W., ed., [1987, p. 514-513] MP 2019 Median group on see forces. 4th state-of-the-art report. Timen, G.W., ed., [1987, p. 514-513] MP 2019 Median group on see forces. 4th state-of-the-art report. Timen, G.W., ed., [1987, p. 514-513] MP 2019 Median group on see forces. 4th state-of-the-art report. Timen, G.W., ed., [1987, p. 514-513] MP 2019 Median group on see forces. 4th state-of-the-a
K.C., et al., (1994, p.323-331) Re ultand fragment in Seclassion Sound, Almán. Essac, A., (1993, p.101-115) Physical properties of sea see in the Gerenium Sea. Techer, W.R., et al., (1995, p.177-133) Pressure ridge and sea are properties Gerenium Sea. Tucker, W.R., et al., (1995, p.216-223) Pressure ridge and sea are properties Gerenium Sea. Tucker, W.R., et al., (1995, p.216-223) M.R., et al., (1995, p.216-223) M.P. 1991 Physical properties of the sea are conset. Weeks, W.F., (1994, p.37-162) Physical properties of the sea are conset. Weeks, W.F., (1994, p.37-162) Weeks, W.F., M.P. 2007 Weeks and his see engineering. Ashion, G.D., ed., (1994, 455); In Sea., (1997); Drividson, K., ed., (1994, 537); Sea., (1997); Drividson, K., ed., (1994, 537); M.P. 2106 River and his see engineering. Ashion, G.D., ed., (1994, 455); In P. 2106 Chemical fractionation of better in McMardo-lee Shell. Cropin, J.H., et al., (1976, p.36*-315); M.P. 2207 Perspectives in sea technology. Ashion, G.D., (1994, p.37-229) Field technologies for obtaining engineering characteristics of frail are accommissions. Deno, A.M., R., (1994, p.25-227) Ashioners in sea see mechanisms in the USA. South, D.S., et al., (1997), p.37-163; Physical properties of sea are discharged from Fram Sense. Gen., A.J., et al., (1997), p.38-230. Physical properties of estiment was use in the Fram Sense. Tucker, W.R., et al., (1997), p.38-230. Physical properties of estiments are use in the Fram Sense. Tucker, W.R., et al., (1997), p.38-33-360. M.P. 2208 Physical properties of estiments are use in the Fram Sense. Tucker, W.R., et al., (1997), p.38-3-3-30. M.P. 2208 Physical properties of summer test or in the Fram Sense. Tucker, W.R., et al., (1997), p.38-3-3-30. M.P. 2208 Physical properties of summer test or in the Fram Sense. Tucker, W.R., et al., (1997), p.38-3-3-30. M.P. 2208 Physical properties of summer test or in the Fram Sense. Tucker, W.R., et al., (1997), p.38-3-3-30. M.P. 2208 Physical properties of summer test or in the Fra	Defective geogenies of strained use. I Effect of plants straining. Ingali, K., (1987, p.16-1-187). MP 2396 RE PRESSURE Its pressure. Its generate on engineering structures. Michel. B., (1970, 719). Re pressure. Its forces on vertical ples. Nevel, D.E., et al., (1972, p.164, 116). MP 1014 Structures in teendeneed water. About, A., (1972, p.31-97). MP 1014 Depth of water-filled cressines of glaciers. The entition, J., (1971, p.19-185). Depth of water-filled cressines of glaciers. The entition, J., (1971, p.19-185). Classification and variation of sea are rulping in the Article Josin. Hiller, W.D., III, et al., (1974, p.127-166). MP 1022 Ict. Secret on model structures. Inhibits, J.J., et al., (1975, p.310-186). MP 240-187. Structures water-filled structures. Inhibits, J.J., et al., (1975, p.310-186). MP 240-187. Structures water-filled structures. Inhibits, J.J., et al., (1975, p.310-186). MP 240-187. Frence Hilder, W.D., III, (1975, p.310-186). MP 240-187. Frence so is al. (1975, p.370-287). MP 240-187. Frence and glace, P., (1975, p.370-287). MP 240-187. MP	D.S., et al., [1942, 1943.] Ice Mock stability. Duly, S.F., [1944, p.544-548] MP 1972. Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-54] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-545] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-1655] Sheet see forces on a council structure: an experimental study. South, D.S., et al., [1945, p.46-1655] International for an upfoling ice force model. Tubbands, L.J., [1945, p.154-1675] Ice cover research—present state and future needs. Keep. A.D., et al., [1946, p.584-199] Impact see force and pressure. An experimental study with strease: South, D.S., et al., [1946, p.39-576] MP 2001 Personal and buckling future of footness (is sheets against structure). South, D.S., [1946, p.39-576] MP 2007 Personal and buckling future of footness (is sheets against structure). South, D.S., [1946, p.39-576] MP 2007 Personal and buckling future of footness (is sheets against structure). South, D.S., [1946, p.39-576] MP 2007 Personal and buckling future of footness (is sheets against structure). South, D.S., [1946, p.39-576] MP 2007 Personal and buckling future of footness (is sheets against structure). South, D.S., [1946, p.37-57] MP 2008 Personal and buckling future of footness. Frankensten, G.E., (1947, p.360-167) Ice stress measurements received program. Cos., G.F.N., (1947, p.360-167) MP 2008 MP 2008 MP 2008 MP 2008 MP 2008 MP 2008 Methals are stress measurement program. Cos., G.F.N., (1948, p.31-156) MP 2008 Methals are stress measurement program. Cos., G.F.N., (1948, p.31-156) MP 2008 Methals are stress measurement program. Cos., G.F.N., (1948, p.31-156) MP 2008 MP
K.C., et al., (1994, p.323-331). MP 1871 lee ulanel fragment in Scelausson Sound, Almia. Exist. A., (1993, p.101-115). MP 1900 Physical properties of sea see in the Gereniand Sea. Techer, W.R., et al., (1995, p.177-131). MP 1903 Pressure ridge and sea see properties Gereniand Sea. Tucker, W.R., et al., (1995, p. 216-213). MP 1903 Pressure ridge and sea see properties Gereniand Sea. Tucker, W.R., et al., (1995, p. 216-213). MP 1903 Chimizic factors in end regions surface conditions. Biology, M.A., (1995, p. 505-312). MP 1901 Physical properties of the sea see conser. Weeks, W.F., (1796, p. 327-102). MP 1903 Sea, 1907:89. Davidson, K., ed., (1994, 517). Sea, 1907:89. Davidson, K., ed., (1994, 517). See faces on beidge piers. Haynes, F.D., (1998, p. 56-101). Chemical fractionation of besite in McMardo kee Shell. Cra- gin, J.H., et al., (1970, p. 367-313). MP 2100 Chemical fractionation of besite in McMardo kee Shell. Cra- gin, J.H., et al., (1970, p. 367-313). MP 2200 Field techniques for obtaining expinering elementation of fracil are accumulations. Deno, A.M., Je., (1984, 25). Physical properties of sea see discharged from Fram Series Gom, A.J., et al., (1997, p. 408-239). MP 2200 Physical properties of summer sea see in the Fram Series Tucker, W.R., et al., (1997, p. 418-230). MP 2200 Physical properties of summer sea see in the Fram Series Tucker, W.R., et al., (1997, p. 418-230). MP 2200 Physical properties of summer sease on the Fram Series Tucker, W.R., et al., (1997, p. 525-336-340). MP 2200 Physical properties of summer sease on the Fram Series Tucker, W.R., et al., (1997, p. 525-336-340). MP 2200 Physical properties of summer sease on the Fram Series Tucker, W.R., et al., (1997, p. 525-336-340). MP 2200 Physical properties of summer sease on the Fram Series July 2004. Gom, A.J., et al., (1997, p. 523-336). MP 2200 Physical properties of summer sease on the Fram Series 100, 1994. Gom, A.J., et al., (1997, p. 523-336). MP 2200 Physical properties of summer sease on the Fram Se	Defective properties of strained see. I Effect of plants straining. Ingals, R., [1937, p.16]-147; MP 2366 INCEPRESSURE Its personne Its passes on engineering structures. Michel, B., (1970, 71p.) Its pressure In feature on engineering structures. Michel, B., (1970, 71p.) Its pressure In feature on vertical plan. Nevel, D.E., et al., [1972, p.16]. 116] Structures in secundented water. Anon, A., [1972, p.16]. MP 1016 Structures in secundented water. Anon, A., [1972, p.19-17]. MP 1016 Depth of water-filled circumsers of planers. Tecrimina, J., [1971, p.15-145]. MP 1016 Circumsers and structures of planers. Tecrimina, J., [1971, p.15-145]. MP 1017 In factor on model structures. Indiansky, L.J., et al., [1973, p.400-407]. MP 243 Structures on model structures. Indiansky, L.J., et al., [1973, p.400-407]. MP 244 Structures on structures and results and deformation rates. Hibber, W.D., III, [1975, p.11-115]. MP 245 Interest on an are boson on the Ecustiannose Canal. Perham, R.E., et al., [1975, p.31-150]. MP 246 Freeze descape prevention on unday distribution. Inter. Michaeles, Y., [1977, p.210-210]. MP 247 Freeze descape prevention on unday distribution. Inter. Michaeles, Y., [1977, p.210-210]. MP 247 Freeze descape prevention on unday distribution. Inter. Michaeles, Y., [1977, p.310-310]. MP 247 Freeze descape prevention on unday distribution. Inter. Michaeles, Y., [1977, p.310-310]. MP 247 Freeze descape prevention for unday large. McFalles, I., [1977, p.310-31]. MP 248 Freeze descape prevention for unday large. McFalles, I., [1977, p.310-31]. MP 249 Internetion to before a structure. Mery, A.D., [1977, p.31-31]. MP 250 Internetion of the Sc. Marys River we bosons. Perham, R.E., [1978, p.211-210]. MP 250 Internetion of the Sc. Marys River see bosons. Perham, R.E., [1978, p.311-316]. MP 251 Helicontail for force secreted by finating see on structure. Acts., D.J., [1978, p.311-316]. MP 251 Rever see Author, G.D., [1979 p. 1607, 90]. MP 251 Freshormanner of the Sc. Marys Riv	les Moch stability Daly, S.F., [1984, p.544-548] MP 1972 Sheet see forces on a comeal structure: an experimental study. South, D.S., et al. [1985, p.64-54] MP 1973 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.64-545] MP 1985 Expertnere with a husual see stress seasor [1985, p.252-258] MP 1997 Instrumentation for an upfolding ice force model. Tabilinally, L.J., [1985, p.151-01435] MP 2091 les cover research—present state and future meeds. Kerr, A.D., et al. [1986, p.384-399] MP 2091 lempart see force and pectoure. An experimental study with strea see South, D.S., et al. [1986, p.39-576] MP 2093 Personal and buckling failure of flooting ice sheets against structure. South, D.S., et al. [1986, p.39-576] MP 2094 Model study of see forces on a sangle pile. Tabilistsky, L.J., [1984, p.77-87] Kallish see stress measurement program. Con. G.F.N., [1987, p.56] MP 2199 Kallish see stress measurement program. Con. G.F.N., [1987, p.160-107] MP 2198 Results from melecations texts on freshwater see. South J.S., et al. [1988, p.38-59] MP 2081 Mp 2081 Modeling use restrument forces in an see boom. Ferham. R.E., [1983, p.11-15] MP 2081 Modeling use restrument forces in an see boom. Ferham. R.E., [1984, p. 198-2004] Modeling use restrument forces in an see boom. Ferham. R.E., [1988, p.11-15] MP 2082 Modeling use restrument forces in an see boom. Ferham. R.E., [1988, p.11-15] MP 2084 Modeling use restrument forces in an see boom. Ferham. R.E., [1988, p.11-15] MP 2085 Modeling use restrument forces in an see boom. Ferham. R.E., [1988, p.11-15] MP 2081 Modeling use restrument forces in an see boom. Ferham. R.E., [1988, p.11-15] MP 2081 Modeling to pressure on strangulater some dynamics. Path. [1989, p.11-15] MP 2081 Modeling to pressure on known forces on freshwater see. [2080, p. 1981-2084] MP 2081 MP 2082 MP 2081 MP 2082 MP 2081 MP 2081 MP 2082 MP 2083 MP 2084 MP 2084 MP 2084 MP 20
K.C., et al., (1994, p.323-331). MP 1871 let uland fragment in Seclations Sound, Alinka. Exoc. A., (1993, p.101-115). MP 1900 Physical properties of sea see in the Gerealistd Sea. Techer, W.E., et al., (1995, p.177-131). MP 1903 Pressure ridge and sea see properties Gerealistd Sea. Tacker, W.E., et al., (1995, p. 177-131). MP 1905 Chimizic factors in cold regions surface conditions. Bioliza, M.A., (1995, p. 508-517). MP 1905 Physical properties of the sea see conset. Weeks, W.E., (1794, p.37-102). Winner integrals et some experiment, Fram Serial Gerealistd Sea, 1917:89. Davidson, K., ed., (1994, 537). Weeks, W.E., MP 2007 River and bide see empineering. Ashion, G.D., ed., (1994, 4852). Rever and bide see empineering. Ashion, G.D., (1998, p. 57-101). MP 2104 Chemical fractionation of bester in McMittab lee Shell. Cra- gin, 3311, et al., (1978, p. 367-333). MP 2209 Perspectives in see technology. Ashion, G.D., (1998, p. 57-101). MP 2209 Field techniques for obtaining expineering characteristics of fraid are accommissions. Deso, A.M., M., (1998, p. 505- 2709. Abstraces in see see mechanics in the USA. Soulks, D.S., et al., (1997, p. 37-204). Physical properties of sea see discharged from Fram Serial Gens, A.J., et al., (1997, p. 48-874). Physical properties of summer sea see in the Fram Serial Gens, A.J., et al., (1997, p. 48-874). Physical properties of summer sea see in the Fram Serial Gens, A.J., et al., (1997, p. 48-874). Physical properties of summer sea see in the Fram Serial July 1994. Gons, A.J., et al., (1997, p. 53-874). Physical properties of summer sea see in the Fram Serial July 1994. Gons, A.J., et al., (1997, p. 92). Physical properties of summer sea see in the Fram Serial Sec. Gons, A.J., et al., (1997, p. 92). Physical properties of summer sea see in the Fram Serial Sec. Gons, A.J., et al., (1997, p. 92). Conference on Officines. Mechanics and Mechanics are seasoners. In Revision of the physical properties of teasur. Tucket, W. B., et al., (1998, p. 368). All 2009. Occus	Defective geogenies of strained use. I Effect of plante straining. Ingali, K., [1927, p.16-]-187. MP 2396 ICE PRESSURE Ice personne on engineering structures. Michel, B., [1970, 7172. Ice personne on engineering structures. Michel, B., [1970, 7172. Ice personne Ice decres on sericulaples. Nevel, D.E., et al., [1972, p.164-116]. MP 1014 Structures in scendenced uniter. Amor, A., [1972, p.91-97]. MP 1016 Depth of uniter-filled cressions of glaciers. Thermine, J., [1971, p.176-185]. MP 1016 Depth of uniter-filled cressions of glaciers. Thermine, J., [1971, p.176-185]. MP 1016 Depth of uniter-filled cressions of glaciers. Thermine, J., [1971, p.176-185]. MP 1016 Depth of uniter-filled cressions of glaciers. Thermine, J., [1971, p.176-185]. MP 1016 Depth of uniter-filled cressions of glaciers. Thermine, J., [1971, p.176-185]. MP 1016 Depth of uniter-filled cressions. Ice endage in the Action Josen. Hilder, W.D., III, [1974, p.127-186]. MP 1021 Ice forces on model structures. Inhibits, L.J., et al., [1975, p.387-196]. In Hilder, W.D., III, [1975, p.31-315]. MP 200 Ice forces on uniterformations. Inhibits, L.J., et al., [1975, p.387-196]. MP 2016 Frence demage personnous in unitary distribution. Innis. Michaelen, Y., [1977, p. 212-218]. MP 201 Irretain, MP 202 Ice forces on serminal piles. Nevel, D.E., et al., [1977, p. 21] Ice forces on serminal piles. Nevel, D.E., et al., [1977, p. 21] Ice and shep efforts on the Sc. Manys River see hooms. Personnous forces on serminal see forces in bridge person. Calmin. DJ., [1978, 291]. Ice forces on serminal see forces in bridge person. Calmin. DJ., [1978, 291]. Ice forces on transfer see forces in bridge person. Calmin. DJ., [1978, 291]. Ice forces on transfer see forces in bridge person. Calmin. DJ., [1978, 291]. Ice forces on transfer see forces in bridge person. Calmin. DJ., [1978, 291]. Ice forces on transfer see forces in structures. S	les Moch stability. Daly, S.F., [1984, p.544-548] MP 1972 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-54] MP 1985 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-545] MP 1985 Experiment with a basial see stress senate: Cost, G.F.N., [1985, p.254-258] Intermentation for an upfolding ice force model. Tabilitation of Tabilitation of the cost of the c
RC., et al., [1994, p.233-331]. MP 1871 lee ulined fragment in Seclassion Sound, Almia. Essace, A., [1993, p.101-115; MP 1900 Physical properties of sea see in the Gereniand Sea. Techn., W.R., et al., [1995, p.177-138]. MP 1903 Pressure ridge and sea see properties Gereniand Sea. Tucker, W.R., et al., [1995, p.177-138]. MP 1903 Pressure ridge and sea see properties Gereniand Sea. Tucker, W.R., et al., [1995, p.216-213]. MP 1903 Physical properties of the sea see conset. Weeks, W.F., [1904, p.37-162]. MP 2007 Winner surgual see some experiments, Fram Stand. Gereniand Sea, 1987:89. Davidson, K., ed., [1904, 5]7; Winner surgual see some experiments, Fram Stand. Gereniand Sea, 1987:89. Davidson, K., ed., [1904, 5]7; Sea, 1907:89. Davidson, K., ed., [1904, 5]7; Interface and links we empreering. Ashion, G.D., ed., [1904, 4557]. Interface and links we empreering. Ashion, G.D., [1904, 95-101]. Chemical fractisonations of besine in McMardo-lee Shot. Cragin, 344, et al., [1970, p.367-313]. MP 2100 Chemical fractisonations of besine in McMardo-lee Shot. Cragin, 344, et al., [1970, p.367-313]. MP 2209 Frish techniques for obtaining experiency characteristics of fraid are accumulations. David, A.M., d., [1954, 5]. Fight techniques for obtaining experiency characteristics of fraid are accumulations. David, A.M., d., [1955, p.205-275]. All et al., [1907, p.37-38]. MP 2200 Frysical properties of summer set see in the Fram Sease. Gen., A.J., et al., [1907, p.37-38-38]. MP 2200 Physical properties of summer set see in the Fram Sease. Gen., A.J., et al., [1907, p.37-38-38]. Physical properties of experiments as see in the Fram Sease. MP 2200 Physical properties of experiments as see in the Fram Sease. Gen., A.J., et al., [1907, p.37-38-38]. Physical properties of experiments as see in the Fram Sease. Gen., A.J., et al., [1907, p.37-38-38]. Physical properties of experiments as see in the Fram Sease. MP 2200 Physical properties of experiments as see in the Fram Sease. High 1904 1904 1904 1904 1905 1905 1906	Defective properties of strained use. I Effect of plants straining. Ingals, R., [1937, p.16]-147; MP 2356 INCEPRESSURE Its personner. Its passes on engineering structures. Michel, B., (1970, 71p.) Its pressure. Its feeten on vertical ples. Nevel, D.E., et al., [1972, p.16]-114] Structures in secundaples. Nevel, D.E., et al., [1972, p.16]-114] Structures in secundaples. Nevel, D.E., et al., [1972, p.16]-114] Structures in secundaples. Nevel, D.E., et al., [1972, p.19]-17, MP 1016 Orph of whitefulfiel circumers of factors. Tectrinian, J., [1973, p.15]-145] Orph of whitefulfiel circumers of factors. Tectrinian, J., [1973, p.15]-145] MP 1046 Christianson and samition of sea see religing in the Arcine Journ. Hilbert, W.D., III, et al., [1974, p.12]-140] MP 1047 Structures on model structures. Tabilistics, L.I., et al., [1975, p.20]-207. MP 2048 Structures on model structures. Tabilistics, L.I., et al., [1975, p.20]-207. MP 2049 Structures on model structures. Tabilistics, L.I., et al., [1975, p.20]-207. MP 2049 Increase of the Structures. Tabilistics, L.I., et al., [1975, p.20]-207. MP 2049 Freeze on model structures. Tabilistics, L.I., et al., [1975, p.20]-207. MP 2049 Freeze on an archiver on the Econhamose Canal. Perham, R.E., et al., [1975, p.20]-207. MP 2049 Freeze damage presentation in unless there Good, A.J., et al., [1975, p.20]-207. Freeze damage presentation for unless here. McFadden, T., [1977, p.21]-207. Freeze damage presentation for unless here. McFadden, T., [1977, p.21]-207. Incrementation tecleron actors on unless discharge sea structures. Actor, A.D., [1977, p.21]-207. Incrementation tecleron actors on unless discharge on unrutures. Actor, A.D., [1977, p.21]-207. Freeze damage protection for fines in bridge ports. Calless, D.J., [1978, p.2] Incrementation tecleron actors on the Sc. Manya River see bosons. Perham, R.E., [1978, p.2] Freeze damage of the Sc. Manya River see hosons. Perham, R.F., [1978, p.2] Freeze white, G.D., [1979, p. 104, p.2] Freeze white, G.D., [1979, p. 104, p.2] Freeze white,	les Moch stability. Daly, S.F., [1984, p.544-548] MP 1972 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-54] MP 1985 Sheet see forces on a comical structure: an experimental study. South, D.S., et al. [1985, p.46-545] MP 1985 Experience with a hazard see stress sensor. Con., G.F.N., [1985, p.252-258] Instrumentation for an upfolding ice force model. Tablanday. L.J., [1985, p.184-1635] L.D., [1985, p.184-1635] Income cover research—present state and future needs. Keep. A.D., et al., [1980, p.184-199] Income cover research—present state and future needs. Keep. A.D., et al., [1980, p.184-199] Instrumental study with stress to: South, D.S., et al., [1986, p.398-359] Instruments. South, D.S., et al., [1986, p.398-359] MP 2007 Experience and pressure. An experimental study with stress to: South, D.S., et al., [1986, p.398-359] MP 2017 Experience and bucking future of floating ice sheets against structures. South, D.S., [1986, p.398-359] MP 2018 Model study of the forces on a single pile. Tablanday, L.J., [1984, p.75-31] Cosp. of expensers seek ace solutions. Frankensten, G.E., [1981, p.383-31] In proceeding the extress measurement program. Cost, G.F.N., [1987, p.308-107] In Stress measurements atomod offshore structures. Johnson, J.B., [1983, p.35-57] MP 2008 Modeling are restrained texts on an ore boom. Perham, R.E., [1981, p.398-208] Modeling are restrained forces in an ore boom. Perham, R.E., [1981, p.398-208] Modeling are restrained forces in an ore boom. Perham, R.E., [1981, p.398-208] Modeling are restrained forces in an ore boom. Perham, R.E., [1981, p.398-208] Modeling are restrained forces in an ore boom. Perham, R.E., [1981, p.398-208] Modeling are restrained forces in an ore boom. Perham, R.E., [1981, p.398-208] Mp 2008 Modeling are restrained forces in an ore boom. Perham, R.E., [1981, p.398-208] Mp 2008 Mp 2008 Mp 2018 Mp
K.C., et al., (1994, p.323-331). MP 1871 lee stand fragment in Seclassion Sound, Alinka. Exic. A., (1995, p.101-115). MP 1900 Physical properties of sea see in the Gerealisad Sea. Techer, W.R., et al., (1995, p.177-131). MP 1903 Pressure ridge and sea see properties Gerealisad Sea. Tacker, W.R., et al., (1995, p. 216-275). MP 1905 Chimizal factors in cold regions surface conditions. Bifelia, M.A., (1995, p. 508-517). MP 1907 Physical properties of the sea see conset. Weeks, W.F., (1796, p.37-105). Winner integrals et some experiment, Fram Stran Gerealisad Sea, 1917:89. Davidson, K., ed., (1994, 537). River and bike are empineering. Ashion, G.D., ed., (1994, 455-2). Ire forces on bridge poers. Haynes, F.D., (1993, p. 57-101). MP 2100 Chemical fractionation of better in McMittol. lee Shell. Cra- gin, J.H., et al., (1974, p. 36*-31). MP 2100 Chemical fractionation of better in McMittol. lee Shell. Cra- gin, J.H., et al., (1974, p. 36*-31). MP 2209 Properties in see technology. Ashion, G.D., (1994, p. 239) Field techniques for obtaining expiniering characteristics of fraid are accommissions. Dette, A.M., it., (1938, p. 25)- 2123. Physical properties of size are discharged from Fram Strate Gon, A.M., et al., (1987, p. 36*-2480). MP 2300 Physical properties of size are discharged from Fram Strate Gon, A.M., et al., (1987, p. 38*-2480). MP 2300 Physical properties of size are discharged from Fram Strate Gon, A.M., et al., (1987, p. 38*-2480). MP 2200 Physical properties of summer sea see in the Fram Strate Gon, A.M., et al., (1987, p. 38*-2480). MP 2200 Physical properties of summer sea see in Gerea Rip. New Hump- where. Meese, D.A., et al., (1987, p. 26*-2480). MP 2200 Physical properties of entirente are new order Rip. New Hump- where. Meese, D.A., et al., (1987, p. 26*-2480). MP 2200 Physical properties of entirente are new Gerea Rip. New Hump- where. Meese, D.A., et al., (1987, p. 29*-2480). MP 2200 Physical properties of entirente are new Gerea Rip. New Hump- where. Meese, D.A., et al., (1987,	Defective geogenies of strained use. 1 Effect of plante straining. Ingali, K., [1927, p.18-]-1873. MP 2398. ICE PRESSURE. Ice personne on engineering structures. Michel. B., [1970, 7172.] Ice personne les decres on vertical ples. Nevel, D.E., et al., [1972, p.164-116]. MP 1014. Structures in scendenced under. About, A., [1972, p.93-97]. MP 1014. Depth of under-filled cressions of glaciers. Therminia, J., [1971, p.19-165]. MP 1016. NP 1016. NP 1017. p.19-165. MP 1016. NP 1017. p.19-165. MP 1017. p.19-165. MP 1017. NP 1018. NP 1	D.S., et al., [1942, 1943.] Ice Moch stability. Duly, S.F., [1944, p.544-548] MP 1972 Sheet see foces on a comeal structure: an experimental study, Sodii, D.S., et al. [1945, p.44-54] Sheet see foces on a comical structure: an experimental study, Sodii, D.S., et al. [1945, p.44-54] Sheet see foces on a comical structure: an experimental study, Sodii, D.S., et al. [1945, p.44-657] MP 1995 Experience with a hazard see stress sensor. Con., G.F.N., [1945, p.152-154] Instrumentation for an updating ice force model. Tabilmody, L.J., [1945, p.154-165] Inc. cover research—present state and future needs. Kerr, A.D., et al. [1946, p.154-179] Impact see force and pressure. An experimental study with sera see. Sodia, D.S., et al. [1946, p.345-376] MP 2007 Personal and bucking failure of fusing ice sheets against structures. Sodia, D.S., [1946, p.375-37] MP 2108 Medici study of see forces on a single pile. Zabilmody, L.J., [1946, p. 57-37] Kaffish see stress measurement program. Gen., G.F.N., [1947, p. 57-37] Kaffish see stress measurement program. Con., G.F.N., [1947, p. 356-167] In stress stresses measurement program. Gen., G.F.N., [1947, p. 366-167] In stress stresses measurement program. MP 2108 Modeling are restraint forces in an see boom. Perham, R.E., [1948, p. 314-359] Modeling are restraint forces in an see hoom. Perham, R.E., [1948, p. 314-359] Modeling are restraint forces in an see hoom. Perham, R.E., [1948, p. 314-359] Modeling are restraint forces in an see hoom. Perham, R.E., [1948, p. 314-359] Modeling are restraint on excess structures. Relater-Menage, J.A., et al., [1949, p. 364-317] MP 2066 Compressive strength of antarcine frainisce. Relater-Menage, J.A., et al., [1949, p. 304-317] Here of operance on bursts fractions of see. Tamedian, J.C., [1949, p. 311-15] If the other pressure on suspicion locks. Frankenge, J.A., et al., [1949, p. 304-317] If the prevention Let removal times the walls of apsignous locks. Frankensen, G.E., et al., [1949, p. 344-34] Venerical smillations o

lce prevention (cont.) Secking low ice adhesion Sayward, J.M., [1979, 83p]	Seeking low ice adhesion. Sayward, J.M., (1979, 83p) SR 79-11	Thermal expansion of saline ice Cox, G.F.N, [1983, p.425-432] MP 1768
SR 79-11	Point source bubbler systems to suppress ice Ashton, G.D., 1979, 12p ₁ CR 79-12	Horizontal salinity variations in sea ice. Tucker, W.B., et al. [1984, p 6505-6514] MP 1761
Freezing problems with wintertime wastewater spray irriga- tion. Bouzoun, J R., [1979, 12p.] SR 79-12	Freezing and thawing tests of hould deleng chemicals on	Structure, salinity and density of multi-year sea ice pressure
Deicing a satellite communication antenna Hanamoto, B., et al, (1980, 14p) SR 80-18	selected pavement materials Minsk, L.D., 1979, p 51- 58 ₁ MP 1220	ridges Richter-Menge, J.A., et al, (1985, p.194-198) MP 1857
lee adhesion tests on coatings subjected to rain erosion.	Point source bubbler systems to suppress ice Ashton, G.D., (1979, p.93-100) Ashton, G.D., MP 1326	Ice electrical properties Gow, A.J., [1985, p 76-82] MP 1910
Minsk, L.D., (1980, 14p) SR 80-28 Icing on structures Minsk, L.D., (1980, 18p)	Clearing ice-clogged shipping channels. Vance, G.P.,	Dielectric properties at 4.75 GHz of saline ice slabs. Arcone, S.A., et al., r1985, p.83-861 MP 1911
CR 80-31 Hydraulic model study of a water intake under frazil ice con-	[1980, 13p] CR 80-28 Self-shedding of accreted ice from high-speed rotors ltaga-	Structure, salinity and density of multi-year sea ice pressure
ditions. Tantillo, T.J., (1981, 11p.) CR 81-03	ki, K, (1983, p 1-6) MP 1719	ridges Richter-Menge, J.A., et al. (1985, p 493-497, MP 1965
River ice suppression by side channel discharge of warm water. Ashton, G D, [1982, p 65-80] MP 1528	Mechanical tee release from high-speed rotors. Itagaki, K, [1983, 8p.] CR 83-26	lee properties in a grounded man-made ice island Cox,
Performance of a point source bubbler under thick ice. Haynes, FD, et al. (1982, p.111-124) MP 1529	Strategies for winter maintenance of pavements and road- ways. Minsk, L.D., et al, (1984, p.155-167)	Chemical fractionation of brine in McMurdo Ice Stielf. Cra-
Lake water intakes under icing conditions. Dean, A.M., Jr.,	MP 1964	gin, J H., et al, (1986, p.307-313) MP 2239 Sea ice salinity and porosity changes during storage. Cox.
(1983, 7p.) CR 83-15 How effective are icephobic coatings. Minsk, L D., (1983,	Snow and ice prevention in the United States Minsk, L.D., (1986, p 37-42) MP 1874	G.F.N., et al. (1986, p 371-375) MP 2244
p.93-95; MP 1634 Aerostat icing problems Hanamoto, B, (1983, 29p.)	Conductor twisting resistance effects on ice build-up and ice shedding. Govoni, J.W., et al, (1986, 8p + figs.)	Compressive behavior of saline ice Richter-Menge, J.A., MP 2200
SR 83-23	MP 2108 Pneumatically de-iced ice detector—final report, phase 2, part	Small-scale projectile penetration in saline ice cole, D M, et al., [1986, p 415-438] Cole, D M, MP 2201
Ice observation program on the semisubmersible drilling ves- sel SEDCO 708 Minsk, L.D., [1984, 14p]	1 Franklin, CH, et al. [1986, 9p + appends] MP 2249	Microwave dielectric, structural and salinity properties of sea
SR 84-02 Atmospheric ucing on sea structures Makkonen, L., (1984,	Harbor design for ice conditions Wortley, CA., (1987,	ice. Arcone, S A., et al (1986, p 832-839) MP 2188 Sea-ice crystal structure and salinity, Hebron Fiord, Labra-
92p ₃ M 84-02	p 14-15; MP 2588 Self-shedding of accreted ice from high-speed rotors. Itaga-	dor. Gow, A.J., [1987, 18p] CR 87-04 Microwave and structural properties of saline ice. Gow,
Polyethylene glycol as an ice control coating ltagaki, K, {1984, 11p.} CR 84-28	kı, K , (1987, p.95-100) MP 2278	A.J, et al, (1987, 36p) CR 87-20
Methods to reduce ice accumulation on miter gate recess walls. Rand, J.H., et al, (1989, 5p) MP 2723	Development of a river ice prow Tatinclaux, JC, et al, (1988, 26p) CR 88-09	Multifrequency passive microwave observation of saline ice grown in a lank Grenfell, T.C., et al. (1988, p. 1687-
Reduced winter leakage in gates with J-scals Rand, J.H., et	ice removal from broadcast towers by low-frequency vibra- tions Mulherin, N.D., et al, (1988, 6p.) MP 2538	Profile properties of undeformed first-year sea acc Cox,
al, [1989, 3p] MP 2724 Evaluation of shear strength of freshwater ice adhered to	Deployment of floating bridges in ice-covered rivers Mel-	G.F.N., et al, (1988, 57p) CR 88-13
icephobic coatings. Mulherin, N.D., (1990, p. 149-154) MP 2578	lor, M., et al. [1988, 38p] SR 88-20 Evaluation of shear strength of freshwater ice adhered to	Numerical simulation of first-year sea ice. Cox, G.F.N., et al., (1988, p.12,449-12,460) MP 2404
Ice push	icephobic coatings Mulherin, N.D., [1990, p 149-154] MP 2578	Field studies of brackish ice to compare with satellite data. Weeks, W.F., et al. (1989, p 1318-1333) MP 2763
Ice pile-up and ride-up on Arctic and subarctic beaches Kovacs, A., et al, (1979, p 127-146) MP 1230	Ice reporting	Cyclic loading of saline ice initial experimental results.
lce pile-up and ride-up on arctic and subarctic beaches Kovacs, A., et al. (1981, p.247-273) MP 1538	Meso-scale strain measurements on the Beaufourt sea pack ice (AIDJEX 1971). Hibler, W.D., Ill, et al. (1974)	Cole, D.M., [1990, p 265-271] MP 2581 Ice sampling
Bank conditions and erosion along selected reservoirs Gat-	p.119-138 ₁ MP 1035 Measurement of mesoscale deformation of Beaufort sea ice	Preparation of polycrystalline ice specimens for laboratory experiments Cole, D.M., [1979, p. 153-159]
Ice rafting	(AIDJEX-1971). Hibler, W D, III, ct al, [1978, p 148- 172; MP 1179	MP 1327
Pebble fabric in an ice-rafted dismicton. Domack, E.W., et al. (1985, p 577-591) MP 1959	Data reduction of GOES information from DCP networks	System for mounting end caps on ice specimens Cole, D.M. et al. (1985, p 362-365) MP 2016
Bank conditions and erosion along selected reservoirs. Gat-	DeCoff, G.W., et al, [1989, 15p] SR 89-29 Ice resistivity	Development of a frazil ice sampler. Brockett, B.E., et al. [1986, 12p] SR 86-37
Ice refrigeration	Conductivity and surface impedance of sea ice McNeill, D, et al. (1971, 19p plus diagrams) MP 1071	Dielectric properties of strained ice 2 Effect of sample preparation method Itagaki, K, et al. (1987, p 149-153)
Isua, Greenland glacier freezing study. Ashton, GD, 1978, p 256-2641 MP 1174	Ice roads	MP 2357
Ice relaxation	Mechanical properties of snow used as construction material Wuori, A.F., (1975, p. 157-164) MP 1057	Update on portable hot-water sea ice drilling Govoni, J.W., et al, [1989, p 175-178] MP 2479
Charged dislocation in ice. 2 Contribution of dielectric relaxation. Itagaki, K, (1982, 15p) CR 82-07	Cantilever beam tests on reinforced ice Ohstrom, E.G., et al. (1976, 12p) CR 76-07	Cryogenic sampling of frazil ice deposits Chacho, E.F., Jr., et al. (1989, 6p) SR 89-28
Possibility of anomalous relaxation dur to the charged dislo- cation process liagali, K, [1983, p 4261-4264]	Surface protection measures for the Arctic Slope, Alaska	First impressions of the comet drilling problem Mellor, M. (1989, p 229-232) MP 2592
MP 1669 Effect of X-ray irradiation on internal friction and dielectric	Snow and ice roads in the Arctic Johnson, P.R., (1979,	Ice scoring
relaxation of ice Itagaki, K, et al. (1983, p 4314-4317) MP 1670	p 1063-1071 ₁ MP 1223 lee thickness-tensile stress relationship for load-bearing ice	Study of a grounded floeberg near Reindeer Island, Alaska. Kovacs, A. [1977, 9p] MP 1751
Discussion Electromagnetic properties of sea ice by R M	Johnson, P.R., (1980, 11p) SR 80-09	Distribution and features of bottom sediments in Alaskan
Morey, A Kovacs and G F.N Cox Arcone, S A., [1984, p.93-94] MP 1821	Ice runways Mechanical properties of snow used as construction material.	coastal waters Sellmann, PV, (1980, 50p) SR 80-15
Authors' response to discussion on Electromagnetic proper- ties of sea ice Morey, R.M., et al. (1984, p. 95-97)	Wuori, A.F., (1975, p.157-164) MP 1057 The strength of natural and processed snow Abele, G.	Sediment displacement in the Ottauquechee River—1975- 1978 Martinson, C.R., [1980, 14p] SR 80-20
MP 1822	(1975, p 176-186) MP 1058	Dynamics of near-shore ice. Kovacs, A., et al. (1981, p.125-135) MP 1599
Dielectric properties of strained ice 1: Effect of plastic straining Itagaki, K., (1987, p. 143-147) MP 2356	Runway site survey, Pensacola Mountains, Antarctica Kovacs, A, et al. (1977, 45p) SR 77-14	Subsea trenching in the Arctic Mellor, M., [1981, 31p]
Strain energy failure criterion for S2 freshwater ice in flexure Cole, D.M., (1988, p. 206-215) MP 2494	Hard-surface runways in Antarctica Mellor, M., 1988, 87p.; SR 88-13	CR 81-17 Lee scoring on the Alaskan shelf of the Beaufort Sea. Weeks,
Ice removal Use of explosives in removing ice jams Frankenstein, G.E.	Improved techniques for construction of snow roads and air- strips Lee, SM, et al. (1988, 99p) SR 88-18	WF, et al. (1983, 34p + map) CR 83-21 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al.
et al. (1970, 10p) MP 1021	Planing machines for building runways on ice Mellor, M.	(1984, p 371-378) MP 1743
Winter maintenance research needs Minsk, L D, 1975, p 36-381 MP 950	[1989, 8p + attachments] MP 2505 Ice runways near the South Pole Swithintonia, C. [1989,	Some probabilistic aspects of ice gouging on the Alaskan Shelf of the Bezufort Sea Weeks, W.F., et al., (1984, p. 213-
Desicing using lasers. Lane, J.W., et al. (1976, 25p.) CR 76-10	42p SR 89-19 Airfields on antarctic glacier ice. Mellor, M, et al. (1989).	236; MP 1838 Study of sea ice induced gouges in the sea floor. Weeks,
Investigation of water jets for lock wall deicing. Calkins,	97p3 CR 89-21	WF, ct al. (1985, p 126-135) MP 1917
D.J., et al. (1976, p G2/13-22) MP 865 Ice removal from the walls of navigation locks Franken-	Ice salinity Sea ice studies in the Weddell Sea region aboard USCGC	W.F. ct al. (1985, p.393-407) MP 1904
stein, G.E., et al. (1976, p. 1487-1496) MP 888 Description of radomes and lock walls using pneumatic devices	Burton Island Ackley, S.F., (1977, p.172-173) MP 1014	Numerical simulation of sea ice induced gouges on the shelves of the polar oceans Weeks, W.F., et al., (1985, p.259-
Ackley, S.F., et al., [1977, p.467-478] MP 1064	Modeling of anisotropic electromagnetic reflections from sea	265) MP 1938 Ice gouge hazard analysis. Lanan. G A., et al. (1986, p 57-
lee accumulation on ocean structures Minsk, L.D., 1977, 42p ₁ CR 77-17	ice Golden, K.M., et al., [1981, p.8107-8116] MP 1469	66 ₁ MP 2106
Lock wall descing studies Hanamoto, B. ed. (1977, 68p) SR 77-22	Growth, structure, and properties of sea ice Weeks, W.F., et al., [1982, 130p] M 82-01	Preliminary simulation of the formation and infilling of sea ice gouges Weeks, W.F., et al. (1986, p.259-268)
Lock wall descing. Hanamoto, B. (1977, p.7-14) MP 972	Using sea ice to measure vertical heat flux in the ocean McPhee, M.G., et al., (1982, p.2071-2074) MP 1521	MP 2218 Bank conditions and erosion along selected reservoirs Gat-
Lock wall descing with high velocity water jet at Soo Locks,	Equations for determining the gas and brine volumes in sea	to, L.W., et al., (1987, p. 143-154) MP 2196 Preliminary study of scour under an ice jam Wuebben, J.L.
Mi Calkins, D.J., et al., (1977, p. 23-35) MP 973 Laboratory experiments on locit wall describe using pneumatic	ice samples Cox, G F N, et al, (1982, 11p.) CR 82-30	(1988, p 177-192 ₁ MP 2475
devices Itagaki, K., et al. [1977, p.53-68] MP 974 Interaction of a surface wave with a dielectric slab discon	McMurdo Ice Shelf brine zone Kovacs, A. et al. (1982, 28p.) CR 82-39	Dynamic simulations of iceberg-seabed interactions Bass, D.W., et al. (1989, p.137-151) MP 2684
tinuity Arcone, S A., et al. (1978, 10p.) CR 78-08	Chemical fractionation of brine in the McMurdo Ice Shelf	Oxygen isotope profiles through ice sheets Johnson, S.J., et
lee releasing block-copolymer coatings Jellinek, H H G, et al. (1978, p 544-551) MP 1141	Cragin, J.H., et al. (1983, 16p) CR 83-06 Ice properties in the Greenland and Barents Seas during sum-	al. (1972, p.429-434) MP 997
Current research on snow and ice removal in the United States Minsk, L.D., [1978, p.21-22] MP 1199	mer Overgaard, S., et al. [1983, p.142-164] MP 2062	Surface-wave dispersion in Byrd Land Acharya, H.K. (1972, p.955-959) MP 992

Stability of Antarctic ice. Weertman, J., [1975, p.159]	Dielectric constant and reflection coefficient of snow surface	Crushing of ice sheet against rigid cylindrical structures Sodhi, D.S., et al, [1986, p 1-12] MP 2018
MP 1042	layers in the McMurdo Ice Shelf. Kovacs, A, et al., (1977, p.137-138) MP 1011	Ice interaction with the U.S. Army ribbon bridge. Couter-
Snow and ice. Colbeck, S.C., et al, [1975, p 435-441, 475-487] MP 844	Subsurface measurements of the Ross Ice Shelf, McMurdo	marsh, B A, (1986, 18p) CR 86-01
Gas inclusions in the Antarctic ice sheet. Gow, A.J., et a	Sound, Antarctica. Kovacs, A, et al, [1977, p 146-148]	Flexural and buckling failure of floating ice sheets against
[1975, p 5101-5108] MP 84.	MP 1013 Los Ice Shelf Project drilling, October-December 1976.	structures. Sodhi, D.S., [1986, p.339-359] MP 2134 Friction of solids on ice. Huber, N.P., et al., [1986, 4p]
Glaciology's grand unsolved problem. Weertman, J., 1976, p 284-286; MP 1056	Rand, J.H., [1977, p.150-152] MP 1061	MP 2179
(1976, p 284-286) MP 1056 Resurvey of the "Byrd" Station, Antarctica, drill hole. Gar-	Some elements of iceberg technology Weeks, W.F., et al.	Ice beam moving against a sloping structure Sodhi, D.S.,
field, D.E., et al. (1976, p.29-34) MP 846	(1978, p 45-98) MP 1616	(1987, p 281-284) MP 2194
Internal structure and crystal fabrics of the West Antarctic ice	Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al, (1978, p.7-36) MP 1075	Parameters affecting the kinetic friction of ice Akkok, M, et al, [1987, p.552-561] Akkok, M, MP 2258
sheet. Gow, A.J., et al., [1976, 25p.] CR 76-35 Geodetic positions of borehole sites in Greenland. Mock,	Core drilling through Ross Ice Shelf Zottkov, I A, et al,	Modelling trash rack freezeup by frazil ice. Daly, SF,
S.J., (1976, 7p) CR 76-41	(1979, p 63-64) MP 1337	[1987, p 101-106] MP 2305
Crystal fabrics of Weat Antarctic ice sheet. Gow, A.J., et al,	Antifreeze-thermodrilling, central Ross Ice Shelf Zotikov, I.A., [1979, 12p.] CR 79-24	Fracture toughness of urea model ice. Bentley, D.L., et al.
(1976, p.1665-1677) MP 1382	Dynamics of snow and ice masses. Colbeck, S.C., ed.	(1988, p 289-297) Working group on ice forces. 4th state-of-the-art report
Atmospheric trace metals and sulfate in the Greenland Ice Sheet. Herron, M.M., et al, (1977, p.915-920)	(1980, 468p) MP 1297	Timco, G.W., ed. (1989, 385p) SR 89-05
MP 949	Radar detection of sea ice and current alinement under the Ross Ice Shelf. Morey, R.M., et al. (1981, p.96-97)	Ice-induced vibrations of structures Sodhi, D.S., [1989, p. 189-221]
Changes in the composition of atmospheric precipitation.	MP 1543	p 189-221; MP 2492 Penetration of floating ice sheets with cylindrical indentors.
Add and the Comp Felenchus and a	Brine zone in the McMurdo Ice Shelf, Antarctica Kovacs, A., et al. (1982, p. 166-171) MP 1550	Sodhi, D.S., [1989, p 377-382] MP 2485
echo sounding Keliher, T.E., et al., [1978, 12p] CR 78-04	A., et al. (1982, p 166-171) MP 1550 McMurdo Ice Shelf brine zone. Kovacs, A, et al. (1982,	Model tests on an icebreaker at two friction factors Tatin-
	28p) CR 82-39	claux, J.C., [1989, p.774-784] MP 2622 Evaluation of shear strength of freshwater ice adhered to
Creep rupture at depth in a cold ice sheet Colbeck, S.C., et al, (1978, p.733) MP 1168	Chemical fractionation of brine in the McMui to Ice Shelf Craem, J.H., et al., r1983, 16p.; CR 83-06	icephobic coatings Mulherin, N.D., (1990, p.149-154)
Ultrasonic investigation on ice cores from Antarctica.	Cragin, J H, et al., [1983, 16p] CR 83-06 Changes in the Ross Ice Shelf dynamic condition Jezek,	MP 25/8
Kohnen, H., et al., [1979, 16p] CR 79-10	K.C., [1984, p 409-416] MP 2058	Colloquium on Water in Planetary Regoliths, Hanover, N.H.
Extending the useful life of DYE-2 to 1986, Part 1 Tobiasson, W., et al, (1979, 15p.) SR 79-27	Modified theory of bottom crevasses. Jezek, K.C., [1984, p. 1925-1931] MP 2059	Oct. 5-7, 1976. (1977, 161p.) MP 911
Ultrasonic investigation on ice cores from Antarctica	p 1925-1931; MP 2059 Mass balance of a portion of the Ross Ice Shelf Jezek, K.C.,	Thermal patterns in ice under dynamic loading Fish, A M.
Kohnen, H., et al. [1979, p 4865-4874] MP 1239	et al, (1984, p.381-384) MP 1919	ct al, (1983, p.240-243) MP 1742 Electromagnetic properties of sea ice Morey, R M., ct al,
Ice sheet internal reflections Ackley, S.F., et al, [1979, p.5675-5680] MP 1319	Rheology of glacier ice. Jezek, K.C., et al, [1985, p.1335- 13371 MP 1844	[1984, p 53-75] MP 1776
Ultrasonic tests of Byrd Station ice cores. Gow, A J, et al,	1337 ₁ MP 1844 Numerical simulation of sea ice induced gouges on the shelves	Theoretical estimates of light reflection and transmission by
(1979, p.147-153) MP 1282	of the polar oceans. Weeks, W.F., et al. (1985, p 259-	spatially inhomogeneous and temporally varying ice covers. Perovich, D.K., [1990, p.45-49] MP 2729
Margin of the Greenland ice sheet at Isua. Colbeck, S.C., et al., r1979, p.155-165; MP 1281	265; MP 1938 Structure of ice in the central part of the Ross Ice Shelf,	Ice strength
al, (1979, p.155-165) MP 1281 Some promising trends in ice mechanics Assur, A., (1980)	Antarctica. Zotikov, I A., et al, (1985, p.39-44)	Interpretation of the tensile strength of ice under triaxial
p.1-15 ₁ MP 1300	MP 2110	stress. Nevel, D.E., et al, (1976, p 375-387) MP 996
Review of buckling analyses of ice sheets Sodhi, D.S., et al,	Chemical fractionation of brine in McMurdo Ice Shelf Cragin, J.H., et al., [1986, p 307-313] MP 2239	Interpretation of the tensile strength of ice under triaxial
[1980, p.131-146] MP 1322 Dynamics of snow and ice masses Colbeck, S.C., ed,	Can relict crevasse plumes on antarctic ice shelves reveal a	stresses. Nevel, D.E, et al, (1976, 9p) CR 76-05
(1980, 468p.) MP 1297	history of ice-stream fluctuation MacAyeal, D.R. et al.	Cantilever beam tests on reinforced ice Ohstrom, E.G., et al. (1976, 12p.) CR 76-07
Planetary and extraplanetary event records in polar ice caps.	[1988, p 77-82] MP 2460 Ice solid interface	al, (1976, 12p) Sea ice properties and geometry Weeks, W.F., (1976, 19
Zeller, E J, et al. (1980, p 18-27) MP 1461 Alaska Good Friday earthquake of 1964 Swinzow, G K	Radar imagery of ice covered North Slope lakes Wecks,	p 137-171 ₁ MP 918
(1982, 26p.) CR 82-01	W.F., et al, [1977, p 129-136] MP 923	Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., 1977, 26p.; CR 77-04
Determining the characteristic length of model ice sheets.	Seeking low ice adhesion Sayward, J.M., [1979, 83p] SR 79-11	Measuring the uniaxial compressive strength of ice. Haynes.
Sodhi, D.S., et al. (1982, p.99-104) MP 1570 lee sheet retention structures. Perham, R E., (1983, 33p)	Working group on ice forces on structures Carstens, T, ed,	F D., ct al. (1977, p.213-223) MP 1027
CR 83-30	(1980, 146p) SR 80-26	Effect of temperature and strain rate on the strength of poly-
Experimental determination of buckling loads of cracked ice	Dynamic ice-structure interaction analysis for narrow vertical structures Eranti, E., et al. [1981, p.472-479]	crystalline ice Haynes, F.D., (1977, p.107-111) MP 1127
sheets Sodhi, DS, et al, [1984, p.183-186] MP 1687	MP 1456	Bearing capacity of river ice for vehicles Nevel, D.E.
Ice sheet retention structures Perham, R E., (1984, p 339-	Frost susceptibility of soil, review of index tests Chamber- lain, E.J., (1981, 110p.) M 81-02	[1978, 22p] CR 78-03
348 ₁ MP 1832	Iam, E.J., (1981, 110p.) M 81-02 Frost susceptibility of soil, review of index tests. Chamber-	Buckling pressure of an elastic floating plate Takagi, S., (1978, 49p.) CR 78-14
Borehole geometry on the Greenland and Antarctic ice sheets Jezek, K.C., (1985, p. 242-251) MP 1817	lain, E J., (1982, 110p) MP 1557	Rheology of ice. Fish, A.M., [1978, 196p] MP 1988
Determining the characteristic length of floating ice sheets by	Dynamic ice-structure interaction during continuous crushing. Määttänen, M, [1983, 48p] CR 83-05	Horizontal forces exerted by floating ice on structures Kerr, A.D. (1978, 90) CR 78-15
moving loads Sodhi, D.S, et al, [1985, p 155-159] MP 1855	Adhesion of ice to polymers and other surfaces Itagaki, K.	A.D., (1978, 9p) Effect of temperature on the strength of snow-ice. Haynes.
Kadluk ice stress measurement program. Johnson, J.B., et al.	(1983, p 241-252) MP 1580	F.D. (1978, 25p) CR 78-27
(1985, p 88-100 ₁ MP 1899	On forecasting mesoscale ice dynamics and build-up Hibler, W.D., III, et al. (1983, p.110-115) MP 1625	Polycrystalline ice mechanics. Hooke, R.L., et al. (1979,
Sheet ice forces on a conical structure: an experimental study	W.D., III, et al. (1983, p.110-115) MP 1625 Method for determining ice loads on offshore structures.	16p j MP 1207 Ice forces on the Yukon River bridge—1978 breakup John-
Sodhi, D.S., et al. (1985, p.643-655) MP 1906 Convective heat transfer in water over melting ice sheet	Johnson, J.B., (1983, p.124-128) MP 2056	son, P.R, et al. (1979, 40p) MP 1304
Lunardini, V.J., (1986, p 42-51) MP 2600	Bucking loads of floating ice on structures Sodhi, DS, et al. [1983, p 260-265] MP 1626	Safe ice loads computed with a pocket calculator Nevel, D.E., (1979, p. 205-223) MP 1249
Folding in the Greenland ice sheet Whillans, I M, et al.	Experiments on ice ride-up and pile-up. Sodhi, DS, et al.	DE, (1979, p 205-223) Application of the Andrade equation to creep data for ice and
(1987, p 485-493) MP 2185 Glaciological investigations using the synthetic aperture radar	(1983, p 266-270) MP 1627	frozen soil Ting, J M, et al. (1979, p.29-36)
imaging system Bindschadler, R.A. et al. [1987, p.11-	Ice forces on model marine structures Haynes, F.D., et al. (1983, p. 778-787) MP 1606	MP 1802 Temperature effect on the uniaxial strength of ice. Haynes.
19) MP 2342	Ice forces on model bridge piers 11 ynes. F.D. et al. (1983,	F D., (1979, p 667-681) MP 1231
Effect of stratigraphy on radar-altimetry data collected over ice sheets Jezek, K.C., et al. (1988, p. 60-63)	IIp) CR 83-19	Physical properties of sea ice and under-ice current orienta-
MP 2458	Ice action on two cylindrical structures Kato, K., ct al. '93, p 159-166; MP 1643	tion Kovacs, A., et al. (1980, p. 109-153) MP 1323 Mechanical properties of polycrystalline ice Mellor, M.
Ice-induced vibrations of structures Sodhi, D.S., (1989, p.189-221) MP 2492	Implications of surface energy in ice adhesion Itagaki, K.,	(1980, p.217-245) MP 1302
fee reinforced with Geogrid Haynes, F.D. et al. (1989).	(1983, p.41-48) MP 1672 Offshore mechanics and Arctic engineering symposium.	Review of buckling analyses of ice sheets. Sodhi, D.S., et al.
p.179-185 ₁ MP 2484	1984 [1984, 3 vols] MP 1675	(1980, p 131-146) MP 1322 Sea ice growth, drift, and decay Hibler, W D. III. (1980.
Penetration of floating ice sheets with cylindrical indentors Sodhi, D.S., et al. (1989, p. 104) MP 2688	Experimental determination of buckling loads of cracked ice	p 141-209) MP 1298
Antarctic ice sheet brightness temperature variations Jezek.	sheets. Sodhi, D.S., et al. (1984, p.183-186) MP 1687	Sea ice anisotropy, electromagnetic properties and strength.
K C., et al, [1990, p 217-223] MP 2736	Ice action on two cylindrical structures. Kato, K, et al.	Kovacs, A., et al. (1980, 18p.) Cyclic loading and fatigue in ice. Mellor, M., et al. (1981,
Ice shelves	[1984, p 107-112] MP 1741	p 41-53 ₁ MP 1371
Stability of Antarctic ice. Weertman, J. (1975, p.159) MP 1042	Modeling the resilient behavior of frozen soils using unfrozen water content. Cole. D.M. (1984, p. 823-834)	Modeling pressure ridge buildup on the geophysical scale.
Snow and ice Colbeck, S.C., et al. (1975, p 435-441, 475-	MP 1715	Hibler, W.D., 111, (1982, p.141-155) MP 1590 Deformation and failure of frozen soils and ice due to stresses
487 ₁ MP 844	Laboratory investigation of the kinetic friction coefficient of ice Forland, K.A., et al. (1984, p.19-28) MP 1825	
Melting and freezing of a drill hole through the Antarctic shelf ice. Tien, C, et al. [1975, p 421-432] MP 861	Crushing ice forces on cylindrical structures Morris, C.E.,	Determining the characteristic length of model ice sheets
Glaciology's grand unsolved problem Weertman, J.	ct al. (1984, p 1-9) MP 1834	Sodhi, D.S., et al. (1982, p.99-103) MP 1570 Adhesion of ice to polymers and other surfaces Itagaki, K.
(1976, p 284-286) MP 1056	Computational mechanics in arctic engineering Sodhi, D.S., 1984, p.351-374; MP 2072	160 1600
Heat transfer in drill holes in Antarctic ice Yen, Y-C. et al, (1976, 15p.) CR 76-12	Kinetic friction coefficient of ice Forland, K A., et al.	Properties of urea-doped ice in the CRREL test basin
Engineering properties of sea ice Schwarz, J. et al. (1977,	(1985, 40p) CR 85-06	Hirayama, K. (1983, 44p)
p 499-531; MP 1005	Real-time measurements of uplifting ice forces Abbilansky, L.J. (1985, p. 253-259) MP 2092	Weeks, W.F., et al. (1983, p.25-41) MP 1604
Stable isotope profile through the Ross Ice Shelf at Little America V, Antarctica. Dansgaard, W, et al. (1977.	In-ice calibration tests for an elongate, uniaxial brassice stress	Study on the tensile strength of ice as a function of grain size
p.322-3251 MP 1095	sensor Johnson, J.B. (1985, p.506-510) MP 1966	Currier, J H., et al. (1983, 38p) CR 83-14

	And the state of t	Mule Designed and the Consider Besufort See
Ice strength (cont.)	Mechanical properties of multi-year sea ice. Richter-Menge, J.A., et al. (1987, p.121-153) MP 2428	Multi-year pressure ridges in the Canadian Beaufort Sea Wright, B, et al, [1981, p 125-145] MP 1514
How effective are icephobic coatings. Minsk, L.D., 1983, p.93-95; MP 1634	Saline ice penetration a joint CRREL-NSWC test program	Physical and structural characteristics of sea ice in McMurdo
p.93-953 MP 1634 Mechanicsl behavior of sea ace Mellor, M., (1983, 105p)	Cole, D M, et al, [1987, 34p] SR 87-14	Sound. Gow, A.J., et al, (1981, p 94-95) MP 1542
M 83-1	CRREL Hopkinson bar apparatus Dutta, P.K., et al,	Physical properties of the ice cover of the Greenland Sea.
Measurement of ice forces on structures. Sodhi, D.S., et al,	(1987, 29p) SR 87-24	Weeks, W.F., [1982, 27p] SR 82-28
[1983, p 139-155] MP 1641	Flexure and fracture of macrocrystalline S1 type freshwater	Physical, chemical and biological properties of winter sea ice
Implications of surface energy in ice adhesion. Itagaki, K	ice Dempsey, J.P., et al. (1988, p.39-46) MP 2318	in the Weddell Sea. Clarke, D.B, et al, [1982, p.107- 109] MP 1609
(1983, p.41-48) MP 1672	Growth of EG/AD/S model ice in a small tank Borland, S.L., [1988, p 47-53] MP 2319	Frazil ice Daly, S.F., (1983, p 218-223) MP 2078
Characteristics of multi-year pressure ridges Kovacs, A, 1983, p.173-182; MP 1698	Effects of temperature and structure of ice on its flexural	First-generation model of ice deterioration. Ashton, G.D.,
Relationship between creep and strength behavior of ice at	strength. Gow, A.J., et al, [1988, 43p] CR 88-06	(1983, p 273-278) MP 2080
failure Cole, D M, [1983, p 189-197] MP 1681	Fracture of S2 columnar freshwater ice floating double can-	Variation of ice strength within and between multiyear pres-
Mechanical properties of ice in the Arctic seas. Weeks,	tilever beam tests. Bentley, D.L., et al. (1988, p 152-	sure ridges in the Beaufort Sea. Weeks, W.F., (1984,
W.F., et al. (1984, p.235-259) MP 1674	161 ₁ MP 2493	p 134-139; MP 1680 Preliminary examination of the effect of structure on the com-
Summary of the strength and modulus of ice samples from	Confined compressive strength of multi-year pressure ridge sea ice samples Cox, G F N, et al. [1988, p 295-301]	pressive strength of ice samples from multi-year pressure
multi-year pressure ridges Cox, G.F.N., et al., (1984, p.126-133) MP 1679	MP 2403	ridges. Richter, J A, et al. (1984, p.140-144)
Variation of ice strength within and between multiyear pres-	Fracture experiments on freshwater and urea model ice.	MP 1685
sure ridges in the Beaufort Sea. Weeks, W.F., (1984,	Bentley, D L, et al, [1988, 152p] MP 2502	Structure of first-year pressure ridge sails in the Prudhoe Bay
p.134-139 ₁ MP 1680	Profile properties of undeformed first-year sea ice. Cox,	region Tucker, W.B. et al. (1984, p.115-135) MP 1837
Preliminary examination of the effect of structure on the com-	G.F.N., et al. (1988, 57p) CR 88-13	Structure, salinity and density of multi-year sea ice pressure
pressive strength of ice samples from multi-year pressure	Imjin River ice boom Perham, R.E., [1988, 10p] SR 88-22	tidges. Richter-Menge, J A., et al, (1985, p 194-198)
ridges. Richter, J A., et al, (1984, p.140-144) MP 1685	Ship model testing in level ice: an overview. Tatinclaux, J C.,	MP 1857
Influence of grain size on the ductility of ice Cole, D.M.	[1988, 30p] Cr 88-15	Measuring multi-year sea ice thickness using impulse radar.
(1984, p 150-157) MP 1686	Working group on ice forces 4th state-of-the-art report	Kovacs, A, et al. (1985, p 55-67) MP 1916
Ice resistance tests on two models of the WTGB icebreaker	Timco, G W, ed, (1989, 385p) SR 89-05	Pressure ridge and sea ice properties Greenland Sea Tucker, W B., et al. r1985, p 214-2231 MP 1935
Tatinclaux, J C., et al. [1984, p 627-638] MP 1716	Uniaxial tension/compression tests on ice—preliminary re-	W B., et al. (1985, p 214-223) MP 1935 Structure, salinity and density of multi-year sea ice pressure
Army research could reduce dangers posed by sea ice Tuck- er, W.B., r1984, p 20-241 MP 2168	sults. Cole, D.M., et al., [1989, p 37-41] MP 2482	ridges Richter-Menge, J.A., et al. (1985, p.493-497)
er, W.B., (1984, p 20-24) MP 2168 Dependence of crushing specific energy on the aspect ratio	Ice reinforced with Geogrid. Haynes, F.D., et al. [1989, p.179-185] MP 2484	MP 1965
and the structure velocity Sodhi, DS, et al. [1984,	Compressive strength of antarctic frazil ice Richter-Menge,	Electromagnetic measurements of sea ice Kovacs, A, et al,
p.363-374 ₁ MP 1708	J.A., et al, [1989, p 269-278] MP 2621	(1986, p 67-93) MP 2020
Mechanical properties of multi-year sea ice Phase 1 Test	Model tests on an icebreaker at two friction factors Tatin-	Physical properties of the sea ice cover Weeks, WF,
results. Cox, G F.N., et al, [1984, 105p] CR 84-09	claux, J.C., (1989, p 774-784) MP 2622	(1986, p 87-102) MP 2047 Optical properties of sea ice structure Gow, A J. (1986.
Mechanical properties of sea ice a status report Weeks, W.F., et al, (1984, p.135-198) MP 1808	Effect of ice pressure on marginal ice zone dynamics Flato, G.M., et al., (1989, p.514-521) MP 2522	p 264-271 ₁ MP 2257
Flexural strengths of freshwater model ice Gow, AJ,	G.M., et al., [1989, p.514-521] MP 2522 Fracture toughness of columnar freshwater ice. Bentley,	On the profile properties of undeformed first-year sea ice.
[1984, p.73-82] MP 1826	D L, et al. (1989, p 7-20) MP 2545	Cox, G.F.N., et al. (1986, p.257-330) MP 2199
4th report of working group on testing methods in ice Earle,	Sea ice thickness measurement Kovars, A., et al. (1989.	Structure and dielectric properties at 48 and 95 GHz of
E N., et al, (1984, p 1-41) MP 1886	p 394-424) MP 2693	saline ice Arcone, S.A., et al., [1986, p.14,281-14,303] MP 2182
ice forces on inclined model bridge piers Haynes, F.D., et	Ice strength estimates from submarine topsounder data.	Folding in the Greenland ice sheet. Whillans, I.M., et al.
al, (1984, p 1167-1173) MP 2407	DiMarco R, et al. (1989, p 425-426) MP 2691	[1987, p 485-493] MP 2185
Ice penetration tests Garcia, NB, et al, [1984, p.209- 240; MP 1996	Wave-induced bergy bit motion near a floating platform Mak, L.M, et al. (1990, p 205-215) MP 2580	Sea ice structure and mechanical properties Richter-
Tensile strength of multi-year pressure ridge sea ice samples	Comparison of the compressive strength of antarctic frazilice	Menge, JA, et al. (1987, 30p) CR 87-03
Cox, G F N, et al, [1985, p 186-193] MP 1856	and laboratory-grown columnar ice Richter-Menge, J A ,	Physical properties of sea ice discharged from Fram Strait.
Grain size and the compressive strength of ice. Cole, D.M.,	et al. (1990, p 79-84) MP 2731	Gow, A J., et al, [1987, p 436-439] MP 2204
(1985, p 220-226) MP 1858	Ice structure	Physical properties of estuarine ice in Great Bay, New Hamp- shire. Meese, D.A., et al., (1987, p. 833-840)
Strength and modulus of ice from pressure ridges Cox, G.F.N., et al, (1985, p. 93-98) MP 1848	Report on ice fall from clear sky in Georgia October 26, 1959	MP 2251
G.F.N., et al. (1985, p 93-98) MP 1848 Structure and the compressive strength of ice from pressure	Harrison, L.P., et al. (1960, 31p. plus photographs) MP 1017	Physical and structural characteristics of Weddell Sea pack
ridges. Richter, J A., et al, (1985, p.99-102)	Investigation of ice islands in Babbage Bight. Kovacs, A . et	ice Gow, A.J., et al., (1987, 70p) CR 87-14
MP 1849	al. (1971, 46 leaves) MP 1381	Microwave and structural properties of saline ice Gow.
Compressive strength of pressure ridge ice samples Richter-	Classification and variation of sea ice ridging in the Arctic	A.J., et al., [1987, 36p] CR 87-20
Menge, J.A., et al., (1985, p.465-475) MP 1877	basin Hibler, W.D., III, et al. (1974, p. 127-146) MP 1022	Mechanical properties of multi-year sea ice Richter-Menge, J.A., et al. (1988, 27p.) CR 88-05
Triaxial compression testing of ice. Cox, GFN., et al, (1985, p 476-488) MP 1878	Results or the US contribution to the Joint US/USSR Bering	Microcomputer-based image-processing system. Perovich,
Propulsion tests in level ice on a model of a 140-ft WTGB	Sea Experiment Campbell, W J., et al. [1974, 197p]	DK, et al. (1988, p 249-252) MP 2385
icebreaker. Tatinclaux, JC. (1985, 13p) CR 85-04	MP 1032	Effects of temperature and structure of ice on its flexural
Pressure ridge strength in the Beaufort Sea Weeks, WF.	Some characteristics of grounded floebergs near Prudhoe Bay.	strength Gow, A J, et al, [1988, 43p] CR 88-06
(1985, p.167-172) MP 2121	Alaska Kovacs, A., et al. (1976, p.169-172) MP 1118	High frequency acoustical properties of saline ice. Jezek, K.C., et al. (1989, p.9-23) MP 2686
lce island fragment in Stefansson Sound, Alaska. Kovacs, A. (1985, p. 101-115) MP 1900	Grounded floebergs near Prudhoe Bay, Alaska Kovacs, A.	Physical properties of brackish ice, Bay of Bothnia. Weeks,
A, (1985, p 101-115) MP 1900 Compressive strength of multi-year sea ice Kovacs, A.,	et al. (1976, 10p) CR 76-34	W F., et al. (1990, p 5-15) MP 2725
[1985, p 116-127] MP 1901	Internal structure and crystal fabrics of the West Antarctic ice	Chemical and structural properties of sea ice in the southern
Experience with a biaxial ice stress sensor Cox, GFN.,	sheet Gow, A J, et al, (1976, 25p) CR 76-35	Beaufort Sea. Meese, D.A. (1990, p.32-35) MP 2728
(1985, p 252-258) MP 1937	Structural growth of lake ice Gow, A.J., et al. (1977, 24p.)	
Grain size and the compressive strength of ice Cole, D.M.	CR 77-01 Engineering properties of sea ice. Schwarz, J., et al. (1977.	Acoustics and morphology of undeformed sea ice. Jezek, K.C., et al. (1990, p 67-75) MP 2730
[1985, p 369-374] MP 1907 Tensile strength of multi-year pressure ridge sea ice samples	p.499-531 ₁ MP 1065	Lidar detection of leads in arctic sea ice. Schnell, R C., et al.
Cox, G F N, et al. (1985, p 375-380) MP 1908	Compressive and shear strengths of fragmented ice covers	(1990, p 119-123) MP 2733
Mechanical properties of multi-year sea ice. Phase 2. Test	Cheng, ST, et al. [1977, 82p] MP 951	Sea ice in the polar regions Gow, A.J., et al. (1 -44, p.47-
results Cox, G F.N., et al. (1985, 81p) CR 85-16	Internal structure of fast ice near Narwahi Island Gow. A J.	122 ₁ MP 2750
Confined compressive strength of multi-year pressure ridge	et al. (1977, 8p) CR 77-29	Physics of ice Glen, J.W., 1974, 81p 1 M II-C2a
sea ice samples Cox, G F N , et al. (1986, p 365-373) MP 2035	Dynamics of near-shore ice Kovaes, A. et al. (1977, p.411-424) MP 1076	Physics of ice Glen, J.W., (1974, 81p.) M II-C2a Sea ice growth, drift, and decay Hibler, W.D., III. (1980.)
Fracture toughness of model ice Dempsey, J.P., et al,	Oxygen isotopes in the basal zone of Matanuska Glacier	p.141-2091 MP 1298
(1986, p 365-376) MP 2125	Lawson, DE, et al. (1978, p 673-685) MP 1177	Sea ice rubble formations off the NE Bering Sea and Norton
Flexural and buckling failure of floating ice sheets against	Dynamics of near-shore ice Kovacs, A. et al. [1978, p 11-	Sound Kovacs, A., (1981, p.1348-1363) MP 1527
structures. Sodhi, D.S., (1986, p. 339-359) MP 2134	22) MP 1205	Surface roughness of Ross Sea pack ice Govoni, J.W. et al. (1983, p. 123-124) MP 1764
Evalus ion of the rheological properties of columnar ridge sea ice Brown, R L., et al. [1986, p 55-66] MP 2177	Problems of offshore oil drilling in the Beaufort Sea Weller. G., et al, [1978, p 4-11] MP 1250	(1983, p. 123-124) MP 1764 Drag coefficient across the Antarctic marginal ice zone An-
Mechanical behavior of sea ice Mellor, M., (1986, p. 165-	Multi year pressure ridges in the Canadian Beaufort Sea	dreas, E.L. et al. (1984, p.63-71) MP 1784
281 ₁ MP 2210	Wright, B. et al. [1979, p 107-126] MP 1229	Dynamic friction of bobsled runners on ice Huber, N.P. et
Some developments in shaped charge technology Mellor,	Dynamics of near-shore ice Kovacs, A, et al. (1979.	al. (1985, 26p) MP 2082
M. (1986, 29p) SR 86-18		There is the sector construction and securities and finance area.
	p 181-207) MP 1291	Theory for scalar roughness and transfer coefficients over
Controlled river ice cover breakup, part 2 Theory and	p 181-207; MP 1291 Ross Ice Shelf bottom ice structure. Zotikov. I A. et al.	snow and ice Andreas E. L. (1987, p 159-184)
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al. (1986)	p 181-207 ₁ MP 1291 Ross Ice Shelf bottom ice structure. Zotikov, I A, et al. (1979, p 65 66 ₁ MP 1336	snow and ice Andreas E.L. (1987, p.159-184) MP 2195
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G., et al., [1986, p 293-305] MP 2392	p 181-207; MP 1291 Ross Ice Shelf bottom ice structure. Zotikov, IA, et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. I awson, D E.	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) MP 2228
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al., [1986, p 293-305] MP 2392 Compressive behavior of saline ice Richter-Menge, J.A., [1986, p 331-350] Richter-Menge, J.A.	p 181-207, MP 1291 Ross Ice Shelf bottom ice structure. Zotikov. I A., et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. I aw son, D E. (1979, p 629 645) Preparation of polyerystalline ice specimens for laboratory	snow and ice Andreas E. L. (1987, p. 159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p. 23-26) Ice surface hydrolys s of disopropylfluorophosphate (DFP)
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al., (1986, p.293-305) MP 2392 Compressive behavior of saline ice [1986, p.331-350] Richter-Menge, J.A. et al., p. 200 Tranual testing of first-year sea ice Richter-Menge_J.A. et	p 181-207; MP 1291 Ross Ice Shelf bottom ice structure. Zotikov. IA, et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. I awson, D E. (1979, p 629 645) Preparation of polycrystalline ice specimens for laboratory experiments. Cole, D M. (1979, p 153-159)	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) Ice surface hydrolys s of dissopropylfluorophosphate (DFP) Leggett D.C. (1987, p.809-815) MP 2457
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al., (1986, p. 293-305) MP 2392 Compressive behavior of saline ice [1986, p. 331-330] MP 2200 Triaxial testing of first-year sea ice al., (1986, 41p.) CR 86-16	p 181-207, MP 1291 Ross Ice Shelf bottom ice structure. Zotikov, I.A., et al., (1979, p.65-66) MP 1336 Pebble orientation ice and glacial deposits. I awson, D.E., (1979, p.629-645) MP 1276 Preparation of polycrystalline ice specimens for laboratory experiments. Cole, D.M., (1979, p.153-159) MP 1327	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) Ice surface hydrolys s of disopropylfluorophosphate (DFP, leggett D.C., (1987, p.809-815) MP 2457 defractive index structure parameter for a year over the frozensia.
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al., [1986, p 293-305] Ferrick, M.G. et al., [1986, p 239-20] Franial testing of first-year sea ice al., [1986, 41p.] CR 86-16 Confined compressive strength of horizontal first-year sea ice	p 181-207, MP 1291 Soss Ice Shelf bottom ice structure. Zottkov. I A., et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. I awson, D.E., (1979, p 629 645) MP 1276 Preparation of polyerystalline ice specimens for laboratory experiments. Cole, D.M., (1979, p 153-159) Margin of the Greenland ice sheet at Isua. Colbeck, S.C., et	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) Ice surface hydrolys s of dissopropylfluorophosphate (DFP) Leggett D.C. (1987, p.809-815) MP 2457
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al., (1986, p. 293-305) MP 2392 Compressive behavior of saline ice [1986, p. 331-330] MP 2200 Triaxial testing of first-year sea ice al., (1986, 41p.) CR 86-16	p 181-207, MP 1291 Ross Ice Shelf bottom ice structure. Zotikov. 1A., et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. I awson, D.E., MP 1276 Peparation of polycrystalline ice specimens for laboratory experiments Cole, D.M., (1979, p 153-159) MP 1327 Margin of the Greenland ice sheet at Isua Collecto, S.C., et al., (1979, p 155-165) MP 1281	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) Ice surface hydrolys s of dissopropylfluorophosphate (DFP) Leggett D.C. (1987, p.809-815) Acfractive index structure parameter for a year over the frozen Beaufort Sea. Andreas, E.L., (1989, p.667-679) MP 2575
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al. (1986, p.293-305) MP 2392 Compressive behavior of saline ice (1986, p.331-350) Richter-Menge, J.A. (1986, 41p) Richter-Menge, J.A. (CR 86-16) Confined compressive strength of horizontal first-year sea ice samples Richter-Menge, J.A. (1987, p. 197-207) MP 2193 Advances in ice mechanics—1987 (1987, 49p.)	p 181-207, MP 1291 Ross Ice Shelf bottom ice structure. Zottkov. 1 A., et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. 1 awson, D.E., (1979, p 629 645) MP 1276 Preparation of polyerystalline ice specimens for laboratory experiments. Cole, D.M., (1979, p 153-159) Margin of the Greenland ice sheet at Isua. Colbeck, S.C., et al., (1979, p 155-165) Dynamic ice-structure interaction analysis for narrow critical structures. Exant., E., et al., (1981, p 472-479)	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al., (1987, p.23-26) Ice surface hydrolys s of disopropylfluorophosphate (DFP) Leggett D.C. (1987, p.809-815) Alfractive index structure parameter for a year over the frozen Beaufort Sea. Andreas, E.L., (1989, p.667-679) MP 2575 Concurrent femote sensing of arctic sea ice from submarine and aircraft. Wadhams, P. et al., (1989, 20p.)
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al. (1986, p 293-305) MP 2392 Compressive behavior of saline ice (1986, p 331-350) MP 2202 Tranual testing of first-year sea ice al. (1986, 41p) CR 86-16 Confined compressive strength of horizontal first-year sea ice samples Richter-Menge, J.A., (1987, p 197-207) MP 2193 Advances in ice mechanics—1987 (1987, 49p) MP 2207	mP 1291 Ross Ice Shelf bottom ice structure. Zotikov. I.A. et al. (1979, p.65-66) MP 1336 Pebble orientation ice and glacial deposits. I awson, D.E. (1979, p.629-645) MP 1276 Preparation of polyerystalline ice specimens for laboratory experiments. Cole, D.M. (1979, p.153-159) Margin of the Greenland ice sheet at Isua. Colbeck, S.C. et al. (1979, p.155-165) MP 1327 Margin of the Greenland ice sheet at Isua. Colbeck, S.C. et al. (1979, p.155-165) MP 1321 Dynamic ice-structure interaction analysis for narrow sertical structures. Eranti, E. et al. (1981, p.472-479) MP 1456	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) Ice surface hydrolys's of disopropylfluorophosphate (DFP) Leggett D.C. (1987, p.809-815) MP 2457 Acfractive index structure parameter for a year over the frozen Beaufort Sea. Andreas, E.L., (1989, p.667-679) MP 2575 Concurrent remote sensing of arctic sea ice from submarine and aircraft Wadhams, P., et al., (1989, 20p.) MP 2697
Controlled river ice cover breakup, part 2 Theory and numerical model studies Ferrick, M.G. et al. (1986, p.293-305) MP 2392 Compressive behavior of saline ice (1986, p.331-350) Richter-Menge, J.A. (1986, 41p) Richter-Menge, J.A. (CR 86-16) Confined compressive strength of horizontal first-year sea ice samples Richter-Menge, J.A. (1987, p. 197-207) MP 2193 Advances in ice mechanics—1987 (1987, 49p.)	p 181-207, MP 1291 Ross Ice Shelf bottom ice structure. Zottkov. 1 A., et al. (1979, p 65 66) MP 1336 Pebble orientation ice and glacial deposits. 1 awson, D.E., (1979, p 629 645) MP 1276 Preparation of polyerystalline ice specimens for laboratory experiments. Cole, D.M., (1979, p 153-159) Margin of the Greenland ice sheet at Isua. Colbeck, S.C., et al., (1979, p 155-165) Dynamic ice-structure interaction analysis for narrow critical structures. Exant., E., et al., (1981, p 472-479)	snow and ice Andreas E.L. (1987, p.159-184) MP 2195 Scientific challenges at the poles. Welch, J.P., et al., (1987, p.23-26) Ice surface hydrolys s of disopropylfluorophosphate (DFP) Leggett D.C. (1987, p.809-815) Alfractive index structure parameter for a year over the frozen Beaufort Sea. Andreas, E.L., (1989, p.667-679) MP 2575 Concurrent femote sensing of arctic sea ice from submarine and aircraft. Wadhams, P. et al., (1989, 20p.)

Recent measurements of sea are topography in the eastern	Experimental scaling study of an annular flow ice-water heat sink. Stubstad, J.M., et al., r1977, 54p 1 CR 77-15	Power requirements and methods for long distance large ice- berg towing Mellor, M., [1980, p 231-240]
Arctic Krabill, W.B., et al, [1990, p 132-136] MP 2735	Effect of the oceanic boundary layer on the mean drift of pack	MP 1275
Antarctic ice sheet brightness temperature variations. Jezek, K.C., et al, [1990, p 217-223] MP 2736	ice, application of a simple model. McPhee, M.G., (1979, p. 388-400) MP 1198	Iceberg water: an assessment Weeks, W.F., [1980, p.5- 10] MP 1365
Radar backscatter measurements over salme ice. Gogineni, S., et al, (1990, p 603-615) MP 2741	Turbulent heat transfer from a river to its ice cover. Haynes, F.D, et al, [1979, 5p.] CR 79-13	Icebergs Towing icebergs Lonsdale, H K., et al, [1974, p.2]
ICE SURVEYS	Problems of the seasonal sea ice zone. Weeks, W.F. 1980,	MP 1020
Surveys of river and lake ice. Michel, B., (1971, 131p.) M III-Bia	p 1-35 ₁ MP 1293 Physical oceanography of the seasonal sea ice zone.	Obtaining fresh water from icebergs Mellor, M., 1977, p.193, MP 1117
Ice surveys Notes and quotes from snow and ice observers in Alaska.	McPhee, M.G., 1980, p.93-132; MP 1294 Modeling of anisotropic electromagnetic reflection from sea	Iceberg thickness profiling using an impulse radar. Kovacs, A., [1977, p.140-142] MP 1012
Bilello, M.A., (1979, p 116-118) MP 1631	ice. Golden, K.M., et al, [1980, p.247-294] MP 1325	Some elements of iceberg technology. Weeks, W.F., et al,
Bibliography on glaciers and permafrost, China, 1938-1979. Shen, J., ed, (1982, 44p) SR 82-20	Nonsteady ice drift in the Strait of Belle Isle. Sodhi, D.S.,	(1978, p.45-98) MP 1616 Iceberg thickness and crack detection. Kovacs, A, (1978,
Proceedings of the Symposium on Applied Glaciology, 2nd, 1982, [1983, 314p] MP 2054	et al, (1980, p.177-186) MP 1364 Free convection heat transfer characteristics in a melt water	p.131-145; MP 1128 Destruction of ice islands with explosives. Mellor, M., et al,
ice engineering facility. Zabilansky, L.J., et al, (1983, 12p	layer. Yen, YC., {1980, p.550-556; MP 1311 Air-ice-ocean interaction in Arctic marginal ice zones Wad-	(1978, p.753-765) MP 1018
+ fig 1 MP 2088 Field investigation of St. Lawrence River hanging ice dams.	hams, P., ed, (1981, 20p) SR 81-19	iceberg thickness profiling. Kovacs, A., (1978, p.766-774) MP 1019
Shen, H.T., et al. (1984, p 241-249) MP 1830 Snow, ice and frozen ground research at the Sleepers River,	Ice-covered North Slope lakes observed by radar. Weeks, W.F., et al, [1981, 17p] CR 8:-19	Icebergs, an overview. Kovacs, A., (1979, 7p.) SR 79-21
VT. Pangburn, T, et al, [1984, p 229-240] MP 2071	Frost susceptibility of soil, review of index tests. Chamber- lain, E.J., [1981, 110p.] M 81-02	Overview 51, the seasonal sea ice zone Weeks, W.F., et al. [1979, p.320-337] MP 1320
Topical databases. Cold Regions Technology on-line. Lis-	Frost susceptibility of soil, review of index tests. Chamber-	iceberg warer, an assessment Weeks, W.F., 1980, p.5-
ton, N., et al, (1985, p 12-15) MP 2027 Techniques for measurement of snow and ice on freshwater	Soft drink bubbles Cragin, J H, [1983, p 71]	10 ₁ MP 1365 Dynamics of snow and ice masses Colbeck, S.C., ed.
Adams, W.P., et al, (1986, p.174-222) MP 2000 Remote sensing of ice and snow (review) Jezek, K.C.,	MP 1736 Relationship between ice and unfrozen water in frozen soils	(1980, 468p) MP 1297 Mechanic, properties of ice in the Arctic seas. Weeks,
[1987, p51] MP 2429	Tice, A.R., et al, [1983, p.37-46] MP 1632 Properties of sea ice in the coastal zones of the polar oceans.	W.F., et al, (1984, p 235-259) MP 1674
Corps of Engineers research in the Arctic Smallidge, PD, et al, [1987, p 81-87] MP 2411	Weeks, W.F., et al, [1983, p 25-41] MP 1604	Conference on offshore mechanics and Arctic engineering, 8th, 1989, [1989, 476p] MP 2481
Snow/ice/frozen ground properties, working group report Sterrett, K.F., et al, [1987, p 163-166] MP 2416	Marginal Ice Zone Experiment, Fram Strait/Greenland Sea, 1984. Johannessen, O.M., ed, (1983, 47p)	Dynamic simulations of iceberg-seabed interactions Bass, D.W., et al, (1989, p 137-151) MP 2684
Satellite remote sensing in Arctic for 1990's Weeks, W.F.,	SR 83-12 Marginal ice zones: a description of air-ice-ocean interactive	Wave-induced bergy bit motion near a floating platform
Development of an airborne sea ice thickness measurement	processes, models and planned experiments Johannessen, O.M., et al, [1984, p.133-146] MP 1673	Mak, L.M., et al, [1990, p 205-215] MP 2580 Icebound lakes
system and field test results Kovacs, A., et al. (1989, 47p.) CR 89-19	Modeling the marginal ice zone Hibler, W.D., III, ed,	lce-covered North Slope lakes observed by radar. Weeks, W.F., et al, [1981, 17p] CR 81-19
Field studies of brackish ice to compare with satellite data Weeks, W.F., et al. [1989, p.1318-1333] MP 2763	(1984, 99p) SR 84-07 Large-scale ice/ocean model for the marginal ice zone. Hi-	Icebound rivers
ICE TEMPERATURE	bler, W.D., III, et al. (1984, p.1-7) MP 1778 On the decay and retreat of the ice cover in the summer MIZ.	St. Lawrence River freeze-up forecast Foltyn, E.P., et al. [1986, p. 467-481] MP 2120
Antarctic ice sheet. Mellor, M, (1961, 50p) M I-B1 Greenland ice sheet Bader, H., (1961, 18p) M I-B2	Maykut, G.A., [1984, p.15-22] MP 1780	Morphology, hydraulics and sediment transport of an ice- covered river. Lawson, D E., et al. (1986, 37p)
Ice temperature	On the role of ice interaction in marginal ice zone dynamics. Lepparanta, M., et al. [1984, p 23-29] MP 1781	CR \$6-11
Nearshore ice motion near Prudhoe Bay, Alaska Tucker, W.B., et al, (1977, p 23-31) MP 1162	Ocean circulation: its effect on seasonal sea-ice simulations Hibler, W.D., III, et al, [1984, p 489-492] MP 1700	Calibrating HEC-2 in a shallow, ice-covered river D J., et al. (1986, 25 refs.) SR 86-34
Equations for determining the gas and brine volumes in sea ice samples Cox, G.F.N., et al. (1982, 11p.)	Temperature and interface morphology in a melting ice-water	Ice cover distribution in Vermont and New Hampshire Atlan- tic salmon rearing streams Calkins, D J., et al. (1988,
CR 82-30 Surface meteorology US/USSR Weddell Polynya Expedition,	system. Yen, YC., (1984, p 305-325) MP 1727 Technique for observing freezing fronts Colbeck, S.C.,	p 85-96 ₁ MP 2473 ICEBREAKERS
1981. Andreas, E.L., et al, [1983, 32p] SR 83-14	(1985, p.13-20) MP 1861 Air-ice ocean interaction in Arctic marginal ice zones	Ice pressure on engineering structures. Michel, B., (1970,
Preliminary investigation of thermal ice pressures. Cox, G.F.N., [1984, p 221-229] MP 1788	MIZEX-West. Wadhams, F., ed, (1985, 119p) SR 85-06	71p.; M III-B1b Icebreakers
Ice properties in a grounded man-made ice island Cox, G.F.N., et al, (1986, p.135-142) MP 2032	Acoustic waves incident on a seawater/sea ice interface.	Icebreaker simulation Nevel, D.E., [1977, 9p] CR 77-16
Effects of temperature and structure of ice on its flexural strength Gow, A J., et al. [1988, 43p] CR 88-06	Jezek, K.C., (1985, 10p.) SR 85-10 Large-scale ice-ocean modeling Hibler, W.D., III, (1986,	Icebreaking concepts Mellor, M., [1980, 18p.]
Profile properties of undeformed first-year sea ice Cox,	p.165-184; MP 2142 Coupled ice-mixed tayer model for the Greenland Sea.	SR 80-02 Evaluation of ice deflectors on the USCG icebreaker Polar
G.F.N., et al, (1988, 57p) CR 88-13 Antarctic ice sheet brightness temperature variations Jezek,	Houssais, M.N., (1986, p.225-260) MP 2143	Star. Vance, G.P., (1980, 37p.) SR 80-04 Performance of the USCGC Katmai Bay icebreaker Vance,
K.C., et al, (1990, p 217-223) MP 2736 Oceanic heat flux in the Fram Strait measured by a drifting	Convective heat transfer in water over melting ice sheet. Lunardini, V.J., [1986, p.42-51] MP 2600	GP, (1980, 28p) CR \$0-08
buoy. Perovich, D.K., et al, [1990, p 291-296] MP 2740	Diagnostic ice-ocean model Hibler, W.D., III, et al., (1987, p.987-1015) MP 2238	Methods of ice control Frankenstein, G E, et al., 1983, p 204-215; MP 1642
Ice thermal properties	Thermal instability and heat transfer characteristics in water-	Model tests on two models of WTGB 140-foot icebreaker. Tatinclaux, J.C., [1984, 17p] CR 84-03
Influence of irregularities of the bed of an ice sheet on deposi- tion rate of till. Nobles, L H, et al. (1971, p.117-126)	Coupled air-ice-ocean models Hibler, W.D., III, (1987,	Ice resistance tests on two models of the WTGB icebreaker
MP 1009 River ice problems Burgi, P.H., et al., (1974, p 1-15)	p.131-137 ₁ MP 2412 Alaska SAR facility Weeks, W.F., et al., [1988, p.103-	Tatinclaux, J.C., et al., [1984, p.627-638] MP 1716 Model tests in ice of a Canadian Coast Guard R-class ice
MP 1002	110 ₁ MP 2344 On the effect of the 4 C density maximum on melting heat	breaker. Tatinclaux, J.C., [1984, 24p] SR 84-06 Propulsion tests in level ice on a model of a 140-ft WTGB
Engineering properties of sea icc. Schwarz, J. et al. (1977, p.499-531) MP 1065	transfer. Yen, YC. (1988, p 362-367) MP 2382	icebreaker. Tatinclaux, J.C., [1985, 13p] CR 85-04
Winter thermal structure, ice conditions and climate of Lake Champlain. Bates, R.E. (1980, 26p) CR 80-02	International Symposium on Cold Regions Heat Transfer, 1989 (1989, 314p) MP 2636	Level ice breaking by a simple wedge Tatinclaux, J C (1985, 46p) CR 85-21
Documentation for a two-level dynamic thermodynamic sea ice model. Hibler, W.D., III, (1980, 35p.) SR 80-08	Heat transfer from water flowing through a chilled-bed open channel. Richmond, PW, et al, (1989, p 51-58)	Development of a river ice-prow Part 2 Tatinclaux, JC (1988, p 44-52) MP 2497
Review of thermal properties of snow, ice and sea ice Yen,	MP 2649 Shortwave radiation and open water in models of sea ice	Comparative model tests in ice of a Canadian Coast Guard R- class teebreaker Tatinelaux, J.C., et al. [1989, p.1/l-
YC, [1981, 27p] CR 81-10 Growth, structure, and properties of sea ice Weeks. W.F	decay Perovich, D.K., et al. (1990, p 242-246) MP 2759	1/18 ₃ MP 2751
et al, [1982, 130p] M 82-01 Thermal patterns in ice under dynamic loading. Fish, A M.	Ice (water storage)	Model tests in ice of a Canadian Coast Guard icebreaker. Tatinclaux, J.C., et al. (1989, 41p.) SR 89-25
et al, [1983, p 240-243] MP 1742	Some elements of iceberg technology Weeks, W.F. et al. (1978, 31p.) CR 78-02	Comparative model tests in ice of a Canadian Coast Guard R- class icebreaker. Tatinclaux, J.C., et al. (1990, p.31-52)
Preliminary investigation of thermal ice pressures Cox, G.F.N., [1984, p.221-229] MP 1788	ICE WEDGES	MP 2762
Growth, structure, and properties of sea ice. Weeks, W.F., et al. (1986, p.9-164) MP 2209	Patterned ground in Alaska Péwé, T.L., et al., [1969, 87p] MP 1180	Iceland Utility distribution systems in Iceland Aamot, H.W.C.
Theoretical estimates of light reflection and transmission by spatially inhomogeneous and temporally varying ice covers	Ice wedges Electromagnetic survey in permafrost. Sellmann, PV, et al.	{1976. 63p } SR 76-05
Perovich, D K., (1990, p 45-49) MP 2729	[1979, 7p] SR 79-14	Roof response to using conditions Lane, J.W., et al. (1979,
Ice thickness Airborne sea ice thickness sounding Kovaes, A., et al.	Bending and buckling of a wedge on an elastic foundation Nevel, DE, (1980, p 278-288) MP 1303	leing on structures Minsk, L. D., (1980, 18p)
[1989, p.1042-1052] MP 2623 Ice volume	lce floe distribution in the wake of a simple wedge Tatin- claux, J.C., (1986, p. 622-629) MP 2038	CR 80-3 Window performance in extreme cold. Flanders, S N., et al
Ground ice in perennially frozen sediments, northern Alaska.	Iceberg towing	(1982, 21p) CR 82-30
Lawson, D.E., (1983, p.695-700) MP 1661 Ice water interface	Some elements of iceberg technology. Weeks, W.F., et al. (1978, p.45-98) MP 1616	Atmospheric icing of structures Afinsk, L.D., ed. (1983, 366p.) SR 83-1
Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p] MP 1243	Some elements of iceberg technology. Weeks, W.F. et al. (1978, 31p.) CR 78-02	How effective are icephobic coatings Minsk, L.D., [1983, p. 93-95] MP 163
Radar imagery of ice covered North Slope lakes Weeks. W.F. et al. (1977, p. 129-136) MP 923	Prospects for towing icebergs from the Southern Ocean Weeks, W.F., et al. (1979, p. 66-75) MP 1305	Application of a block copolymer solution to ice-prone struc- tures Hanamoto, B., (1983), p.155-1583 MP 1630

Icing (cont.) Aerostat icing problems. Hanamoto, B, [1983, 29p]	Vanadium and other elements in Greenland ice cores. Herron, M.M., et al, [1976, 4p] CR 76-24	Wavelength-dependent extinction by falling snow. Koh, G., [1986, p.51-55] MP 2019
SR 83-23	Photomacrography of artifacts in transparent materials	Scattering at mm wavelengths from in situ snow. Walsh, J,
Mechanical ice release from high-speed rotors Itagaki, K., [1983, 8p] CR 83-26	Marshall, S.J., (1976, 31p.) CR 76-40 Composition of vapors evolved from military TNT. Leggett,	et al, [1986, p 1.6.1-1.6.2] MP 2141
Atmospheric icing on sea structures. Makkonen, L, [1984,	D.C., et al, [1977, 25p] SR 77-16	Extinction coefficient measurement in falling snow. Koh, G., [1987, 9p] SR 87-04
92p ₁ M 84-02 Icing rate on stationary structures under marine conditions.	Tracer movement through snow. Colbeck, S.C., [1977, p.255-262] MP 1093	Extinction coefficient for a distribution of ice fog particles.
Itagaki, K., [1984, 9p.] CR 84-12	Verification tests for a stiff inclusion stress sensor. Cox,	Jordan, R., [1987, p 527-539] MP 2286 Scavenging of infrared screener EA 5763 by falling snow.
Survey of ice problem areas in navigable waterways Zufelt, J., et al, [1985, 32p] SR 85-02	G.F N., et al, (1987, p 81-88) MP 2223	Cragin, J.H., et al, (1987, p 13-20) MP 2292
Measurement of icing on offshore structures. Minsk, LD,	Indexes (ratios) Axial double point-load tests on snow and ice. Kovacs, A.,	Slant path extinction and visibility measurements from an unmanned aerial vehicle. Cogan, J., et al., (1987, p.115-
(1985, p 287-292) MP 2010	(1978, 11p) CR 78-01	126 ₁ MP 2296
Comparison of winter climatic data for three New Hampshire sites. Govoni, J.W., et al, [1986, 78p] SR 86-05	Environmental atlas of Alaska. Hartman, C.W, et al. (1978, 95p.) MP 1204	Infrared reconnaissance Hand-held infrared systems for detecting roof moisture.
Transfer of meteorological data from mountain-top sites. Govoni, J.W., et al. [1986, 6p.] MP 2107	Plant recovery from Arctic oil spills Walker, D.A., et al,	Tobiasson, W, et al, (1977, p 261-271) MP 1390
Communication tower icing in the New England region	[1978, p.242-259] MP 1184 India	Recommendations for implementing roof moisture surveys in the U.S. Army. [1978, 8p] SR 78-01
Mulherin, N., et al, [1986, 7p.] MP 2109 Atmospheric icing on communication masts in New England	-Yamuna River	Thermal observations of Mt. St Helens before and during
Mulherin, N., (1986, 46p) CR 86-17	Snow hydrology in the upper Yamuna basin, India Malhotra, R.V., et al, (1988, p 84-93) MP 2633	eruption. St. Lawrence, W.F., et al, (1980, p. 1526-1527) MP 1482
Rime meteorology in the Green Mountains Ryerson, C.C., [1987, 46p] CR 87-01	Indicating instruments	Roof moisture surveys: current state of the technology.
Effect of oscillatory loads on the bearing capacity of floating	Photoelastic instrumentation—principles and techniques. Roberts, A, et al, [1979, 153p] SR 79-13	Tobiasson, W., (1983, p.24-31) MP 1628 Cnemical obscurant tests during winter: Environmental fate.
ice covers. Kerr, AD, et al, (1987, p 219-224) MP 2216	Indoor climates	Cragin, J.H., [1983, p.267-272] MP 1760
Meteorological instrumentation for characterizing atmo-	Reference guide for building diagnostics equipment and techniques. McKenna, C., et al. (1986, 148p) MP 2226	Infrared testing for leaks in new roofs. Korhonen, C., [1987, p 49-54] MP 2282
spheric icing. Bates, R E, et al, (1987, p 23-30) MP 2276	Vents and vapor retarders for roofs. Tobiasson, W, [1986,	Impact of the winter environment on infrared target signa-
Ice detector measurements compared to meteorological data	11p ₁ MP 2246	tures. Lacombe, J., {1989, np; MP 2587 Infrared spectroscopy
Tucker, W.B, et al. [1987, p 31-37] MP 2277 Self-shedding of accreted ice from high-speed rotors. Itaga-	Reference guide for building diagnostics equipment and techniques McKerna, C M, et al. (1989, 64p.)	Red and near-infrared spectral reflectance of snow O'Brien.
kı, K., [1987, p.95-100] MP 2278	SR 89-27 Inflatable structures	H.W., et al. (1975, p 345-360) MP 872 Research on roof moisture detection Tobiasson, W., et al.
Climatology of rime accretion in the Green and White Mountains. Ryerson, C.C., [1987, p.267-272] MP 2284	Lock wall deicing. Hanamoto, B. (1977, p.7-14)	[1578, 6p] SR 78-29
Meteorological system performance in icing conditions	MP 972	Roof moisture survey. Korhonen, C., et al, [1980, 31p.] SR 80-14
Bates, R.E., (1987, p 73-86) MP 2285 Cold regions roof design. Tobiasson, W, (1987, p 457-	Laboratory experiments on lock wall deicing using pneumatic devices Itagaki, K, et al, [1977, p 53-68] MP 974	Problems in snow cover characterization. O'Brien, H.W.,
458 ₁ MP 2243	Infrared equipment Detecting structural heat losses with mobile infrared thermog-	(1982, p 139-147) MP 1987 Instruments
Mobility: working group report. Blassdell, G L., et al, (1987, p 273-274) MP 2423	raphy, Part IV. Munis, R.H., et al. (1976, 9p.)	Instruments in the Arctic. Atkins, R.T., [1972, p 183-188]
New England mountain icing climatology Ryerson, C.C., [1988, 35p] CR 88-12	CR 76-33 CRREL roof moisture survey, Pease AFB. Korhonen, C., et	MP 990 Insulation
Atmospheric icing and broadcast antenna reflections Ryer-	al, [1977, 10p] SR 77-02	Protected membrane roofs in cold regions Aamot, H.W.C.,
son, C.C., (1988, 13p) CR 88-11 Ice removal from broadcast towers by low-frequency vibra-	Infrared detective: thermograms and roof moisture Kor- honen, C, et al, [1977, p 41-44] MP 961	et al, (1976, 27p) CR 76-02 Water absorption of insulation in protected membrane roofing
tions. Mulherin, N.D., et al. (1988, 6p) MP 2538	Roof moisture survey-US Military Academy. Korhonen,	systems. Schaefer, D., (1976, 15p) CR 76-38
Atmospheric using climatologies of two New England mountains. Ryerson, C.C., [1988, p.1261-1281] MP 2669	C, et al. (1979, 8 refs.) SR 79-16 Transient heat flow and surface temperatures of a built-up	CRREL roof moisture survey, Pease AFB. Korhonen, C., et al, 1977, 10p 1 SR 77-02
Roof design in cold regions Tobiasson, W. (1989, p 462-	roof Korhonen, C, (1983, 20p) SR 83-22	Installation of loose-laid inverted roof system at Fort Wain-
472 ₁ MP 2613	Infrared photography	wright, Alaska. Schaefer, D, [1977, 27p] SR 77-18
Icing rate	Land use and water quality relationships, eastern Wisconsin.	Infrared detective, thermograms and roof moisture Kor-
Icing rate Atmospheric ucing rates with elevation on northern New Eng-	Land use and water quality relationships, eastern Wisconsin. Haugen, R.K., et al., [1976, 47p] CR 76-30	Infrared detective, thermograms and roof moisture Kor- honen, C, et al. [1977, p.41-44] MP 961
Atmospheric using rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97] MP 2589		honen, C, et al. (1977, p 41-44) MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253
Atmospheric Icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97] MP 2589 IMPACT STRENGTH	Haugen, R. K., et al., [1976, 47p] Infrared thermography of buildings (1977, 17p) Infrared thermography of buildings Munis, R. H., et al.	honen, C, et al. [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA Croy, F.E. MP 1253 Roof construction under wintertime conditions a case study.
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97] MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] MP 988	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 12p.) Roof moisture survey, ten State of New Hampshire buildings.	honen, C, et al, [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253 Roof construction under wintertime conditions a case study. SR 78-24 Roof moisture survey—U.S Military Academy Kothonen,
Atmospheric teing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97] MP 2589 IMPACT STRENGTH Impact of spheres on icc. [1972, p.473] MP 988 Impact strength	Haugen, R K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire SR 77-28 Tobiasson, W., et al., [1977, 29p.] CR 77-31	honen, C, et al. [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253 Roof construction under wintertime conditions a case study. SR 78-24 Roof moisture survey—U.S Military Academy C, et al. [1979, 8 refs.] SR 79-16
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97] MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p.693-704] MP 934	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. L. et al., [1978, 13p.) MP 1169	honen, C, et al, [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA [1978, p.13-15] NPRA [1978, p.13-15] Roof construction under wintertime conditions a case study. SR 78-24 Roof moisture survey—U.S Military Academy C, et al, [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p] MP 1408
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97, MP 2589] IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p.693-704] Brazil tensile strength tests on sea ice a data report. Kovacs,	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof monsture survey. ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. L. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared cam-	honen, C, et al, [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA [1978, p.13-15] NPRA [1978, p.13-15] Roof construction under wintertime conditions a case study. SR 78-24 Roof moisture survey—U.S Military Academy C, et al, [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p] MP 1408
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p.693-704] MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, 399.] SR 77-24 Ice and ship effects on the St. Marys River ice booms Per-	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.) Inundation of vegetation in New England. McKim, H. L. et al., (1978, 13p.) MP 1169 Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., (1978, p. A9-A15) MP 1213	honen, C, et al., [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253 Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C, et al., [1983, p 168-173] MP 1729
Atmospheric teing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97, MP 2589] IMPACT STRENGTH Impact of spheres on tee. Closure. Yen, YC., et al., [1972, p.473] MP 988 Impact strength Remote sensing of accumulated frazil and brash tee Dean, A.M., Jr., [1977, p.693-704] MP 934 Brazil tensile strength tests on sea tee a data report. Kovacs, A., et al., [1977, 39p] SR 77-24 Ice and ship effects on the St. Marys River tee boom P 1617	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 22p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., (1977, 29p.) Inundation of vegetation in New England. McKim, H. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera Korhonen, C, et al., (1978, p. A9-A15)	honen, C, et al, [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. SR 78-24 Roof moisture survey—U.S Military Academy C, et al, [1979, 8 refs.] Roofs in cold regions Tobiasson, W. [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al. [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W. [1986, p.49-50] MP 2140
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, 399]. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., [1978, p.222-230]. MP 1617 Ice forces on the Yukon River bridge—1978 breaup. Johnson, P.R., et al., [1979, 40p]. MP 1304	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al. (1977, 29p.) Inundation of vegetation in New England. McKim. H. L. et al. (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., (1978, p. A9-A15) MP 1213 Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) Roof moisture surveys. Tobiasson, W., [1982, p. 163-166)	honen, C, et al., [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253 Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof monsture survey—U.S Military Academy C, et al., [1979, 8 refs.) Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1408 Protected membrane roofing systems Tobiasson, W, (1986, p.49-50) MP 2140 Wetting of polystyrene and urethane roof insulations.
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., (1990, p. 9097). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p. 473). Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p. 693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 395). A., et al., (1977, 395). SR 77-24. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p. 222-230). MP 1617 Lee forces on the Yukon River bridge—1978 breakup. John-	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., (1977, 29p.) Inundation of vegetation in New England. McKim, H. L. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., (1978, p. A9-A15) Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) SR 79-20	honen, C, et al., [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253 Roof construction under wintertime conditions a case study. Sendert, F.L., (1978, 34p.) SR 78-24 Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.) SR 79-16 Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems (1986, p.49-50) MP 2140 Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine.
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p. 90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p. 473]. MP 988 Impact streagth Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p. 693-704]. Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, 399]. Ice and ship effects on the St. Marys River ice booms. Per. ham, R.E., [1978, p. 222-230]. MP 1617 Ice forces on the Yukon River bridge—1978 breauly Johnson, P.R., et al., [1979, 40p]. MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 3]p.] Impact fuse performance in snow (Initial evaluation of a new	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim. H. L. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. NP 1213 Infrared thermography of buildings. SR 79-20 Roof moisture surveys. Tobiasson, W., [1982, p. 163-166], MP 1505 Infrared inspection of tew roofs. Korhonen, C., [1982, 14p.) SR 82-33 SR 82-33	honen, C, et al, [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) MP 1253 Roof construction under wintertime conditions a case study. See Roof moisture survey—U.S Military Academy C, et al, [1978, 34p.) Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C, et al, [1983, p 168-173] MP 1729 Protected membrane roofing systems (1986, p.49-50) MP 1729 Protected membrane roofing systems (1986, p.49-50) MP 1729 Protected membrane roofing systems (1986, p.49-50) MP 1739 Radar profiling of Newton Airfield in Jackman, Maine, Martinson, C R., [1989, 9p.) SR 89-04
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p. 90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p. 473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p. 693-704] MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, 399] SR 77-24 Ice and ship effects on the St. Marys River ice booms Perham, R.E., [1978, p. 222-230] MP 1617 Ice forces on the Yukon River bridge—1978 breakup Johnson, P.R., et al., [1979, 40p.] MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p. 3145)	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.) Inundation of vegetation in New England. McKim, H. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys. Tobiasson, W., [1982, p. 163-166], MP 1505. Infrared inspection of 1 ew roofs. Korhonen, C., (1982, 14p.) Comparison of aerial to on-the-roof infrared moisture surveys. Korhonen, C., et al., [1983, p.95-105). MP 1709	honen, C, et al., [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Senterly, 1978, 24p.; SR 78-24 Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] SR 79-16 Roofs in cold regions Tobiasson, W. [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W. [1986, p.49-50] MP 2140 Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119] MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1989, 9p.) Interfaces CRREL instrumented vehicle for cold regions mobility meas-
Atmospheric icing rates with elevation on northern New England mountains, U.S.A. Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, 295]. A., et al., [1977, 295]. MP 1617 Lee forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p]. MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.; SR 80-22 impact fuse performance in snow (Initial evaluation of a new test technique). Attken, G.W., et al., [1980, p.3]-45j.	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. L. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korthonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys Tobiasson, W., [1982, p. 163-166], MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., [1982, 14p.] Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p. 95-105] Thermal emittance of disthermanous materials MP 1863 MP 1863	honen, C, et al, [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA [1978, p, 13-15] NPRA [1978, p, 13-15] Roof construction under wintertime conditions a case study. SR 78-24 Roof moisture survey—U.S Military Academy C, et al, [1978, 34p.] Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C, et al, [1983, p 168-173] MP 1729 Protected membrane roofing systems (1986, p.49-50) MP 186, p.49-50, MP 2140 Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al, [1987, p 108-119] MP 2337 Radar profiling of Newton Airfield in Jackman Mainten Martinson, CR., [1989, 9p.] SR 89-04 Interfaces CREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p. 90-97] MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p. 473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p. 693-704] MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, 399] Ice and ship effects on the St. Marys River ice booms Perham, R.E., [1978, p. 222-230] MP 1617 Lee forces on the Yukon River bridge—1978 breakup Johnson, P.R., et al., [1979, 40p.] MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.] SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p. 31-45] MP 1347 Small caliber projectile penetration in frozen soil Richmond, P.W., [1980, p. 801-823] MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p. 305-	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. L. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., (1978, p. A9-A15.) Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) Roof moisture surveys. Tobiasson, W., (1982, p. 163-166), MP 1505. Infrared inspection of 1 cw roofs. Korhonen, C., et al., (1983, p.95-105). MP 1709. Thermal emittance of disthermanous materials. Munis. R. H., et al., (1984, p. 209-220). Infrared inspection of infrared moisture surveys. Rorhonen, C., et al., (1983, p.95-105). MP 1709. Time-lapse thermography, a unique electronic imaging ap-	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.) Roofs in cold regions Tobiasson, W. (1980, 21p.) MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W. (1980, 21p.) MP 2337 Rodar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., (1989, 9p.) Interfaces CREEL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) MP 1515 On the rheology of a broken ice field due to floe cold issue.
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p. 90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p. 473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p. 693-704] MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, p. 693-704] SR 77-24 Ice and ship effects on the St. Marys River ice booms Perham, R.E., [1978, p. 222-230] MP 1617 Ice forces on the Yukon River bridge—1978 breakup Johnson, P.R., et al., [1979, 40p.) MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.) SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p. 31-45] MP 1347 Small caliber projectile penetration in frozen soil Richmond, P.W., [1980, p. 801-823] MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p. 305-321] Impact fuse performance in the Yukon River bridge. McFad-	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys Tobiasson, W., [1982, p. 163-166], MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., [1982, 14p.] Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p.95-105] Thermal emittance of disthermanous materials MP 1709 Thermal emittance of disthermanous materials MP 1805 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p.84-88] MP 2103	honen, C, et al., [1977, p 41-44] MP 961 Construction of temporary airfields in NPRA (1978, p.13-15) NP 1253 Roof construction under wintertime conditions a case study. Senterly, E.L., (1978, 34p.) SR 78-24 Roof monsture survey—U.S Military Academy C, et al., [1979, 8 refs.] NP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems (1986, p.49-50) MP 1814 Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119] MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1988, 9p.) SR 89-04 Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p) MP 1515 On the rheology of a broken ice field due to floc collision Shen, H, et al., (1984, p.29-34) MP 1812 Internal friction
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97] MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] MP 988 Impact streagth Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704] Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, 39p.] Ice and ship effects on the St. Marys River ice booms. Perham, R.E., [1978, p.222-230] Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p.] MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.) SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p.31-45], MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823) MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823) MP 1349 Ship resistance in thick brash ice. Mellor, M., [1980, 305-321) Ice force measurement on the Yukon River bridge. McFadden, T., et al., [1981, p.749-777] MP 1396	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. L. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. 1977. Coast. Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys. Tobiasson, W., [1982, p. 163-166) Infrared inspection of 1 ew roofs. Korhonen, C., et al., [1983, p.95-105] Thermal emittance of disthermanous materials. R. H., et al., [1984, p. 209-220] Time-lapse thermography, a unique electronic imaging application. Marshall, S.J., et al., [1984, p. 84-88] MP 2103 Acrial roof moisture surveys. Tobiasson, W., [1985, p. 424-	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Sentert, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy (SR 78-24) Roof moisture survey—U.S Military Academy (SR 79-16) Roofs in cold regions Tobiasson, W. (1980, 21p.) MP 1408 Locating wet cellular plastic insulation in recently constructed roofs (Korhonen, C., et al., [1983, p 168-173) MP 1729 Protected membrane roofing systems (1986, p.49-50) Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2140 Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., (1989, 9p.) Interfaces CREEL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) On the rheology of a broken ice field due to floe collision Shen, H. et al., (1984, p 29-34) MP 1812 Internal friction Effect of X-ray irradiation on internal friction and delectric relaxation of ice (Itagaki, K., et al., [1983, p 43]4-4317)
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p.693-704] MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, 399] SR 77-24 Ice and ship effects on the St. Marys River ice booms Perham, R.E., [1978, p.222-230] MP 1617 ice forces on the Yukon River bridge—1978 breakup Johnson, P.R., et al., [1979, 40p] MP 1304 Cost of ice damage to shorteline structures during navigation. Carey, K.L., [1980, 33p] SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p.31-45], MP 1347 Small caliber projectile penetration in frozen soil Richmond, P.W., [1980, p.801-823] MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p.305-321] Ice force measurement on the Yukon River bridge. McFadden, T., et al., [1981, p.749-777] Measurement of ice forces on structures. Sodh, D.S., et al., [1983, p.139-155] MP 1641	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings (1977 Coast) Infrared thermography of buildings (1977 Coast) Roof moisture surveys Tobiasson, W., [1982, p. 163-166] Infrared inspection of 1 ew roofs (1982, p. 163-166) Infrared inspection of 1 ew roofs (1982, p. 163-166) Infrared emittance of disthermanous materials MP 1505 Thermal emittance of disthermanous materials MP 1505 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p. 84-88] MP 2103 Acrial roof moisture surveys Tobiasson, W., [1985, p. 424-425] MP 2022 Thermal emissivity of disthermanous materials Munis, MP 2021	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W, [1986, p.49-50] Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119] Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C., et al., [1987, p 108-119] Ratinson, C., [1989, 9p.] SR 89-04 Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515 On the rheology of a broken ice field due to floc collision Shen, H, et al., [1984, p 29-34] MP 1812 Internal friction Effect of X-ray irradiation on internal friction and delectric relaxation of ice. Itagaki, K., et al., [1983, p 43]4-4317, MP 1670 Friction loss through a uniform snow layer Yen, Y.C.,
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 395). A., et al., (1977, 395). SR 77-2. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1617 Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., (1979, 40p). Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.). SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Attken, G.W., et al., (1980, p.31-45). Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1349 Ship resistance in thick brash ice. Mellor, M., (1980, p. 305-321). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1399 Measurement of ice forces on structures. Sodh, D.S., et al.,	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. L. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., (1978, p. A9-A15.) Infrared thermography of buildings. 1977. Coast. Guard survey. Marshall, S.J., (1979, 40p.) Roof moisture surveys. Tobiasson, W., [1982, p. 163-166.) Infrared inspection of 1 ew roofs. Korhonen, C., et al., (1983, p.95-105.) Infrared emittance of disthermanous materials. R. H., et al., (1984, p. 209-20). Acrial roof moisture surveys. Tobiasson, W., [1982, p. 1879.] Acrial roof moisture surveys. Tobiasson, W., [1984, p. 84-88]. MP 2103. Acrial roof moisture surveys. Tobiasson, W., (1985, p. 424-425). Thermal emissivity of diathermanous materials. R. H., et al., (1985, p. 872-878). MP 1963.	honen, C, et al., [1977, p 41-44) Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.) Roofs in cold regions Tobiasson, W. (1980, 21p.) MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems (1986, p.49-50) Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2140 Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., (1989, 9p.) Interfaces CREEL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) MP 1812 Internal friction Effect of X-ray irradiation on internal friction and delectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) MP 2703
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473] MP 988 Impact strength Remote sensing of accumulated frazil and brash ice Dean, A.M., Jr., [1977, p.693-704] MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., [1977, p.693-704] MP 104 Lee and ship effects on the St. Marys River ice booms Perham, R.E., [1978, p.222-230] MP 1617 Lee forces on the Yukon River bridge—1978 breakup Johnson, P.R., et al., [1979, 40p.] MP 1304 Cost of lice damage to shorteline structures during navigation, Carey, K.L., [1980, 33p.] SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p.31-45], MP 1347 Small caliber projectile penetration in frozen soil Richmond, P.W., [1980, p.801-823] MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p.305-321] Lee force measurement on the Yukon River bridge. McFadden, T., et al., [1981, p.749-777] MP 1396 Measurement of ice forces on structures. Sodh, D.S., et al., [1983, p.139-155] MP 1641 Mechanics of ice cover breakthrough. Kerr, A.D., [1984, p.245-262] MP 1997 Lee penetration tests Garcia, N.B., et al., [1985, p.223-	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings (1977 Coast) Infrared thermography of buildings (1977 Coast) Roof moisture surveys Tobiasson, W., [1982, p. 163-166] Infrared inspection of 1 ew roofs (1982, p. 163-166) Infrared inspection of 1 ew roofs (1982, p. 163-166) Infrared emittance of disthermanous materials (1982, p. 163-166) Thermal emittance of disthermanous materials (1982, p. 163-166) Time-lapse thermography, a unique electronic imaging application (1982, p. 1983, p. 1984, p. 84-88) MP 2103 Acrial roof moisture surveys (1983, p. 424-425) Thermal emissivity of disthermanous materials (1983, p. 424-425) Thermal emissivity of disthermanous materials (1983, p. 424-425) Thermal emissivity of disthermanous materials (1983, p. 424-425) MP 103 Acrial roof moisture surveys (1983, p. 50-61) MP 169 MP 169	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W, [1986, p.49-50] Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C., et [1989, 9p.] Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515 On the rheology of a broken ice field due to floe collision Shen, H, et al., [1984, p 29-34] MP 1812 Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmen-
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. MP 934 Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, p.993-704]. Record of the strength ices on the St. Marys River ice booms. Perham, R.E., [1978, p.222-230]. MP 1610 Lee forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p.]. Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.]. SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p.31-45]. MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p.305-321]. MP 1390 Measurement of ice forces on structures. Sodhi, D.S., et al., [1983, p.139-155]. MP 1391 Measurement of the forces on structures. Sodhi, D.S., et al., [1983, p.139-155]. MP 1997 Lee penetration tests. Garcia, N.B., et al., [1985, p.223-236). MP 1997 Lee penetration tests. Garcia, N.B., et al., [1985, p.223-236]. MP 1901 Limpact Lice force and pressure: An experimental study with	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] CR 77-31 Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] MP 1169 Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] MP 1213 Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys Tobiasson, W., [1982, p. 163-166] MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., (1982, 14p.) Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p. 95-105] Thermal emittance of diathermanous materials R. H., et al., [1984, p. 209-220] MP 1863 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p. 84-88] MP 2103 Aerial roof moisture surveys Tobiasson, W., [1985, p. 424-425] MP 2022 Thermal emissivity of diathermanous materials Munis, R.H., et al., [1985, p. 872-878] MP 2022 Thermal emissivity of diathermanous materials Munis, R.H., et al., [1985, p. 872-878] MP 1063 Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1988, p. 50-61] MP 2436 Text of a prototype advanced thermal imaging system Munis, R.H., [1989, p. 81-82] MP 2645	honen, C, et al., [1977, p 41-44) Construction of temporary artifields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Senett, F.L., [1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W. [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] Protected membrane roofing systems Tobiasson, W. (1986, p.49-50) Wetting of polystyrene and urethane roof insulations, Tobiasson, W. et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1989, 9p.) Interfaces CREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) On the rheology of a broken ice field due to floc collision Shen, H., et al., [1984, p.29-34) Internal friction Effect of X-ray irradiation on internal friction and delectric relaxation of ice (tagaki, K., et al., [1983, p.4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p.83-90) International cooperation
Atmospheric icing rates with elevation on northern New England mountains, U.S.A. Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 1997). All ce and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1617 Lee forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., (1979, 40p). Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p). SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., (1980, p.31-45). MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1349 Ship resistance in thick brash ice. Mellor, M., (1980, p. 305-321). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1347 Mechanics of ice cover breakthrough. Kerr, A.D., (1984, p.245-262). Impact ice force and pressure: An experimental study with urea ice. Sodhi, D. S., et al., (1986, p.569-576).	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.) CR 77-31 Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys. Tobiasson, W., [1982, p. 163-166] Infrared inspection of 1 ew roofs. Korhonen, C., (1982, 14p.) Comparison of aerial to on-the-roof infrared moisture surveys. Korhonen, C., et al., [1983, p.95-105]. MP 1709 Thermal emittance of disthermanous materials. R. H., et al., (1984, p. 209-220). MP 209-220, MP 2103 Aerial roof moisture surveys. Tobiasson, W., [1982, p. 424-425]. MP 2103 Aerial roof moisture surveys. Tobiasson, W., [1985, p. 424-425]. Thermal emissivity of diathermanous materials. R. H., et al., (1985, p. 872-878). MP 2103 MP 1963 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., [1988, p. 50-61]. MP 2436 Test of a prototype advanced thermal imaging system. Munis, R. H., (1939, p. 81-82). MP 2445 Inpact of the winter environment on infrared target signa-	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.) Roofs in cold regions Tobiasson, W. (1980, 21p.) Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W. (1986, p.49-50) Wetting of polystyrene and utethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1989, 9p.) Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) MP 1515 On the rheology of a broken ice field due to floe cold in Shen, H. et al., (1984, p.29-34) MP 1515 On the rheology of a broken ice field due to floe cold in Shen, H. et al., (1984, p.29-34) MP 1670 Friction loss through a uniform snow layer yen, Y.C., (1990, p.83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W. et al., (1975, p.1V/57-1 MP 917) Scientists visit Kolyma Water Balance Station in the USSR.
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. MP 934 Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, p.693-704]. Kovacs, A., et al., [1977, p.693-704]. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., [1978, p.222-230]. MP 1610 Lee forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p.]. MP 1304 Cost of ice damage to shorteline structures during navigation. Carey, K.L., [1980, 33p.]. SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p.31-45]. MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., [1980, p.801-823]. MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p. 305.321]. MP 1390 Measurement of ice forces on structures. Sodh, D.S., et al., [1983, p. 139-155]. MP 1391 Measurement of ice forces on structures. Sodh, D.S., et al., [1983, p. 139-155]. MP 1641 Mechanics of ice cover breakthrough. Kerr, A.D., [1984, p.245-262]. MP 2014 Impact ice force and pressure: An experimental study with urea ice. Sodhi, D.S., et al., [1986, p.569-576]. MP 2037 Wave-induced bergy bit motion near a floating platform.	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] CR 77-31 Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] MP 1169 Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] MP 1213 Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) SR 79-20 Roof moisture surveys Tobiasson, W., [1982, p. 163-166] MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., [1982, 14p.] Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p.95-105] Thermal emittance of disthermanous materials Munis, R.H., et al., [1984, p. 209-220) MP 1605 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p. 84-88] MP 2103 Aerial roof moisture surveys Tobiasson, W., [1985, p. 424-425] MP 2002 Thermal emissivity of diathermanous materials Munis, R.H., et al., [1985, p. 872-878] MP 103 Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1988, p. 50-61] MP 2436 Test of a prototype advanced thermal imaging system Munis, R.H., [1939, p. 81-82] MP 2587 Thermal infrared survey of winter trails at Fort Wainwright, thermal infrared survey of winter trails at Fort Wainwright.	honen, C, et al., [1977, p 41-44) Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W, et al., [1987, p 108-119) Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine, Martinson, C.R., [1989, 9p.] Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515 On the rheology of a broken ice field due to floe collision Shen, H, et al., [1984, p 29-34] Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W. et al., [1975, p,1075, 10768] Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al., [1976, 66p.) Subarctic watershed research in the Soviet Union Slaugh-
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 395). SR 77-24. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1617 Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., (1979, 40p). Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p). SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., (1980, p. 31-45). Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1399 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1399 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1399 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1399 Ice penetration tests Garcia, N.B., et al., (1985, p.223-236). MP 1997 Ice penetration tests. Garcia, N.B., et al., (1985, p.223-236). MP 2014 Impact ice force and pressure: An experimental study with urea ice. Sodhi, D.S., et al., (1986, p.569-576). MP 2037	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] CR 77-31 Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys. Tobiasson, W., [1982, p. 163-166] Infrared inspection of 1 ew roofs. Korhonen, C., (1982, 14p.) Comparison of aerial to on-the-roof infrared moistures surveys. Korhonen, C., et al., [1983, p.95-105]. MP 103 Thermal emittance of disthermanous materials. R. H., et al., (1984, p. 209-220). MP 1863 Time-lapse thermography, a unique electronic imaging application. Marshall, S.J., et al., [1984, p. 84-88]. MP 2103 Aerial roof moisture surveys. Tobiasson, W., [1985, p. 424-425]. Thermal emissivity of diathermanous materials. MP 103 MP 103 Aerial roof moisture surveys. Tobiasson, W., [1985, p. 424-425]. Thermal emissivity of diathermanous materials. MP 103 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., [1988, p. 50-61]. MP 2436 Test of a prototype advanced thermal imaging system. Munis, R. H., (1939, p. 81-82]. Inpact of the winter environment on infrared target signatures. Lacombe, J., [1989, n. p.; MP 2587 Thermal infrared survey of winter trails at Fort Wainwright. Collins, C. M., et al., [1990, 16p.). SR 79-20	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof monsture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W. [1980, 21p.] Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1229 Protected membrane roofing systems Tobiasson, W. [1986, p.49-50] Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1989, 9p.] Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] On the rheology of a broken ice field due to floc on Shen, H, et al., [1984, p.29-34) Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317) MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W. et al., [1977, 66p.] Scientists visit Kolyma Water Balance Station in the USSR, Slaughter, C.W. et al., [1977, 66p.] Subarctic watershed research in the Soviet Union MP 1273
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. MP 934 Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, p.693-704]. SR 77-24 Ice and ship effects on the St. Marys River ice booms. Perham, R.E., [1978, p.222-230]. MP 1617 Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p.]. MP 1304 Cost of ice damage to shorteline structures during navigation. Carey, K.L., [1980, 33p.]. SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p. 31-45]. MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., [1980, p.801-823]. MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p. 305. 321]. MP 1490. P. (1980, p.801-823). MP 1396 Measurement of ice forces on structures. Sodh, D.S., et al., [1983, p. 139-155]. MP 1347 Measurement of ice forces on structures. Sodh, D.S., et al., [1984, p.245-262]. MP 1997 Impact ice force and pressure: An experimental study with urea ice. Sodhi, D.S., et al., [1986, p.569-576]. MP 2014 Impact ice force and pressure: An experimental study with urea ice. Sodhi, D.S., et al., [1986, p.569-576]. MP 2037 Wave-induced bergy bit motion near a floating platform Ms, L.M., et al., [1990, p. 205-215]. Impact tests.	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] CR 77-31 Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys Tobiasson, W., [1982, p. 163-166] Infrared inspection of 1 ew roofs Korhonen, C., [1982, 14p.] Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p.95-105] Thermal emittance of disthermanous materials Munis, R.H., et al., [1984, p. 209-220] MP 1803 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p. 84-88] MP 2103 Aerial roof moisture surveys Tobiasson, W., [1985, p. 424-425] Thermal emissivity of diathermanous materials Munis, R.H., et al., [1985, p. 872-878] MP 1963 Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 872-878] Method for conducting airborne infrared moisture surveys Tobiasson, W., [1985, p. 872-878] Method for conducting airborne infrared moisture surveys Tobiasson, W., [1988, p. 50-61] MP 2436 Text of a prototype advanced thermal imaging system Munis, R.H., [1939, p. 81-82] Thermal infrared survey of winter trails at Fort Wannwight, Collins, C.M., et al., [1990, 16p.) Infrared radiation infrared thermography of buildings an annotated bibliogra-	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W, [1986, p.49-50] Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1989, 9p.] Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515 On the rheology of a broken ice field due to floe collision Shen, H, et al., (1984, p 29-34) MP 1812 Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., (1983, p 4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W., et al., (1975, p.10/57-10/66) Subarctic watershed research in the Swiet Union Slaughter, C.W., et al., (1977, 66p.) SR 77-18 MP 1273 International and national developments in land treatment of wastewater. McKim, H.L., et al., (1979, 28p.)
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 395). SR 77-24. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1310. Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p.). Carey, K.L., (1980, 33p.). SR 80-22 impact fuse performance in snow (Initial evaluation of a new test technique). Attken, G.W., et al., (1980, p. 31-45). Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1309 Ship resistance in thick brash ice. Mellor, M., (1980, p. 305-321). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). Messurement of ice forces on structures. Sodh, D.S., et al., (1983, p.139-155). MP 1684. MP 1698 MP 2698 MP 2698 MP 2698 MP 2697 Weelen and the strength and the structure of the structure of the force of the structure of the st	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Ros moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] CR 77-31 Inundation of vegetation in New England. McKim, H. L., et al., [1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys. Tobiasson, W., [1982, p. 63-166] MP 1505 Infrared inspection of 1 ew roofs. Korhonen, C., [1982, 14p.] SR 82-33 Comparison of aerial to on-the-roof infrared moisture surveys. Korhonen, C., et al., [1983, p. 95-105] MP 1709 Thermal emitiance of diathermanous materials. Munis, R. H., et al., [1984, p. 209-220] Thermal emissivity of diathermanous materials. MP 163 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., [1985, p. 87-8-85] Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2022 Thermal emissivity of diathermanous materials. Munis, R. H., et al., [1985, p. 872-878] Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1988, p. 50-61] MP 2436 Method for conducting airborne infrared toof moisture surveys. Tobiasson, W., [1989, p. p.] MP 2437 Method f	honen, C, et al., [1977, p41-44] Construction of temporary artifields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., [1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] Protected membrane roofing systems Tobiasson, W, [1986, p.49-50] Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martison, C.R., [1989, 9p.) Interfaces CREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515 On the rheology of a broken ice field due to floc collision Shen, H, et al., [1984, p 29-34] Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-431]. MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W. et al., [1975, p.IV/57, IV/68], Scientists visit Kolyma Water Balance Station in the USSR Scientists wisit Kolyma Water Balance Station in the USSR Slaughter, C.W. et al., [1977, 66p.] SR 77-15 Subarctic watershed research in the Soviet Union Slaughter, C.W. et al., [1978, p.305-313] MP 1273 International and national developments in land treatment of wastewater McKim, H.L., et al., [1979, 28p.] MP 1420
Atmospheric teing rates with elevation on northern New England mountains, U.S.A. Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). MP 934 Brazil tensile strength tests on sea ice a data report. Kovacs, A., et al., (1977, 1997). SR 77-24. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1617 Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., (1979, 40p). MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p). SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., (1980, p. 31-45). MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p. 801-823). MP 1490 Ship resistance in thick brash ice. Mellor, M., (1980, p. 305-321). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1396 Mesaurement of ice forces on structures. Sodhi, D.S., et al., (1983, p. 139-155). MP 1397 Mesaurement of ice forces on structures. Sodhi, D.S., et al., (1983, p. 139-155). MP 1396 Mechanics of ice cover breakthrough. Kerr, A.D., (1984, p. 245-262). MP 2014 Impact ice force and pressure: An experimental study with urea ice Sodhi, D.S., et al., (1986, p. 569-576). MP 2037 Wave-induced bergy bit motion near a floating plantainer at ces. Sodhi, D.S., et al., (1986, p. 569-576). MP 2037 Wave-induced bergy bit motion near a floating plantainer. et al., (1990, p. 205-215). MP 2380 Impact tests Report of the ITTC panel on testing in ice. 1978 Franken. Sodi., 1971,	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] CR 77-31 Inundation of vegetation in New England. McKim, H. et al., [1978, 13p.] Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) Roof moisture surveys Tobiasson, W., [1982, p. 163-166] MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., [1982, 14p.) Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p.95-105] Thermal emittance of disthermanous materials Munis, R.H., et al., [1984, p. 209-220) MP 1605 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p. 84-88] MP 2103 Aerial roof moisture surveys Tobiasson, W., [1985, p. 424-425] Thermal emissivity of diathermanous materials Munis, R.H., et al., [1985, p. 872-878] MP 1605 Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared moisture surveys Tobiasson, W., [1988, p. 50-61] MP 2436 Test of a prototype advanced thermal imaging system Munis, R.H., [1939, p. 81-82] Thermal infrared survey of winter trails at Fort Wannwight, Collins, C.M., et al., [1990, 16p.) Infrared radiation infrared survey of winter trails at Fort Wannwight, Collins, C.M., et al., [1977, 21p.) CREL roof moisture survey, Building 208 Rock Island Arsenal Korhonen, C. et al., [1977, 6p.) SR 77-09 CREL roof moisture survey, Building 208 Rock Island Arsenal	honen, C, et al., [1977, p 41-44] Construction of temporary airfields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W, [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W, [1986, p.49-50] Wetting of polystyrene and urethane roof insulations. Tobiasson, W, et al., [1987, p 108-119] Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C., et al., [1987, p 108-119] Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C., [1989, 9p.] Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515 On the rheology of a broken ice field due to floc collision Shen, H, et al., [1984, p 29-34] Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice. Itagaki, K., et al., [1983, p 43]4-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W., et al., [1975, p,1075-10766], MP 2703 International defense research in the Soviet Union Slaughter, C.W., et al., [1977, 66p.] Schartic watershed research in the Soviet Union wastewater McKim, H.L., et al., [1979, 28p.] MP 1420 Arctic research in the United States, Vol.3, [1989, 72p., MP 1263)
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. MP 934 Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, 39p.]. SR 77-24 Ice and ship effects on the St. Marys River ice booms. Perham, R.E., [1978, p.222-230]. MP 1610 Lee forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p.]. Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.]. SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., [1980, p.31-45]. MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., [1980, p.801-823]. MP 1490 Ship resistance in thick brash ice. Mellor, M., [1980, p.305-321]. MP 1390 Measurement of ice forces on structures. Sodhi, D.S., et al., [1983, p.139-155]. MP 1391 Measurement of ice forces on structures. Sodhi, D.S., et al., [1983, p.139-155]. MP 1641 Mechanics of ice cover breakthrough. Kerr, A.D., [1984, p.245-262]. Impact feets. Report of the ITTC panel on testing in ice. 1978 stein, G.E., et al., [1990, p.205-215]. Impact feets. Report of the ITTC panel on testing in ice. 1978 stein, G.E., et al., [1970, 190]. Prantine behavior of ice in Charpy impact testing. Itagaki, K., et al., [1980, 13p.] Dynamic testing of free field stress gages in frozen soil. Aitken, G.W., et al., [1980, 26p.] SR 80-30	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.] Inundation of vegetation in New England. McKim, H. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) Roof moisture surveys Tobiasson, W., [1982, p. 163-166] MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., (1982, 14p.) SR 82-33 Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., [1983, p.95-105] MP 1709 Thermal emittance of disthermanous materials R. H., et al., (1984, p.209-220) MP 1863 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., [1984, p.84-88] MP 2103 Aerial roof moisture surveys Tobiasson, W., (1985, p.424-425) Thermal emissivity of diathermanous materials MP 163 Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p.424-425] Thermal emissivity of diathermanous materials R.H., et al., (1985, p.872-878) MP 2022 Thermal emissivity of diathermanous materials Munis, R.H., et al., (1985, p.872-878) MP 1963 Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1988, p.50-61] MP 2496 Linpact of the winter environment on infrared target signatures. Lacombe, J., [1989, p.9) Thermal infrared survey of winter trails at Fort Wainwright, Collins, C. M., et al., [1990, 16p.) SR 79-01 Infrared radiation Infrared radiation Infrared radiation Infrared radiation Infrared radiation Infrared radiation	honen, C, et al., [1977, p41-44] Construction of temporary artifields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., (1979, 8 refs.) Roofs in cold regions Tobiasson, W. (1980, 21p.) MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., (1983, p 168-173) MP 1729 Protected membrane roofing systems Tobiasson, W. (1986, p.49-50) Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., (1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C. R., (1989, 9p.) SR 89-04 Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) MP 1515 On the rheology of a broken ice field due to floe collision Shen, H. et al., (1984, p 29-34) Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., (1983, p 4314-4317), MP 1670 Friction loss through a uniform snow layer Yen, Y.C., (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W. et al., (1975, p.10/57-10/65) Scientists visit Kolyma Water Balance Station in the USST Scientists visit Kolyma Water Balance Station in the USST International and national developments in land treatment of wastewater McKim, H.L., et al., (1979, 28p.) MP 1420 Arctic research in the United States, Vol 3, [1989, 72p.) MP 1653 Interstitial water
Atmospheric icing rates with elevation on northern New England mountains, U.S.A. Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). MP 988 Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 395). A., et al., (1977, 395). SR 77-2. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1617 Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., (1979, 40p). Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p). SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Autken, G.W., et al., (1980, p.31-45). MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1349 Ship resistance in thick brash ice. Mellor, M., (1980, p. 303-321). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p. 749-777). MP 1349 Measurement of ice forces on structures. Sodhi, D.S., et al., (1983, p. 131-55). MP 1641 Mechanics of ice cover breakthrough. Kerr, A.D., (1984, p. 245-262). Impact ice force and pressure: An experimental study with urea ice. Sodhi, D.S., et al., (1986, p. 569-576). MP 2037 Wave-induced bergy bit motion near a floating platform Mak, L.M., et al., (1990, p. 205-215). Impact tests Report of the ITTC panel on testing in ice. 1978 stein, G.E., et al., (1978, p. 157-179). MP 1140 Fracture behavior of ice in Charpy impact testing Raghi, K., et al., (1980, 26p). Results from indentation tests on freshwater ice. Sodhi, O.S., et al., (1980, 26p). Results from indentation tests on freshwater ice. Sodhi, et al., (1980, 26p).	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Roof moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., [1977, 29p.) CR 77-31 Inundation of vegetation in New England. McKim, H. L., et al., [1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., [1979, 40p.] Roof moisture surveys. Tobiasson, W., [1982, p. 163-166]. MP 1505 Infrared inspection of 1 ew roofs. Korhonen, C., [1982, 14p.] SR 82-33 Comparison of aerial to on-the-roof infrared moisture surveys. Korhonen, C., et al., [1983, p. 95-105). MP 1509 Thermal emitiance of dishtermanous materials. R. H., et al., [1984, p. 209-220]. MP 163 Time-lapse thermography. a unique electronic imaging application. Marshall, S. J., et al., [1984, p. 84-88]. MP 163 Time-lapse thermography. Tobiasson, W., [1985, p. 424-425]. Acrial roof moisture surveys. Tobiasson, W., [1985, p. 424-425]. Thermal emissivity of diathermanous materials. R. H., et al., [1985, p. 872-878]. MP 2022 Thermal emissivity of diathermanous materials. Munis, R. H., et al., [1985, p. 872-878]. MP 203 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., [1988, p. 50-61]. MP 2436. Text of a prototype advanced thermal imaging system. Munis, R. H., [1939, p. 81-82]. Inpact of the winter environment on infrared target signatures. Lacombe, J., [1989, n. p.; MP 2687. Thermal infrared survey of winter trails at Fort Wainwright. Collins, C. M., et al., [1990, 16p.]. SR 79-01. Infrared rediation. Infrared rediation. Infrared thermography of buildings an annotated bibliography. Marshall, S. J., [1977, 6p.]. SR 77-05. RR 7-20 CRR EL toof tuoisture survey, Building 208 Rock Island Arsenal Korhonen, C. c. et al., [1977, 6p.]. SR 77-05. SR 79-01. SR 79-01.	Construction of temporary airfields in NPRA Crory, F.E., (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., (1978, 34p.) Roof moisture survey—U.S Military Academy C., et al., (1979, 8 refs.) Roofs in cold regions Tobiasson, W., (1980, 21p.) MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., (1983, p 168-173) MP 1729 Protected membrane roofing systems Tobiasson, W., (1986, p.49-50) Wetting of polystyrene and urethane roof insulations. Tobiasson, W., et al., (1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., (1989, 9p.) Interfaces CREEL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) MP 1515 On the rheology of a broken ice field due to floe collision Shen, H. et al., (1984, p 29-34) Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., (1983, p 4314-4317, MP 1670) Friction loss through a uniform snow layer Yen, Y.C., (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W., et al., (1977, 66p.) Scientists visit Kolyma Water Balance Station in the USSR, Slaughter, C.W., et al., (1977, 68p.) Subarctic watershed research in the Soviet Union Sulyner, C.W., et al., (1978, p, 305-313) MP 1273 International and national developments in land treatment of wastewater McKim, H.L., et al., (1979, 28p.) MP 1265 Interstitial water Chemistry of interstitial water from subsea permafost, Prudhoe Bay, Alaska Iskandar, I.K., et al., (1978, p.92.)
Atmospheric icing rates with elevation on northern New England mountains, U.S.A Ryerson, C.C., [1990, p.90-97]. MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., [1972, p.473]. MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. MP 934 Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1977, p.993-704]. Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., [1977, p.693-704]. MP 934 Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., [1978, p.222-230]. MP 1610. Lee forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., [1979, 40p.]. Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.]. MP 1304 Cost of ice damage to shoreline structures during navigation. Carey, K.L., [1980, 33p.]. MP 1304 Small caliber projectile penetration in frozen soil. Richmond, P.W., [1980, p.801-823]. MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., [1980, p.801-823]. MP 1309 Ship resistance in thick brash ice. Mellor, M., [1980, p. 305-321]. MP 1309 MP 1304 Measurement of ice forces on structures. Sodhi, D.S., et al., [1983, p. 139-155]. MP 1307 Measurement of ice forces on structures. Sodhi, D.S., et al., [1983, p. 139-155]. MP 1641 Mechanics of ice cover breakthrough. Kerr, A. D., [1984, p. 245-262]. MP 2017 Wave-induced bergy bit motion near a floating platform Mak, L.M., et al., [1990, p. 205-215]. MP 2037 Wave-induced bergy bit motion near a floating platform Mak, L.M., et al., [1990, p. 205-215]. MP 2038 Report of the ITTC panel on testing in ice. 1978 stein, G.B., et al., [1980, 26p.]. Sranken, G.W., et a	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Ros Munis, R. H., et al., (1977, 21p.) Ros moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., (1977, 29p.) CR 77-31 Inundation of vegetation in New England. McKim, H. L. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera. Korthonen, C., et al., (1978, p. A9-A15) Infrared thermography of buildings. 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) Ros Mp 1505 Infrared inspection of 1 ew roofs. Korhonen, C., (1982, 14p.) Comparison of aerial to on-the-roof infrared moisture surveys. Korhonen, C., et al., (1983, p.95-105) Thermal emittance of disthermanous materials. R. H., et al., (1984, p.209-220) Mp 1863 Time-lapse thermography, a unique electronic imaging application. Marshall, S.J., et al., (1984, p.84-88). MP 2103 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425). Thermal emissivity of diathermanous materials. Munis, R.H., et al., (1985, p.872-878). MP 2022 Thermal emissivity of diathermanous materials. Munis, R.H., (1985, p.872-878). MP 203 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1985, p.424-425). Text of a prototype advanced thermal imaging system. Munis, R.H., (1985, p.872-878). MP 2436 Text of a prototype advanced thermal imaging system. Munis, R.H., (1985, p.872-878). MP 2436 Text of a prototype advanced thermal imaging system. Munis, R.H., (1985, p.872-879). MP 2436 Text of a prototype advanced thermal imaging system. Munis, R.H., (1985, p.872-879). MP 2645 Infrared radiation. Infrared survey of winter trails at Fort Wainwright. Collins, C. M., et al., (1990, 16p.). SR 79-017 Infrared thermography of buildings—a bibliography with abstracts. Marshall, S.J., (1977, 6p.). SR 77-43 Infrared thermography of buildings—a bibliography with abstracts. Marshall, S.J., (1979, 67p.). SR 79-018 Snow chem. y of obscurants released during SNOW. TW	honen, C, et al., [1977, p 41-44) Construction of temporary artifields in NPRA (1978, p.13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., [1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1979, 8 refs.] Roofs in cold regions Tobiasson, W. [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W. (1986, p.49-50) Wetting of polystyrene and urethane roof insulations, Classon, W. (1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine, Martinson, C.R., [1987, p.108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine, Martinson, C.R., [1987, p.1] Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p.) MP 1812 Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W., et al., (1975, p.1075), 1V/68) Scientists visit Kolyma Water Balance Station in the USSR, Slaughter, C.W., et al., (1977, 66p.) Sk 77-15 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) International and national developments in land treatment of wastewater McKim, H.L., et al., (1979, 28p.) MP 1653 Interstitial water Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska Iskandar, I.K., et al., (1978, p.92-85) Ion density (concentration)
Atmospheric icing rates with elevation on northern New England mountains, U.S.A. Ryerson, C.C., (1990, p.90-97). MP 2589 IMPACT STRENGTH Impact of spheres on ice. Closure. Yen, YC., et al., (1972, p.473). MP 988 Impact strength Remote sensing of accumulated frazil and brash ice. Dean, A.M., Jr., (1977, p.693-704). Brazil tensile strength tests on sea ice. a data report. Kovacs, A., et al., (1977, 395). A., et al., (1977, 395). SR 77-24. Ice and ship effects on the St. Marys River ice booms. Perham, R.E., (1978, p.222-230). MP 1617 Ice forces on the Yukon River bridge—1978 breakup. Johnson, P.R., et al., (1979, 40p). Cost of ice damage to shoreline structures during navigation. Carey, K.L., (1980, 33p). SR 80-22 Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al., (1980, p.31-45). MP 1347 Small caliber projectile penetration in frozen soil. Richmond, P.W., (1980, p.801-823). MP 1490 Ship resistance in thick brash ice. Mellor, M., (1980, p. 305-321). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1329 Ice force measurement on the Yukon River bridge. McFadden, T., et al., (1981, p.749-777). MP 1329 Ice force measurement or forces on structures. Sodhi, D.S., et al., (1983, p.139-155). MP 1611 Mechanics of ice cover breakthrough. Kerr, A.D., (1984, p.245-262). MP 1997 Ice penetration tests. Garcia, N.B., et al., (1985, p. 223-236). MP 2014 Impact ice force and pressure: An experimental study with urea ice. Sodhi, D.S., et al., (1986, p.569-576). MP 2037 Wave-induced bergy bit motion near a floating platform Mak, L.M., et al., (1990, p.205-215). MP 2037 Wave-induced bergy bit motion near a floating platform Mak, L.M., et al., (1980, 126). MP 2037 Wave-induced bergy for notesting in ice. 1978 Frankensets: Sepont of the ITTC panel on testing in ice. 1978 Frankensets: Report of the ITTC panel on testing in ice. 1978 Frankensets: Report of the ITTC panel on festing in ice. 1978 F	Haugen, R. K., et al., [1976, 47p.] Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 17p.) Infrared thermography of buildings (1977, 21p.) Ros moisture survey, ten State of New Hampshire buildings. Tobiasson, W., et al., (1977, 29p.) CR 77-31 Inundation of vegetation in New England. McKim, H. et al., (1978, 13p.) Detecting wet roof insulation with a hand-held infrared camera Korhonen, C., et al., [1978, p. A9-A15] Infrared thermography of buildings 1977 Coast Guard survey. Marshall, S.J., (1979, 40p.) Roof moisture surveys Tobiasson, W., [1982, p. 163-166] MP 1505 Infrared inspection of 1 ew roofs Korhonen, C., (1982, 14p.) Comparison of aerial to on-the-roof infrared moisture surveys Korhonen, C., et al., (1983, p.95-105) MP 1709 Thermal emitiance of disthermanous materials Munis, R.H., et al., (1984, p.209-220) MP 1863 Time-lapse thermography, a unique electronic imaging application Marshall, S.J., et al., (1984, p.84-88) MP 2103 Aerial roof moisture surveys Tobiasson, W., [1985, p. 424-425] Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 87-287] Method for conducting airborne infrared roof moisture surveys Tobiasson, W., [1985, p. 87-61] Method for conducting airborne infrared target signatures. Lacombe, J., (1988, p. 50-61) MP 2403 Method for conducting airborne infrared target signatures. Lacombe, J., (1988, p. 50-61) MP 2403 MP 2645 Inpact of the winter environment on infrared target signatures. Lacombe, J., (1989, p. p.) Termal infrared survey of winter trails at Fort Wainwright. Collins, C.M., et al., (1980, 16p.) SR 77-09 CREL roof moisture survey, Building 208 Rock Island Arsenal Korhonen, C., et al., (1977, 6p.) SR 77-09 SR 79-01 Snow, cher v. of observance released during SNOW, TWO/Sir-ike Week VI Cragin, JH., (1984, p. 409, 416)	honen, C, et al., [1977, p 41-44) Construction of temporary artifields in NPRA (1978, p,13-15) Roof construction under wintertime conditions a case study. Bennett, F.L., [1978, 34p.) Roof moisture survey—U.S Military Academy C, et al., [1978, 8 refs.) Roofs in cold regions Tobiasson, W. [1980, 21p.] MP 1408 Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al., [1983, p 168-173] MP 1729 Protected membrane roofing systems Tobiasson, W. (1986, p.49-50) Wetting of polystyrene and urethane roof insulations. Tobiasson, W. et al., [1987, p 108-119) MP 2337 Radar profiling of Newton Airfield in Jackman, Maine. Martinson, C.R., [1989, 9p.) SR 89-04 Interfaces CRREL instrumented vehicle for cold regions mobility measurements Blaisfell, G.L., (1982, 11p.) MP 1515 On the rheology of a broken ice field due to floe collision Shen, H., et al., [1984, p 29-34) Internal friction Effect of X-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317, MP 1812 Internal friction Effect of S-ray irradiation on internal friction and dielectric relaxation of ice Itagaki, K., et al., [1983, p 4314-4317, MP 1670 Friction loss through a uniform snow layer (1990, p 83-90) International cooperation High-latitude basins as settings for circumpolar environmental studies Slaughter, C.W., et al., (1975, p.10/57, il/68) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1975, p.10/57, il/68) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1975, p.10/57, il/68) MP 1670 MP 263 International and national developments in land treatment of wastewater McKim, H.L., et al., [1979, 28p.) MP 2653 Interstitial water Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska Iskandar, I.K., et al., [1978, p.2038] MP 1385

Ion diffusion	Data acquisition in USACRREL's flume facility. Daly, S.F., et al. (1985, p.1053-1058) MP 2089	Ice problems associated with rivers and reservoirs. Benson,
Ionic migration and weathering in frozen Antarctic soils. Ugohm, F.C., et al., [1973, p.461-470] MP 941	et al, (1985, p.1053-1058) MP 2089 Corps of engineers seek ice solutions Frankenstein, G.E.,	C., et al, (1986, p.70-98) MP 2155 River and lake ice engineering Ashton, G.D., ed, (1986,
Does snow have ion chromatographic properties. Hewitt,	[1987, p.5-7] MP 2219	485p ₁ Ashlon, O.D., ed, [1750,
A D., et al. (1989, p.165-171) MP 2755	Information systems planning study. Atkins, RT, et al,	Short-pulse radar investigations of freshwater ice sheets and
Ion exchange	(1987, 48p) SR 87-23	brash ice. Arcone, S A., et al, (1986, 10p)
Prototype wastewater land treatment system. Jenkins, T.F.,	Unique new cold weather testing facility. Eaton, R.A.,	CR 86-06
et al, [1979, 91p] SR 79-35	(1988, p.745-750) MP 2542	Experiments on the cutting process in ice Ueda, H.T., et al., (1989, 36p.) CR 89-05
Ions	Unique new cold weather testing facility. Eaton, R.A.	(1989, 36p.) CR 89-05 Flexural properties of freshwater ice sheets Gow, A.J., et al.
Ion and moisture migration and frost heave in freezing Morin	[1989, p 335-342] MP 2468	[1989, p.249-270] MP 2652
clay. Qiu, G., et al, (1986, p.1014) MP 1970 Irrigation	Data acquisition. first the FERF then the world Knuth, K.V, 1989, p 136-138; MP 2567	Investigation of the LIZ-3 Dew Line Station water supply
Land treatment of wastewaters for rural communities. Reed,	Laboratory techniques	lake. Kovacs, A , [1990, 10p] SR 90-11
S.C., et al, [1975, p 23-39] MP 1399	Ice forces on model structures. Zabilansky, L.J., et al,	Lake water
Land treatment of wastewater. Murrmann, R.P., et al,	[1975, p.400-407] MP 863	Correlation and quantification of airborne spectrometer data
(1976, 36p) MP 920	Apparent anomaly in freezing of ordinary water. Swinzow,	to turbidity measurements at Lake Powell, Utah Merry,
Land application of wastewater in permafrost areas Sletten,	G.K , [1976, 23p.] CR 76-20	C.J., (1970, p 1309-1316) MP 1271 Remote detection of water under ice-covered lakes on the
RS, [1978, p 911-917] MP 1110	Laboratory studies of compressed air seeding of supercooled	North Slope of Alaska. Kovacs, A, (1978, p 448-458)
Uptake of nutrients by plants irrigated with wastewater. Clapp, C.E, et al, (1978, p.395-404) MP 1151	fog. Hicks, J R., et al, [1977, 19p] SR 77-12	MP 1214
Microbiological aerosols during wastewater irrigation. Bau-	Laboratory experiments on lock wall deicing using pneumatic devices. Itagaki, K, et al, [1977, p.53-68] MP 974	Case study fresh water supply for Point Hope, Alaska
sum, H.T, et al. (1978, p 273-280) MP 1154	Resiliency in cyclically frozen and thawed subgrade soils.	McFadden, T, et al. [1979, p.1029-1040] MP 1222
Mass water balance during spray irrigation with wastewater at	Chamberlain, E.J., et al, [1977, p 229-281] MP 1724	Dissolved nitrogen and oxygen in lake water Leggett, D.C.,
Deer Creek Lake land treatment site. Abele, G., et al,	Laboratory experiments on icing of rotating blades Ackley,	(1979, 5p.) SR 79-24
(1978, 43p) SR 79-29	SF, et al, [1979, p 85-92] MP 1236	Tundra lakes as a source of fresh water: Kipnuk, Alaska. Bredthauer, S.R., et al. [1979, 16p] SR 79-30
Experimental system for land renovation of effluent. Ny- lund, J.R., et al. (1978, 26p.) SR 78-23	Kinetics of denitrification in land treatment of wastewater	Limnology of Lake Koocanusa, MT, the 1967-1972 study.
Freezing problems with wintertime wastewater spray irriga-	Jacobson, S, et al, [1979, 59p] SR 79-04	Bonde, T J.H., et al, [1982, 184p] SR 82-21
tion. Bouzoun, J.R., (1979, 12p) SR 79-12	Preparation of polycrystalline ice specimens for laboratory experiments Cole, D.M., [1979, p.153-159]	Limnology of Lake Koocanusa, Montana. Storm, P.C, et al,
International and national developments in land treatment of	MP 1327	{1982, 597p.} SR 82-23
wastewater. McKim, H.L., et al. (1979, 28p)	Frazil ice in rivers and streams Daly, S.F., [1987, p.19-	Lake water intakes under icing conditions Dean, A.M., Jr., (1983, 7p.) CR 83-15
MP 1420	26 ₁ MP 2381	(1983, 7p.) CR 83-15 Shoreline erosion processes Orwell Lake, Minnesota. Reid,
Bacterial aerosols resulting from wastewater irrigation in Ohio. Bausum, H.T., et al., [1979, 64p.] SR 79-32	Solvent extraction for solute preconcentration from water.	J.R., (1984, 101p) CR 84-32
Nitrogen transformations in land treatment. Jenkins, T.F.,	Leggett, D.C., et al., (1990, p.1355-1356) MP 2743	Use of SPOT HRV data in a Corps dredging operation in Lake
et al, (1979, 32p) SR 79-31	Lacustrine deposits Phosphorus chemistry of sediments of Lake Koocanusa, Mon-	Erie. Merry, C.J., et al, [1987, p 49-58] MP 2548
Land treatment of waste water in cold climates. Jenkins,	tana Iskandar, I K., et al, (1981, 9p) SR 81-15	Winter water quality in lakes and streams. Calkins, D J., et
T.F., ct al, (1979, p 207-214) MP 1279	Lake ice	al. (1988, 8p) MP 2507
Prototype wastewater land treatment system. Jenkins, T.F.,	Ice-cratering experiments Blair Lake, Alaska Kurtz, M.K.,	Use of SPOT HRV data in the Corps of Engineers dredging
et al, (1979, 91p) SR 79-35	et al, (1966, Various pagings) MP 1034	program. Merry, C.J., et al, (1988, p.1295-1299) MP 2528
Wastewater treatment in cold regions by overland flow. Martel, C.J., et al. (1980, 14p) CR 80-07	LAKE ICE	Investigation of the LIZ-3 Dew Line Station water supply
Dynamics of NH4 and NO3 in cropped soils irrigated with	Surveys of river and lake ice Michel, B, (1971, 131p)	lake. Kovacs, A, [1990, 10p] SR 90-11
wastewater. Iskandar, I.K., et al, (1980, 20p)	M III-Bla	Lakes
SR 80-27	Lake ice	Remote sensing for earth dam site selection and construction
Forage grass growth on everland flow systems. Palazzo,	Growth and mechanical properties of river and lake ice. Ramseier, R.O., (1972, 243p) MP 1883	materials Merry, C.J., et al. (1980, p.158-170) MP 1316
A.J., et al, (1980, p.34774) MP 1402	Winter thermal structure and ice conditions on Lake Cham-	Land development
Effectiveness of land application for P removal from waste water. Iskandar, I.K., et al., [1980, p 616-621]	plain, Vermont Bates, R E, [1976, 22p] CR 76-13	Urban waste as a source of heavy metals in land treatment.
MP 1444	Structural growth of lake ice. Gow, A J, et al. [1977, 24p.]	Iskandar, I K. (1976, p 417-432) MP 977
Seasonal growth and accumulation of N, P, and K by grass	CR 77-01	Land use and water quality relationships, eastern Wisconsin.
irrigated with wastes Palazzo, A.J., [1981, p 64-68]	Radar imagery of ice covered North Slope lakes Weeks,	Haugen, R K., et al, (1976, 47p) CR 76-30
MP 1425	WF, et al. [1977, p 129-136] MP 923 Flexural strength of ice on temperate lakes Gow, AJ.	Symposium: geography of polar countries, selected papers
Hydraulic characteristics of the Deer Creek Lake land treat- ment site during wastewater application. Abele, G, et al.	(1977, p.247-256) MP 1063	and summaries. Brown, J. ed. (1977, 61p) SR 77-06
[1981, 37p] CR 81-07	Visual observations of floating ice from Skylab Campbell,	
Seasonal growth and uptake of nutrients by orchardgrass irri-	W.J., et al. (1977, p 353-379) MP 1263	Effects of wastewater on the growth and chemical composi- tion of forages Palazzo, A.J., [1977, p. 171-180] MP 975
gated with wastewater. Palazzo, A J, et al, [1981, 19p]	Flexural strength of ice on temperate lakes Gow, A.J., et al.	
CR 81-08	(1978, 14p) CR 78-09	Wastewater treatment at Calumet, Michigan Baillod, C.R., et al., 1977, p 489-510; MP 976
Misgivings on isostatic imbalance as a mechanism for sea ice	Remote detection of water under ice-covered takes on the North Slope of Alaska. Kovacs, A, [1978, p 448-458]	et al, [1977, p 489-510] MP 976 Land treatment of wastewater at Manteca, Calif, and Quincy,
cracking Ackley, S.F., et al. [1976, p.85-94]	MP 1214	Washington, Iskandar, I.K. et al. (1977, 34p)
MP 1379	Forecasting ice formation and breakup on Lake Champlain	CR 77-24
Isotope analysis	Bates, R.E. et al. (1979, 21p) CR 79-26	Symposium on land treatment of wastewater, CRREL, Aug.
Greenland climate changes shown by ice core. Dansgaard,	Winter thermal structure, ice conditions and climate of Lake	1978 (1978, 2 vols) MP 1145
W, et al. (1971, p.17-22) MP 998	Champlain Bates, R.E., [1980, 26p] CR 80-02	Antarctic ice sheet Mellor, M., [1961, 50p] M. I-B1
Oxygen isotope profiles through ice sheets Johnsen, S.J., et al., (1972, p 429-434) MP 997	Maximum thickness and subsequent decay of lake, river and fast sea ice in Canada and Alaska. Bilello, M.A., [1980,	
C-14 and other isotope studies on natural ice. Oeschger, H.	160p) CR 80-06	Greenland ice sheet. Bader, H. (1961, 18p) M I-B2 Land ice
et al. (1972, p.D70-D92) MP 1052	Freshwater ice growth, motion, and decay Ashton, GD.	Planetary and extraplanetary event records in polar ice caps.
Stable isotope profile through the Ross Ice Shelf at Little	(1980, p 261-304) MP 1299	Zeller, E J., et al., [1980, p.18-27] MP 1461
America V, Antarctica Dansgaard, W., et al. (1977, p.322-325) MP 1095	lce formation and breakup on Lake Champlain Bates, R.E., [1980, p 125-143] Bates, MP 1429	Land reclamation
Methodology for nitrogen isotope analysis at CRREL Jen-	Method for measuring brash ice thickness with impulse radar	Bibliography of soil conservation activities in USSR perma-
kins, T.F., et al. (1978, 57p) SR 78-08	Martinson, C.R., et al. (1981, 10p.) SR 81-11	frost areas Andrews, M., [1977, 116p.) SR 77-07
20-yr cycle in Greenland ice core records. Hibler, W.D., III,	Sea ice the potential of remote sensing Weeks, W.F.	Land treatment of wastewater in subarctic Alaska Sletten, R.S., et al., [1977, p.533-547; MP 1268
et al, [1979, p 481-483] MP 1245	(1981, p 19-48) MP 1468	Municipal sludge management environmental factors.
Isotopes		
Method for measuring enriched levels of deuterium in soil	Ice-covered North Slope lakes observed by radar. Weeks,	Reed. S.C., ed. (1977, Var. p.) MP 1406
water Olinhant II et al /1987 17m. CD #2.7E	WF, et al (1981, 17p) CR 81-19	Land treatment, present status, future prospects Pound,
water Oliphant, J.L., et al. (1982, 12p.) SR 82-25 Deuterium diffusion in a soil-water-ice mixture Oliphant.	WF, et al. [1981, 17p] CR 81-19 Port Huron are control model studies Calkins, D.J., et al.	Land treatment, present status, future prospects Pound, CE, et al. (1978, p.98-102) MP 1417
water Oliphant, J.L., et al. (1982, 12p) SR 82-25 Deuterium diffusion in a soil-water-ice mixture J.L., et al. (1984, 11p) SR 84-27	W F, et al. [1981, 17p] CR 81-19 Port Huron are control model studies Calkins, D J., et al. [1982, p 361-373] MP 1530	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Ny-
Deuterium diffusion in a soil-water-ice mixture J L., et al. (1984, 11p.) SR 84-27 Isotopic labeling	WF, et al. (1981, 17p.) Port Huron rec control model studies (2alkins, D.J., et al. (1982, p. 361-373) MP 1530 Model study of Port Huron rec control structure; wind stress simulation Sodhi, D.S., et al. (1982, 27p.)	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p) SR 78-23
Deuterium diffusion in a soil-water-ice mixture Oliphant, J L., et al. (1984, 11p.) SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research	WF, ct al. (1981, 17p) Port Huron rec control model studies (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p) CR 82-09	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Ny-
Deuterium diffusion in a soil-water-ice mixture J L., et al. [1984, 11p.] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p.] SR 78-18	WF, et al. (1981, 17p.) Port Huron rec control model studies Calkins, DJ, et al. (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p.) CR 82-09 Theory of thermal control and prevention of ice in tivers and	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p) SR 78-23 Five-year performance of CRREL, land treatment test cells. Jenkins, T.F., et al. (1978, 24p) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold
Deuterium diffusion in a soil-water-ice mixture Oliphant, J.L., et al. [1984, 11p] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p] SR 78-18 Korea	WF, et al. (1981, 17p.) Port Huron rec control model studies Calkins, D.J., et al. (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, D.S., et al. (1982, 27p.) Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) MP 1554	Land treatment, present status, future prospects Pound, C.E., et al., (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., (1978, 26p.) Five-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al., (1978, 24p.) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions. Elgawher, S.M., et al., (1979, 25p.)
Deuterium diffusion in a soil-water-ice mixture Oliphant, J L., et al. [1984, 11p] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p] SR 78-18 Korea Deployment of floating bridges in ice-covered rivers Mel-	WF, et al. (1981, 17p) Or 81-19 Port Huron rec control model studies (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) Predicting lake rec decay. Ashton, G.D., (1983, 4p)	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p.) SR 78-23 Five-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al. (1978, 24p.) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars S.M., et al. (1979, 25p.) SR 79-18
Deuterium diffusion in a soil-water-ice mixture J L., ct al. (1984, 11p.) SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P., (1978, 77p.) Korea Deployment of floating bridges in ice-covered rivers Mellor, M., ct al. (1988, 38p.) SR 88-20	WF, et al. (1981, 17p.) Port Huron rec control model studies Calkins, DJ, et al. (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p.) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) Predicting lake ice decay. Ashton, G.D., (1983, 4p.) SR 83-19	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p) Five-year performance of CRREL, land treatment test cells. Jenkins, T.F. et al. (1978, 24p) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars SM, et al. (1979, 25p) SR 79-18 Land treatment systems and the environment McKim,
Deuterium diffusion in a soil-water-ice mixture J L., ct al. (1984, 11p.) SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P., (1978, 77p.) Korea Deployment of floating bridges in ice-covered rivers Mellor, M., ct al. (1988, 38p.) SR 88-20	WF, et al. (1981, 17p) Or 81-19 Port Huron rec control model studies (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) Predicting lake rec decay. Ashton, G.D., (1983, 4p)	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p.) SR 78-23 Five-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al. (1978, 24p.) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars S.M., et al. (1979, 25p.) SR 79-18
Deuterium diffusion in a soil-water-ice mixture J L., ct al. [1984, 11p.] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p.] Korea Deployment of floating bridges in ice-covered rivers Mellor, M., ct al. [1988, 38p.] SR 88-20 —Imjin River Imjin River ice boom Perham, R.E. [1988, 10p.] SR 88-22	WF, et al. (1981, 17p) Ort Huron rec control model studies Calkins, DJ, et al. (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p) Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p. 131-165) MP 1554 Predicting lake ree decay. Ashton, G.D., (1983, 4p) SR 83-19 Measurement of ice forces on structures. Sodhi, DS, et al. (1983, p. 139-155) Lake ice decay. Ashton, G.D., (1983, p. 83-36)	Land treatment, present status, future prospects Pound, C.E., et al., [1978, p.98-102] MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., [1978, 26p] SR 78-23 Five-year performance of CRREL, land treatment test cells, Jenkins, T.F., et al., [1978, 24p] SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars S.M., et al., [1979, 25p] SR 79-18 Land treatment systems and the environment McKim, H.L., et al., [1979, p. 201-225] MP 1414 Design of liquid-waste land application Islandar, 1 K., MP 1415
Deuterium diffusion in a soil-water-ice mixture J., et al. [1984, 11p] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p] SR 78-18 Rorea Deployment of floating bridges in ice-covered rivers Deployment of floating bridges in ice-covered rivers Mellor, M., et al. [1988, 38p] SR 88-20 —Imjin River Imjin River ice boom Perham, R.E. [1988, 10p] SR 88-22 Laboratories	WF, et al. (1981, 17p) Port Huron tre control model studies (1982, p. 361-373) Model study of Port Huron tee control structure; wind stress simulation Sodhi, DS, et al. (1982, 27p) Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) MP 1554 Predicting lake tee decay. Ashton, G.D., (1983, 4p) Measurement of the forces on structures Sodhi, D.S., et al., (1983, p. 139-155) MP 1641 Lake ice decay. Ashton, G.D., (1983, p. 83-86) MP 1684	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p.) SR 78-23 Five-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al. (1978, 24p.) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars SM, et al. (1979, 25p.) Land treatment systems and the environment McKim, H.L., et al., (1979, p. 201-225) MP 1414 Design of liquid-waste land application Iskandar, 1 K. (1979, p. 65-88). International and national developments in land treatment of
Deuterium diffusion in a soil-water-ice mixture J L, et al. [1984, 11p.] Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p.] Korea Deployment of floating bridges in ice-covered rivers Mellor, M., et al. [1988, 18p.] SR 88-20 Imjia River Imjin River ice boom Perham, R.E. [1988, 10p.] SR 88-22 Laboratorles Research activities of U.S. Army Cold Regions Research and	WF, et al. [1981, 17p] Or 81-19 Port Huron rec control model studies (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, D.S., et al., (1982, 27p) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) Measurement of rec forces on structures (1983, p. 139-155) Measurement of rec forces on structures (1983, p. 139-155) MP 1641 Lake ice decay Ashton, G.D., (1983, p. 83-86) MP 1684 Flexural strengths of freshwater model rec Gow, A.J.	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p) SR 78-23 Five-year performance of CRREI, land treatment test cells, Jenkins, T.F. et al. (1978, 24p) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars SM, et al. (1979, 25p) Land treatment systems and the environment McKim, H L., et al. (1979, p. 65-88) MP 1414 Design of liquid-waste land application liskandar, 1 K, (1979, p. 65-88) International and national developments in land treatment of wastewater McKim, H L., et al., (1979, 28p.)
Deuterium diffusion in a soil-water-ice mixture J L, et al. [1984, 11p] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p] SR 78-18 Korea Deployment of floating bridges in ice-covered rivers Deployment of floating bridges in ice-covered rivers Mellor, M., et al. [1988, 38p] SR 88-20 —Imjia River Imjin River ice boom Perham, R.E. [1988, 10p] SR 88-22 Laboratorles Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D. [1975, p.9-12]	WF, et al. (1981, 17p) Port Huron rice control model studies (1982, p. 361-373) Model study of Port Huron rice control structure; wind stress simulation Sodhi, D.S., et al., (1982, 27p) Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) MP 1554 Predicting lake rice decay. Ashton, G.D., (1983, 4p.) SR 83-19 Measurement of rice forces on structures (1983, p. 139-155) Lake ice decay. Ashton, G.D., (1983, p. 83-86) Flexural strengths of freshwater model rice (1984, p. 73-82) MP 1684	Land treatment, present status, future prospects Pound, C.E., et al., (1978, p.98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., (1978, 26p.) SR 78-26 Site-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al., (1978, 24p.) SR 78-26 Sitrification inhibitor in land treatment of wastewater in cold regions. Elgawhars, S.M., et al., (1979, 25p.) Land treatment systems and the environment McKim, H.L., et al., (1979, p.201-225) MP 1415 Design of liquid-waste land application. Iskandar, I.K., (1979, p.65-88) MP 1445 International and national developments in land treatment of wastewater. McKim, H.L., et al., (1979, 28p.) MP 1420
Deuterium diffusion in a soil-water-ice mixture J L, et al. [1984, 11p] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. [1978, 77p] SR 78-18 Korea Deployment of floating bridges in ice-covered rivers Mellor, M., et al. [1988, 18p] SR 88-20 Imjin River ice boom Perham, R.E., [1988, 10p] SR 88-22 Laboratories Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D., [1975, p. 9-12] MP 1244 Cold Regions Research and Engineering Laboratory	WF, et al. (1981, 17p) Or 81-19 Port Huron rec control model studies Calkins, D.J., et al. (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, D.S., et al. (1982, 27p) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., (1982, p. 131-165) MP 1554 Predicting lake ree decay. Ashton, G.D. (1983, 4p) Measurement of ree forces on structures. Sodhi, D.S., et al. (1983, p. 139-155) MP 1641 Lake ice decay. Ashton, G.D., (1983, p. 83-86) MP 1684 Flexural strengths of freshwater model ice. Giow, A.J., (1984, p. 73-82) Quiet freezing of lakes and the concept of orientation textures in lake ree sheets. Giow, A.J., (1984, p. 137-149)	Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, JR, et al. (1978, 26p) SR 78-23 Five-year performance of CRREI, land treatment test cells, Jenkins, T.F. et al. (1978, 24p) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions Elgawhars SM, et al. (1979, 25p) Land treatment systems and the environment McKim, H L., et al. (1979, p. 65-88) MP 1414 Design of liquid-waste land application liskandar, 1 K, (1979, p. 65-88) International and national developments in land treatment of wastewater McKim, H L., et al., (1979, 28p.)
Deuterium diffusion in a soil-water-ice mixture Diphant, J., et al. [1984, 11p.] SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A.P., [1978, 77p.] SR 78-18 Korea Deployment of floating bridges in ice-covered rivers Mellor, M., et al., [1988, 38p.) SR 88-20 —Imjia River Imjin River ice boom Perham, R.E., [1988, 10p.] SR 88-22 Laboratories Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D., [1975, p.9-12], MP 1244 Cold Regions Research and Engineering Laboratory Free-tag, D.R., [1978, p.4-6] MP 1251	WF, et al (1981, 17p) Ort Huron ree control model studies (1982, p 361-373) Model study of Port Huron ree control structure; wind stress simulation Sodhi, D.S., et al. (1982, 27p) Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p 131-165) MP 1554 Predicting lake ree decay. Ashton, G.D., (1983, 4p) Measurement of ree forces on structures Sodhi, D.S., et al., (1983, p 139-155) Lake ree decay. Ashton, G.D., (1983, p 83-86) MP 1641 Lake ree decay. Ashton, G.D., (1983, p 83-86) MP 1684 Flexural strengths of freshwater model ree (1984, p.73-82) Quiet freezing of lakes and the concept of orientation textures in lake ree sheets. Gow, A.J., (1984, p. 137-149) MP 1828	Land treatment, present status, future prospects Pound, C.E., et al., (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., (1978, 26p.) SR 78-26 Sitrice-year performance of CRREI, land treatment test cells. Jenkins, T.F., et al., (1978, 24p.) SR 78-26 Nitrification inhibitor in land freatment of wastewater in cold regions Elgawhars S.M., et al., (1979, 25p.) Land treatment systems and the environment McKim, H.L., et al., (1979, p. 201-225) MP 1415 Design of Inquid-waste land application Iskandar, I.K., (1979, p. 65-88, MP 1415 International and national developments in land treatment of wastewater McKim, H.L., et al., (1979, 28p.) MP 1420 Revegetation at two construction sites in New Hampshire and Alaska Palazzo A.J., et al., (1980, 21p.) CR 80-03 EPA policy on land treatment and the Clean Water Act of
Deuterium diffusion in a soil-water-ice mixture J., et al. [1984, 11p] Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A.P., [1978, 77p] SR 78-18 Korea Deployment of floating bridges in ice-covered rivers Mellor, M., et al., [1988, 38p] SR 88-20 -Imijin River Imjin River ice boom Perham, R.E., [1988, 10p] SR 88-22 Laboratorles Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D., [1975, p.9-12] MP 1244 Cold Regions Research and Engineering Laboratory Free- tag, D.R., [1978, p.4-6] Mercury contamination of water samples Cragin, J.H.,	WF, et al. (1981, 17p) CR 81-19 Port Huron tre control model studies (1982, p 361-373) Model study of Port Huron tee control structure; wind stress simulation. Sodhi, D.S., et al., (1982, 27p) Theory of thermal control and prevention of ice in triers and lakes. Ashton, G.D., (1982, p 131-165). MP 1554 Predicting lake tee decay. Ashton, G.D., (1983, 4p) Measurement of tre forces on structures. Sodhi, D. et al., (1983, p 139-155). MP 1641 Lake ice decay. Ashton, G.D., (1983, p 83-36). MP 1644 Flexural strengths of freshwater model ice. (1984, p.73-82). Quiet freezing of lakes and the concept of orientation textures in lake ice sheets. Gow, A.J., (1984, p.137-149). MP 1828 Techniques for measurement of snow and ice on freshwater.	Land treatment, present status, future prospects Pound, C.E., et al., [1978, p. 98-102] MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., [1978, 26p.] Five-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al., [1978, 24p.] SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions. Elgawhars. S.M., et al., [1979, 25p.] Land treatment systems and the environment. H.L., et al., [1979, p. 201-225]. MP 1414 Design of liquid-waste land application. Iskandar, I.K., (1979, p. 65-88). MP 1415 International and national developments in land treatment of wastewater. McKim, H.L., et al., [1979, 28p.] Revegetation at wo construction sites in New Hampshire and Alaska. Palazzo. A.J., et al., [1980, 21p.]. CR 80-03 EPA policy on land treatment and the Clean Water Act of 1977. Thomsy, R.E., et al., [1980, p. 452-460]
Deuterium diffusion in a soil-water-ice mixture J L, et al. (1984, 11p.) Giphant, SR 84-27 Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A P. (1978, 77p.) Korea Deployment of floating bridges in ice-covered rivers Deployment of floating bridges in ice-covered rivers Melior, M., et al. (1988, 38p.) SR 88-20 Imjin River ice boom Perham, R.E., (1988, 10p.) SR 88-22 Laboratorles Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D., (1975, p.9-12) MP 1244 Cold Regions Research and Engineering Laboratory Free- tag, D.R., (1978, p.4-6) Mercury contamination of water samples (Cagin, J.H., MP 1270 MP 1270	WF, et al. (1981, 17p) Or 81-19 Port Huron rec control model studies (1982, p. 361-373) Model study of Port Huron rec control structure; wind stress simulation Sodhi, D.S., et al., (1982, 27p) CR 82-09 Theory of thermal control and prevention of ice in rivers and lakes Ashton, G.D., (1982, p. 131-165) Measurement of rec forces on structures (1983, p. 139-155) Measurement of rec forces on structures (1983, p. 139-155) MP 1641 Lake ice decay Ashton, G.D., (1983, p. 83-86) MP 1684 Flexural strengths of freshwater model ice (1984, p. 73-82) Quiet freezing of lakes and the concept of orientation textures in lake ice sheets Gow, A.J., (1984, p. 137-149) MP 1828 Techniques for measurement of snow and ice on freshwater Adams, W.P., et al., (1986, p. 174-222) MP 2000	Land treatment, present status, future prospects Pound, C.E., et al., (1978, p. 98-102) MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., (1978, 26p.) SR 78-26 Sitis-eyear performance of CRREI, land treatment test cells, Jenkins, T.F., et al., (1978, 24p.) SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions. Elgawhars S.M., et al., (1979, 25p.) Land treatment systems and the environment McKim, MP 1416 Design of liquid-waste land application [skandar, I.K., (1979, p. 65-88] International and national developments in land treatment of wastewater McKim, H.L., et al., (1979, 28p.) MP 1420 Revegetation at wo construction sites in New Hampshire and Alaska Palazzio A.J., et al., (1980, 21p.) CR 80-03 EPA policy on land treatment and the Clean Water Act of 1977 Thomas, R.E., et al., (1980, p. 452-460) MP 1418
Deuterium diffusion in a soil-water-ice mixture J., et al. [1984, 11p] Isotopic labeling Guide to the use of 14N and 15N in environmental research Edwards, A.P., [1978, 77p] SR 78-18 Korea Deployment of floating bridges in ice-covered rivers Mellor, M., et al., [1988, 38p] SR 88-20 -Imijin River Imjin River ice boom Perham, R.E., [1988, 10p] SR 88-22 Laboratorles Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D., [1975, p.9-12] MP 1244 Cold Regions Research and Engineering Laboratory Free- tag, D.R., [1978, p.4-6] Mercury contamination of water samples Cragin, J.H.,	WF, et al. (1981, 17p) CR 81-19 Port Huron tre control model studies (1982, p 361-373) Model study of Port Huron tee control structure; wind stress simulation. Sodhi, D.S., et al., (1982, 27p) Theory of thermal control and prevention of ice in triers and lakes. Ashton, G.D., (1982, p 131-165). MP 1554 Predicting lake tee decay. Ashton, G.D., (1983, 4p) Measurement of tre forces on structures. Sodhi, D. et al., (1983, p 139-155). MP 1641 Lake ice decay. Ashton, G.D., (1983, p 83-36). MP 1644 Flexural strengths of freshwater model ice. (1984, p.73-82). Quiet freezing of lakes and the concept of orientation textures in lake ice sheets. Gow, A.J., (1984, p.137-149). MP 1828 Techniques for measurement of snow and ice on freshwater.	Land treatment, present status, future prospects Pound, C.E., et al., [1978, p. 98-102] MP 1417 Experimental system for land renovation of effluent. Nylund, J.R., et al., [1978, 26p.] Five-year performance of CRREI, land treatment test cells, Jenkins, T.F., et al., [1978, 24p.] SR 78-26 Nitrification inhibitor in land treatment of wastewater in cold regions. Elgawhars. S.M., et al., [1979, 25p.] Land treatment systems and the environment. H.L., et al., [1979, p. 201-225]. MP 1414 Design of liquid-waste land application. Iskandar, I.K., (1979, p. 65-88). MP 1415 International and national developments in land treatment of wastewater. McKim, H.L., et al., [1979, 28p.] Revegetation at wo construction sites in New Hampshire and Alaska. Palazzo. A.J., et al., [1980, 21p.]. CR 80-03 EPA policy on land treatment and the Clean Water Act of 1977. Thomsy, R.E., et al., [1980, p. 452-460]

Land reclamation (cont.) Forage grass growth on overland flow systems Palazzo,	Landscape types	Performance and optical signature of an AN/VVS-1 laser rangefinder in falling snow: Preliminary test results La-
A.J., et al. (1980, p.347-354) MP 1402	ristering and classification routines in land use imagery. Merry, C.J., et al, [1988, p.57-58] MP 2534	combe, J, [1983, p.253-266] MP 1759
Spray application of waste-water effluent in a cold climate,	Lasers	Wavelength-dependent extinction by falling snow. Koh, G., [1986, p 51-55] MP 2019
Cassell, E.A., et al. [1980, p 620-626] MP 1403 Overland flow: removal of toxic volatile organics. Jenkins,	De-icing using lasers Lane, J.W., et al, [1976, 25p] CR 76-10	Snow mass extinction coefficient. Koh, G., [1986, p 35-
T.F., et al, (1981, 16p) SR 81-01	Dynamics of near-shore ice. Kovacs, A., et al, 1977,	38 ₁ MP 2659
Seasonal growth and accumulation of N, P, and K by grass irrigated with wastes Palazzo, A J., [1981, p 64-68]	p.151-163; MP 1073 Use and application of PRESTO in Snow-IH West. Stailings,	Preview of the SNOW-III West data base. Lacombe, J., (1987, p 3-11) MP 2291
MP 1425	E S, et al, [1986, p.11-24] MP 2658	Slant path extinction and vis.bility measurements from an
Seasonal growth and uptake of nutrients by orchardgrass irrigated with wastewater. Palazzo, A J, et al, [198], 199.]	Effects of water and ice on the scattering of diffuse reflectors Jezek, K.C., et al. (1986, p 259-269) MP 2664	unmanned aerial vehicle Cogan, J, et al, (1987, p 115- 126 ₁ MP 2296
CR 81-08	Latent heat	Two-stream approximation to radiative transfer in falling
Seven-year performance of CRREL slow-rate land treatment prototypes. Jenkins, T.F., et al, [1981, 25p.]	Deforming finite elements with and without phase change	snow. Koh, G., [1988, p 463-470] MP 2604 Increased transmission through brass obscurant clouds during
SR 81-12	Lynch, D.R., et al., [1981, p 81-96] MP 1493 Heat fluxes, humidity profiles, and surface humidity. An-	snowfall. Hewitt, A.D., et al. (1988, p. 489-496)
Site selection methodology for the land treatment of wastewa- ter. Ryan, J.R., et al. [1981, 74p] SR 81-28	dress, E.L., [1982, 18p] CR 82-12	MP 2605
Model for prediction of nitrate leaching losses in soils Meh-	Year of Bowen ratios over the frozen Beaufort Sea. Andreas, E.L., [1989, p 12,721-12,724] MP 2508	Snow-smoke interaction. Hogan, A.W, et al, [1988, p.497- 506] MP 2607
ran, M, et al. (1981, 24p) CR 81-23	Wind-generated polynyas off the coasts of the Bering Sea	Optical technique for characterizing precipitation. Koh, G.,
Vegetation selection and management for overland flow sys- tems. Palazzo, A J, et al, [1982, p 135-154]	islands. Kozo, T.L., et al, [1990, p 126-132] MP 2734	(1989, p. 71-76) MP 2627 Radiative transfer in falling snow: a two-stream approxima-
MP 1511	Layers	tion. Koh, G., [1989, 10p.] CR 89-06
Overview of models used in land treatment of wastewater Iskandar, I.K., [1982, 27p] SR 82-01	Enclosing fine-grained soils in plastic moisture barriers	Two-stream multilayer, spectral radiative transfer model for sea ice. Perovich, D K, [1989, 17p] CR 89-15
Wastewater treatment and plant growth. Palazzo, A.J.,	Smith, N., £1978, p.560-570; MP 1089 Leaching	Refractive index structure parameter for a year over the froz-
[1982, 21p.] SR 82-05 Land treatment of wastewater. Reed, SC, [1982, p.91-	Model for prediction of nitrate leaching losses in soils Meh-	en Beaufort Sea. Andreas, E.L., [1989, p 667-679] MP 2575
123 ₁ MP 1947	ran, M., et al, (1981, 24p) CR 81-23 Leaching of metal pollutants from well casings Hewitt,	Theoretical estimates of light reflection and transmission by
User's index to CRREL land treatment computer programs	Leaching of metal pollutants from well casings Hewitt, A D., [1989, 11p] SR 89-32	spatially inhomogeneous and temporally varying ice covers
and data files. Berggren, P.A., et al, (1982, 65p) SR 82-26	Leakage	Perovich, D.K., [1990, p.45-49] MP 2729 Light reflection and transmission by sea ice covers. Pero-
Case study of land treatment in a cold climate—West Dover,	Roof moisture survey—U.S. Military Academy. Korhonen, C., et al, [1979, 8 refs] SR 79-16	vich, D.K., (1990, p.9557-9567) MP 2761
Vermont. Bouzoun, J.R., et al, [1982, 96p.] CR 82-44	Roof leaks in cold regions: school at Chevak, Alaska	Light (visible radiation) Polarization of skylight. Bohren, C., (1984, p 261-265)
Assessment of the treatability of toxic organics by overland	Tobiasson, W., et al, [1980, 12p] CR 80-11	MP 1794
flow. Jenkins, T.F., et al, [1983, 47p] CR 83-03 Model for land treatment, Pt.1. Baron, J.A., et al, [1983,	Roof blister valve. Korhonen, C., [1986, p.29-31] MP 2138	Ice fog as an electro-optical obscurant Koh, G. (1985,
35p. ₁ SR 83-06	Infrared testing for leaks in new roofs. Korhonen, C.	11p 3 CR 85-08 Spectra and cospectra of atmospheric turbulence over snow.
Model for land treatment planning, design and operation, Pt.2 Baron, J.A., et al, [1983, 30p] SR 83-07	(1987, p 49-54) MP 2282 Reduced winter leakage in gates with J-seals Rand, J.H., et	Andreas, E L., (1986, p 219-233) MP 2661
Model for land treatment planning, design and operation,	al, (1989, 3p) MP 2724	Lightning What makes thunderbolts zig and zag. Itagaki, K, (1988,
Pt.3. Baron, J.A., et al, [1983, 38p] SR 83-08	Land treatment present status, future prospects Pound,	p 22-27 ₁ MP 2524
Corps of Engineers land treatment of wastewater research program an annotated bibliography Parker, L.V., et al.	C.E. et al. (1978, p 98-102) MP 1417	Liming
(1983, 82p) SR 83-09	EPA policy on land treatment and the Clean Water Act of	Wastewater treatment in Alaska Schneiter, R.W., et al. [1982, p 207-213] MP 1696
Engineering systems for wastewater treatment, Lochr, R., et al, 1983, p 409-417; MP 1948	1977. Thomas, R E., et al, [1980, p.452-460] MP 1418	Restoration of acidic dredge soils with sewage sludge and
Land treatment research and development program Iskan-	Arctic research of the United States, Vol.3. [1989, 71p]	lime. Palazzo, A.J., [1983, 11p ₃ CR 83-28 Limnology
dar, I K., et al, [1983, 144p] C. R. 83-20 Land treatment processes. Merry, C.J., et al, [1983, 79p]	MP 2530 United States arctic research plan biennial revision: 1990-	Arctic limnology a review. Hobbie, J E., (1973, p 127-
SR 83-26	1991. Brown, J., ed. [1989, 72p.] MP 2544	168 ₁ MP 1007
Nitrogen behavior in soils irrigated with figuid waste. Selim, H.M., et al., (1984, p.96-108) MP 1762	Lichens Tundra environment at Barrow, Alaska. Bunnell, F.L., et al.	Environmental analyses in the Kootenai River region, Mon- tana McKim, H.L., et al. (1976, 53p) SR 76-13
impact of slow-rate land treatment on groundwater quality.	[1975, p.73-124] MP 1050	Phosphorus chemistry of sediments of Lake Koocanusa, Mon-
toxic organics. Parker, L.V., et al, [1984, 36p] CR 84-30	Lider	tana Iskandar, I K, et al. (1981, 9p) SR 81-15 Bottom heat transfer to water bodies in winter. O'Neill, K.,
Overland flow wastewater treatment at Easley, S.C. Aberna-	Lidar detection of leads in arctic sea ice. Schnell, R.C., et al., 1990, p.119-123; MP 2733	et al, (1981, 8p) SR \$1-18
thy, A R., et al. [1985, p 291-299] MP 2183	Recent measurements of sea ice topography in the eastern	Limnology and primary productivity, Lake Koocanusa, Mon- tana. Woods, P.F., et al. (1982, 106p.) SR \$2-15
Toxic organics removal kinetics in overland flow land treat- ment. Jenkins, T.F., et al. (1985, p.707-718)	Arctic. Krabill, W.B., et al., [1990, p.132-136] MP 2735	Limnology of Lake Koocanusa, MT, the 1967-1972 study.
MP 2111	Lidar-derived particle concentrations in plumes from arctic	Bonde, T.J H., et al. (1982, 184p.) SR 82-21
Corps of Engineers Land Treatment Research and Develop- ment program. Iskandar, I K., (1986, p 17-18)	leads Andreas, E.L., et al, [1990, p 9-12] MP 2758 Light scattering	Limnology of Lake Koocanusa, Montana Storm, P.C., et al. [1982, 597p] SR 82-23
MP 2149	Optical properties of salt ice Lane, J.W., (1975, p 363-	Linings
Forest land treatment with municipal wastewater in New England. Reed, S.C., et al., [1986, p. 420-430]	372 ₁ MP 854 Snowpack optical properties in the infrared Berger, R.H.,	Wastewater stabilization pond linings. Middlebrooks, E.J., et al. 1978, 116p.; SR 78-28
MP 2280	(1979, 16p) CR 79-11	1979 Greenland Ice Sheet Program. Phase 1; casing opera-
Removal of trace-level organics by slow-rate land treatment. Parker, L.V., et al. [1986, p.1417-1426] MP 2170	Polarization of skylight Bohren, C., [1984, p 261-265] MP 1794	tion Rand, J.H., (1980, 18p.) SR 80-24
Of. Overland flow wastewater treatment at Easley, S.C.	Forward-scattering corrected extinction by nonspherical par-	Lipids Trends in carbohydrate and lipid levels in Arctic plants.
Martel, C.J., et al. (1986, p 1078-1079) MP 2300 Disturbance and recovery of arctic Alaskan tundra terrain	ticles Bohren, C.F., et al. [1984, p 261-271] MP 1870	McCown, B H., et al. (1972, p 40-45) MP 1376
Walker, D.A., et al. [1987, 63p] CR 87-11	Forward-scattering corrected extinction by nonspherical par-	Liquid solid interfaces Liquid distribution and the dielectric constant of wet snow.
Landforms Geobotanical atlas of the Prudhoc Bay region, Alaska.	ticles Bohren, CF, et al. [1985, p 1023-1029] MP 1958	Colbeck, S.C., (1980, p.21-19) MP 1349
Walker, D A, et al. (1980, 69p) CR 80-14	Was elength-dependent extinction by falling snow. Koh, G.	Deforming finite elements with and without phase change. Lynch, DR, et al. [1981, p. 81-96] MP 1493
Spatial analysis in recreation resource management. Edwar- do, H.A. et al. (1984, p. 209-219) MP 2084	[1986, p 51-55] MP 2019	Simulation of planar instabilities during solidification. Sul-
Periglacial landforms and processes, Kenai Mts., Alaska	Snow mass extinction coefficient Koh, G, [1986, p 35-38] MP 2659	livan, J.M., Jr., et al., [1987, p.81-111] MP 2585
Bailey, P.K., [1985, 60p] SR 85-03	Comments on the characteristics of in situ snow at millimeter	LOADS (FORCES) Properties of snow. Mellor, M., (1964, 105p)
Near real time hydrologic data acquisition utilizing the	wavelengths Walsh, J., et al. (1986, p 317-320) MP 2666	M III-AI
LANDSAT system McKim, H L., et al. (1975, p 200-	Extinction coefficient measurement in falling snow Koh.	Londs (forces) lee forces on simulated structures Zabilansky, L.J., et al.
2111 MP 1055 Remote measurement of sea ice drift Hibler, W.D., III, et	G., (1987, 9p.) SR 87-04 Scavenging of infrared screener EA 5763 by falling snow	(1975, p 387-396) MP 864
al. (1975, p 541-554) MP 849	Cragin, J.H., et al. (1987, p 13-20) MP 2292	Forces on an ice boom in the Beauharnois Canal R.E. et al. (1975, p. 397-407) MP 858
Sea ice drift and deformation from LANDSAT imagery Hi- bler, W.D., III, et al. (1976, p. 115-135) MP 1059	Forward scatter meter for measuring extinction in adverse weather Koh, G. (1987, p.81-84) MP 2295	Creep theory for a floating ice sheet Nevel. D E , 1976.
Landsat data analysis for New England reservoir manage-	Light transmission	98p 3 SR 76-04
ment. Merry, C.J., et ai. (1978, 61p.) SR 78-06 Landsat data collection platform, south central Alaska Hau-	Correlation and quantification of airborne spectrometer data to turbidity measurements at Lake Powell, Utah. Merry.	Shallow snow performance of wheeled vehicles Harnson, WI., (1976, p 589-614) MP 1130
gen, R.K., et al. (1979, 17 refs.) SR 79-02	CJ. (1970, p 1309-1316) MP 1271	Some economic benefits of ice booms Perham, R.E.,
Mapping of the LANDSAT imagery of the Upper Susiting River Gatto, L.W., et al. (1980, 41p.) CR 80-04	Water quality measurements at Lake Powell, Utah Merry, CJ, (1977, 38p) SR 77-28	(1977, p.570-581) MP 959 Rinof loads resulting from rain-on-snow Colbeck, S.C.,
Remote sensing of revegetation of burned tundra, Kokolik	CJ. (1977, 38p) SR 77-28 Problems in snow cover characterization O'Brien, HW.	(1977, 19p ₁ CR 77-12
River, Alaska Hall, D.K. et al. [1980, p.263-272] MP 1391	[1982, p.139-147] MP 1987	Concentrated loads on a floating ice sheet Nevel, D.E., [1977, p.237-245] MP 1062
Sea ice piling at Forway Rock, Bering Strait, Alaska.	Failing snow characteristics and extinction Berger, R.H., [1983, p.61-69] MP 1756	Intermittent ice forces acting on inclined wedges Tryde, P.
Kovacs, A., et al. (1981, p.985-1000) MP 1460	Visible propagation in falling snow as a function of mass con-	(1977, 26p) CR 77-26
Hydrologic modeling from Landsat land cover data McKim H.L., et al. (1984, 1993 SR 84-01	p 103-111; Lacombe, J. et al. (1983, p 103-111) MP 1757	Viscoelasticity of flowing ice plates subjected to a circular load. Takagi, S., §1978, 32p.; CR 78-05
• • • •		- · · · · · · · · · · · · · · · · · · ·

Load tests on membrane-enveloped road sections Smith, N., et al, (1978, 16p) CR 78-12	Lock wall deicing. Hanamoto, B, (1977, p :-24-)	Magnetic properties Detection of Arctic water supplies with geophysical tech-
Ice cover forces on structures. Kerr, A.D., 11978, p 123- 1341 MP 879	Lock wall descing with high velocity water jet ** Soo Locks, Mi. Calkins, D.J., et al, [1977, p.23-35] MP 973	niques Arcone, SA, et al. (1979, 30p) CR 79-15
Horizontal forces exerted by floating ice on structures Kerr,	Laboratory experiments on lock well descing us. 14 pneumatic	Magnetic surveys Measurements of ground resistivity. Arcone, S A., [1982]
A.D., 1978, 9p CR 78-15 Loading on the Hartford Civic Center roof before collapse	devices. Itagaki, K, et al. (1977, p 53-58) MP 974 Effects of ice on coal movement via the inland waterways	p 92-110 ₁ MP :313 Comparative field testing of buried utility locators Bigl,
Redfield, R., et al, (1979, 32p) SR 79-09 Safe ice loads computed with a pocket calculator. Nevel,	Lunardini, V J, et al, [1981, 72p] fR 81-13 lee control at navigation locks. Haramoto, [7] [1981,	S.R., et al. [1984, 25p] MP 1977
D.E., (1979, p 205-223) MP 1249 Analysis of plastic shock waves in snow Brown, R.L.	p.1088-1095 ₁ MP 1448 Application of a block copolymer solution to ice-prone struc-	Locating buried utilities. Bigl, S.R., [1985, 48p.] SR 85-14
(1979, 14p) CR 79-29	tures. Hanamoto, B, (1983, p 155-158) 1636	Maintenance Approach roads, Greenland 1955 program [1959, 100p]
Power requirements and methods for long distance large ice- berg towing. Mellor, M., [1980, p.231-240]	Methods of ice control. Frankenstein, G.E., et al., 1983, p. 204-215; MP 1642	MP 1522 Haines-Fairbanks pipeline: design, construction and opera-
MP 1275 Pressure waves in snow. Brown, R.L., [1980, p 99-107]	Survey of ice problem areas in navigable waterways. Zufelt, J., et al, (1985, 32p) SR 85-02	tion. Garfield, DE, et al, [1977, 20p.] SR 77-04
MP 1306 Extending the useful life of DYE-2 to 1986. Tobiasson, W.	Data acquisition for refrigerated physical model Zufelt, J.E., (1987, p.338-341) MP 2351	Maintaining buildings in the Arctic Tobiasson, W., et al. (1977, p 244-251) MP 1508
et al. [1980, 37p] SR 80-13 Some promising trends in ice mechanics. Assur, A. [1980,	High-flow air-screen bubbler systems to control ice in locks. Rand, J.H., [1988, p 34-43] MP 2496	Excavation of frozen materials Moore, H.E., et al. [1980, p 323-345] MP 1360
p.1-15 ₁ MP 1300	Methods to reduce ice accumulation on miter gate recess	Construction engineering community materials and diagnos- tics. [1986, 54p] SR 86-01
Bending and buckling of a wedge on an elastic foundation Nevel, D.E., (1980, p.278-288) MP 1303	walls Rand, J.H., et al, [1989, 5p] MP 2722 Unconventional power sources for ice control at locks and	Rebuilding infrastructure for pleasure boating Wortley,
Working group on ice forces on structures. Carstens, T., ed. [1980, 146p] SR 80-26	dams Nakato, T. et al, (1989, p.107-126) MP 2572	Roofer, a management tool for maintaining built-up roofs.
Mechanics of cutting and boring in permafrost. Mellor, M., (1980, 82p.) Cft 80-21	Loess Effects of salt on unfrozen water content in silt, Lanzhou,	Bailey, D.M., et al. (1989, p.6-10) MP 2488 Vapor retarders for membrane roofing systems Tobiasson,
Investigation of the snow adjacent to Dye-2, Greenland.	China. Tice, AR, et al, [1984, 18p] CR 84-16 Logistics	W., (1989, p 31-37) MP 2489 Manuals
Pavement deflection after freezing and thawing. Chamber-	Towing icebergs Lonsdale, H K, et al. (1974, p 2)	Cold climate utilities delivery design manual. Smith, D.W.
lain, E.J., [1981, 10p] CR 81-15 Macroscopic view of snow deformation under a vehicle	MP 1020 Operational report 1976 USACRREL-USGS subsea perma-	et al, [1979, c300 leaves] MP 1373 Guidebook to permafrost and its features, northern Alaska.
Richmond, P.W., et al. [1981, 20p] SR 81-17 Vehicle tests and performance in snow. Berger, R.H., et al.	frost program Beaufort Sea, Alaska. Sellmann, P.V., et al, 1976, 20p 1 SR 76-12	Brown, J., ed. (1983, 230p) MP 1640 User's guide for the BIBSORT program for the IBM-PC per-
[1981, p 51-67] MP 1477	Megastructures for mobilization. Flanders, S.N., (1986, p.10-11)	sonal computer. Kyriakakis, T., et al, ¿1985, 61p ; SR 85-04
kis, P.C., et al. (1982, p 129-139) MP 1589	I seld water supply on the winter battlefield. Bouzoun, JR,	Mapping
Force distribution in a fragmented ice cover. Daly, S.F., ct al, (1982, p.374-387) MP 1531	(1988, 7p.) SR 88-02 Logians	Permafrost and vegetation maps from ERTS imagery. Anderson, D.M. et al. (1973, 75p) MP 1003
Piling in frozen ground. Crory, F.E., [1982, p.112-124] MP 1722	Debris of the Chena River McFadden, T. et al. (1976, 14p) CR 76-26	ERTS mapping of Arctic and subarctic environments Anderson, D.M., et al., [1974, 128p.] MP 1047
Determining the characteristic length of model ice sheets Sodhi, D.S., et al, 1982, p.99-1041 MP 1570	Long range forecasting Study of climatic elements occurring concurrently. Bilello,	Land use/vegetation mapping in reservoir management.
CRREL instrumented vehicle hardware and software	M A , 1976, p.23-30) MP 1613	Regionalized feasibility study of cold weather earthwork.
Blaisdell, G L., [1983, 75p] SR 83-03 Stress/strain/time relations for ice under uniaxial compres-	Low temperature research Proceedings of the Second International Symposium on Cold	Roberts, W.S., (1976, 190p) SR 76-02 Skylab imagery Application to reservoir management in New
sion. Mellor, M, et al. [1983, p 207-230] MP 1587 Frozen soil characteristics that affect land mine functioning.	Regions Fingineering Burdick, J. ed. (1977, 597p.) MP 952	England McKim, H L., et al, (1976, 51p) SR 76-07
Richmond, P.W., [1983, 18p.] SR 83-05 Effect of loading on the unfrozen water content of silt. Oli-	Optical engineering for cold environments Aitken, G.W., ed., [1983, 225p] MP 1646	Ecology on the Yukon-Prudhoe haul road. Brown, J., ed. [1978, 131p] MP 1115
phant, J.L., et al, [1983, 17p] SR 83-18	Unique new cold weather testing facility. Eaton, RA, [1988, p.745-750] MP 2542	Water resources by satellite. McKim, H.L., (1978, p.164-
Stress measurements in ice. Cox, G.F.N., et al. (1983, 31p) CR 83-23	Unique new cold weather testing facility. Eaton, R.A.	1693 MP 1090 Geoecological mapping scheme for Alaskan coastal tundra.
Effect of stress application rate on the creep behavior of poly- crystalline ice. Cole, D M., [1983, p 454-459]	[1989, p 335-342] MP 2468 Low-temperature effects on systems for composting explo-	Everett, K.R., et al. (1978, p. 359-365) MP 1098 Estuarine processes and intertidal habitats in Grays Harbor,
MP 1671 Experimental determination of buckling loads of cracked ice	sives-contaminated soils. Ayonnde, O.A., et al. (1989, 18p.) SR 89-38	Washington a demonstration of remote sensing techniques. Gatto, L.W., (1978, 79p) CR 78-18
sheets Sodhi, D.S., et al. [1984, p.183-186] MP 1687	Load tests on membrane-enveloped road sections Smith,	Electrical ground impedance. Arcone, S.A. et al. (1978,
Force distribution in a fragmented ice cover Stewart, D.M. et al. [1984, 16p] CR 84-07	N., et al. (1978, 16p) CR 78-12 Water vapor adsorption by sodium montmorillonite at -5C.	92p ₁ MP 1221 Snow cover mapping in northern Maine using LANDSAT.
Static determination of Young's modulus in sea ice. Richter-	Anderson, D M, et al. (1978, p 638-644) MP 981	Merry, C.J., et al. (1979, p 197-198) MP 1510 Mapping of the LANDSAT imagery of the Upper Susitna
Menge, J.A., [1984, p 283-286] MP 1789 Mechanics of ice cover breakthrough Kerr, A D., [1984,	Waterproofing strain gages for low ambient temperatures. Garfield, D.E., et al. (1978, 20p.) SR 78-15	River Gatto, L.W., et al. (1980, 41p) CR 80-04 Characteristics of permafrost beneath the Beaufort Sea Sell-
p 245-262; MP 1997 Creep of a strip footing on ice-rich permafrost. Sayles, FH.	Thermal and load-associated distress in pavements Johnson, T.C., et al. (1978, p.403-437) MP 1209	mann, P.V., et al. (1981, p.125-157) MP 1428
(1985, p 29-51) MP 1731 Experience with a biaxial ice stress sensor Cox, G F.N.,	Resilient response of two frozen and thawed soils Chamber- lain, E.J., et al. [1979, p. 257-271] MP 1176	Environmental mapping of the Arctic National Wildlife Ref- uge, Alaska Walker, D. A., et al., [1982, 59p. + 2 maps]
(1985, p 252-258) MP 1937 Brittleness of reinforced concrete structures under arctic con-	Grouting silt and sand at low temperatures—a laboratory investigation. Johnson, R. (1979, 33p.) CR 79-05	Perspective ground loads and mapping Tobiasson, W
ditions. Kivekäs, L., et al. (1985, 28 + 14p) MP 1969	Heat and mass transfer from freely falling drops at low tem-	(1989, p. 512-513) MP 2614 Coastal subsea permafrost and bedrock observations using de
Simple design procedure for heat transmission system piping	peratures Zarling, J.P., (1980, 14p.) CR 80-18 Field cooling rates of asphalt concrete overlays at low temper-	resistivity Sellmann, P.V. et al. [1989, 13p] CR 89-13
Phetteplace, G. (1985, p 1748-1752) MP 1942 Confined compressive strength of multi-year pressure ridge	atures Eaton, R.A., et al., (1980, 11p.) CR 80-30 Brittleness of reinforced concrete structures under arctic con-	Maps
sea ice samples Cox, G F.N , et al. (1986, p 365-373) MP 2035	ditions Kivekäs, L., et al. (1985, p.111-121) MP 2272	Plant recovery from Arctic oil spills Walker, D.A., et al. (1978, p. 242-259) WP 1184
On the determination of the average Young's modulus for a floating ice cover—Kerr, A.D., et al. (1988, p. 39-43)	Low temperature cracking susceptibility of asphalt concrete. Janoo, V.C., et al. [1987, p. 397-415] MP 2233	Geobotanical atlas of the Prudhoc Bay region, Alaska Walker, D.A., et al., 1980, 69p.; CR 80-14
MP 2324 Uniaxial tension/compression tests on ice - preliminary re-	Theory of particle coarsening with a log-normal distribution Colbeck, S.C., (1987, p. 1583-1588) MP 2250	lee atlas, 1984-1985, Ohio River, Allegheny River, Monon- gahela River Gatto, L.W., et al. (1986, 185p.)
sults. Cole, D.M., et al. (1989, p.37-41) MP 2482	On the application of thermosyphons in cold regions Zar-	SR #6-23
State of the art of pavement response monitoring systems for roads and airfields {1989, 401p} SR 89-23	ling, J.P., et al. (1988, p. 281-286) MP 2321 Performance of laminated composites in cold Dutta, P.K.	lce atlas 1985-86 of five rivers of the USA Gatto, L.W., et al. [1987, 367p] SR 87-20
Resilient modulus determination for frost conditions Chamberlain, E.J., et al., [1989, p.320-333] MP 2569	et al. (1988, p 269-281) MP 2433 Behavior of materials at low temperatures Dutta, P.K.	Marine biology Choanoflagellata from the Weddell Sea, summer 1977
Dynamic analysis of a floating ich sheet undergoing vertical indentation. McGilvary, W.R. et al. (1990, p. 195-203)	[1988, 68p] SR 88-09 Structural fiber composite materials for cold regions Dutta,	Buck, KR, (1980, 26p) CR 80-16 Choanoflagellates from the Weddell Sea Buck, kR,
MP 2579	P.K., (1988, p.124-134) MP 2405	(1981, p.47-54) MP 1453
Cyclic loading of saline ice initial experimental results Cole, D.M., [1990, p. 265-271] MP 2581	Fiber composite mate isls in an arctic environment Dutta, P.K., (1989, p.216-225) MP 2559	Physical mechanism for establishing algal populations in frazilice Gatrison, D.L., et al. [1983, p.363-365]
Snow cover effects on antaretic sea ice thickness Ackley, S.F., et al. (1990, p. 16-21) MP 2726	Graphite-epoxy composites subjected to low temperatures Dutta, P.K., et al., {1989, p.429-435} MP 2554	MP 1717 Sea ice microbial communities in Antarctica Garrison,
Loams Relationship between freezing and water content in sandy	Macquarie Island Soil properties of the International Tundra Biome sites	D.L., et al. (1986, p. 243-250) MP 2026 Sea see a habitat for the foraminifer Neogloboquadrina pa-
loam Black, P.B., et al. (1988, 37p) CR 88-26 Soil freezing and soil water in sandy loam Black, P.B., et al.	Brown, J., et al. (1974, p. 27-48) MP 1043 Tundra and analogous soils Everett, K.R., et al. (1981)	chysterma? Dieckmann, G, et al (1990, p.86-92) MP 2732
(1989, p 2205-2210) MP 2577	p 130-170 ₁ MP 1405	Marine deposits
Locks (waterways) Lock wall descing studies Haramoto, B., ed. (1977, 68p.)	Magnetic measurement Bedrock geology survey in northern Maine Sellmann, P.V.	Preliminary simulation of the formation and infilling of sea ice gouges. Weeks, W.F., et al., §1986, p. 259-2681
SU 77.22	et al. 1976, 19n	\tP ??!#

Marine geology Coastal marine geology of the Beaufort, Chukchi and Bering	Mathematical model to predict frost heave. Berg, R. L., et al., 1977, p.92-109; MP 1131	Sea ice thickness versus impulse radar time-of-flight data Kovacs, A., et al, [1990, p.91-98] MP 2704
Seas Gatto, L.W., (1980, 357p.) SR 80-05	Viscous wind-driven circulation of Arctic sea ice. Hibler,	Radar backscatter measurements over saline ice Gogineni,
Distribution and features of bottom sediments in Alaskan coastal waters. Selimann, P.V., [1980, 50p.]	W.D., III, et al. (1977, p.95-133) MP 983 Modeling pack ice as a viscous-plastic continuum. Hibler,	S, ct al. (1990, p 603-615) MP 2741 MEASURING INSTRUMENTS
SR 80-15	W.D., III, (1977, p 46-55) MP 1164	Heat exchange at the ground surface. Scott, R.F., [1964,
Marine meteorology Using a MicroCORA sounding system in the southern ocean	Finite element formulation of a sea ice drift model. Sodhi, D.S., et al, [1977, p 67-76] MP 1165	49p. r'us append. ₁ M II-A1
Andreas, E.L., et al, [1982, 17p.] CR 82-28	Finite element model of transient heat conduction. Guy-	Investigation and exploitation of snowfield sites Mellor, M., [1969, 570] MIII-A2b
US/USSR Weddell Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13	mon, G L., et al. (1977, 167p) SR 77-38	Measuring instruments
Simple boom for use in measuring meteorological data from	Roof loads resulting from rain on snow Colbeck, S.C., [1977, p 482-490] MP 982	Instrument for determining snow properties related to traffi- cability Parrott, W.H., et al., (1972, p. 193-204)
a ship. Andreas, E.L., et al, (1984, p 227-237) MP 1752	Model simulation of near shore ice drift, deformation and	MP 886
Lidar detection of leads in arctic sea ice Schnell, R.C., et al.	thickness Hibler, W.D., III. (1978, p.33-44) MP 1010	Case for comparison and standardization of carbon dioxide reference gases Kelley, J.J., et al. (1973, p.163-181)
(1990, p 119-123) MP 2733 Marine transportation	Symposium on land treatment of wastewater, CRREL, Aug. 1978. [1978, 2 vols] MP 1145	MP 964 Remote sensing program required for the AIDJEX model.
Effects of ice on coal movement via the inland waterways	NO3-N in percolate water in land treatment. Iskandar, I.K.,	Weeks, W.F. et al. (1974, p 22-44) MP 1040
Lunardini, V.J., et al. (1981, 72p) SR 81-13 Mars (planet)	ct al. (1978, p 163-169) MP 1148	Heat and moisture flow in freezing and thawing soils—a field study Berg, R L. [1975, p 148-160] MP 1612
Mars soil-water analyzer instrument description and status	Nitrogen behavior in land treatment of wastewater a simpli- fied model Selim, H.M., et al. (1978, p. 171-179)	Near real time hydrologic data acquisition utilizing the
Anderson, D.M., et al. [1977, p 149-158] MP 912 UV radiational effects on Martian regolith water. Nadeau,	MP 1149 Simulation of the movement of conservative chemicals in soil	LANDSAT system. McKim, H.L. et al. (1975, p 200- 211) MP 1055
P.H. (1977, 89p) MP 1072	solution. Nakano, Y, et al. (1978, p. 371-380)	On the use of tensiometers in snow hydrology. Colbeck,
Water vapor adsorption by sodium montmorillonite at -5C. Anderson, D.M., et al. [1978, p 638-644] MP 981	MP 1156 Numerical simulation of atmospheric ice accretion. Ackley,	S C. (1976, p.135-140) MP 843 Winter thermal structure and ice conditions on Lake Cham-
Proceedings of the second planetary water and polar pro-	S.F., et al, [1979, p 44-52] MP 1235	plain, Vermont. Bates, R.E., [1976, 22p.] CR 76-13
cesses colloquium, 1978 [1978, 209p] MP 1193 Viking GCMS analysis of water in the Martian regoliti.	Effect of the oceanic boundary layer on the mean drift of pack ice application of a simple model McPhee, MG, 1979,	Remote-reading tensiometer for use in subfreezing tempera- tures McKim, H L, et al. (1976, p 31-45) MP 897
Anderson, D.M., et al, (1978, p 55-61) MP 1195	p 388-400 ₁ MP 1198	Mars soil-water analyzer: instrument description and status
Analysis of water in the Martian regolith. Anderson, D.M., et al., [1979, p.33-38] MP 1409	Dynamic thermodynamic sea ice model Hibler, W.D., III, 1979, p. 815-846; MP 1247	Anderson, D.M., et al., (1977, p.149-158) MP 912 Sea ice thickness profiling and under-ice oil entrapment.
Mass balance	Mathematica: model to correlate frost heave of pavements	Kovacs, A., (1977, p 547-550) MP 940
Mass-balance aspects of Wedge, "Sea pack-ice. Ackley, S.F., (1979, p. 391-405) MP 1286	Berg, R L., et zl. (1980, 49p) CR 80-10 Shore ice pile-up and ride-up field observations, models,	Evaluation of electrical equipment for measuring permafrost distribution. Sellmann, P.V., et al. [1977, p 39-42]
Mass balance of a portion of the Ross Ice Shelf Jezek, K.C.,	theoretical analyses Kovacs, A, et al. (1980, p.269-	MP 925
ct al, (1984, p 381-384) MP 1919 Mass flow	298 ₁ MP 1295 Numerical modeling of sea ice in the seasonal sea ice zone.	Iceberg thickness profiling using an impulse radar. Kovaes, A. (1977, p 140-142) MP 1012
Friction loss through a uniform snow layer Yen. Y.C.	Hibler, W.D., III, [1980, p.299-356] MP 1296	Difficulties of measuring the water saturation and porosity of
(1990, p 83-90) MP 2703	Nonsteady ice drift in the Strait of Belle Isie. Sodhi, D.S., et al., [1980, p.177-186] MP 1364	snow Colbeck, S.C., (1978, p.189-201) MP 1124 Simplified method for monitoring soil moisture. Walsh, J.E.,
Mass everements (geology) Glacigenic resedimentation related to mass-movement pro-	Continuum sea ice model for a global climate model Ling.	et al. [1978, p 40-44] MP 1194
cesses. Lawson, D.E., [1989, p.147-169] MP 2472	CH, et al. (1980, p 187-196, MP 1622 Linearized Boussinesq groundwater flow equation. Daly,	Construction and performance of platinum probes for measurement of redox potential. Blake, B J, et al. (1978, 8p.)
Mass transfer Mass transfer along ice surfaces. Tobin, T M, et al. (1977,	C.J., ct al. (1981, p.875-884) MP 1470	SR 78-27
p.34-37 ₁ MP 1091	Frost heave model Hromadka, T.V., II, et al. (1982, p.1- 10) MP 1567	Photoelastic instrumentation—principles and techniques Roberts, A., et al. (1979, 153p) SR 79-13
Heat and mass transfer from freely falling drops at low temperatures. Zarling, J.P., (1980, 14p.) CR 80-18	Field tests of a frost-heave model. Guymon, G L., et al.	Determination of frost penetration by soil resistivity measure-
Estimation of heat and mass fluxes over Arctic leads An-	[1983, p.409-414] MP 1657 Equations for determining gas and brine volumes in sea ice	ments Atkins, R.T., (1979, 24p) SR 79-22 CRREL frost heave test, USA Chamberlain, E.J., et al.
dreas, E.L., (1980, p 2057-2063) MP 1410 Heat transfer in cold climates Lunardini, V.J., (1981,	Cox, G F.N., et al. (1983, p 306-316) MP 2055	(1981, p 55-62) MP 1499
731p ₁ MP 1435	Increased heat flow due to snow compaction: the simplistic approach Colbeck, S.C., [1983, p. 227-229]	Airborne-Snow Concentration Measuring Equipment La- combe, J., (1982, p 17-46) MP 1981
One-dimensional transport from a highly concentrated, trans- fer type source. O'Neill, K., (1982, p 27-36)	MP 1693	Collapsible restraint for measuring tapes Ueda, H.T.,
MP 1489	Numerical simulation of sea ice induced gouges on the shelves of the polar oceans Weeks, W.F., et al., [1985, p.259-	[1983, 12 col] MP 2335 Technique for measuring the mass concentration of falling
On the temperature distribution in an air-ventilated snow lay er Yen, Y-C., (1982, 10p.) CR 82-05	265 ₁ MP 1938 Bulk transfer coefficients for heat and momentum over leads	snow Lacombe, J. [1983, p.17-28] MP 1647 Progress in methods of measuring the free water content of
Calculation of advective mass transport in heterogeneous media. Daly, C.J., [1983, p.73-89] MP 1697	and polynyas. Andreas, E L., et al. (1986, p 1875-1883)	snow Fisk, DJ. (1983, p.48-51) MP 1649
media. Daly, C.J., (1983, p.73-89) MP 1697 Aerosol growth in a cold environment Yen, YC., (1984,	MP 2187 Comment on "Atmospheric boundary layer modification in	Boom for shipboard deployment of meteorological instru- ments Andreas, E.L., et al., [1983, 14p] SR 83-28
21p. ₁ CR 84-06	the marginal ice zone" by T.J. Bennett, Jr. and K. Hunkins	Surface roughness of Ross Sea pack ice Govoni, J W., et al.
Status of numerical models for heat and mass transfer in frost- susceptible soils. Berg. R. L., [1984, p 67-71]	Andreas, E.L., (1987, p. 3965-3969) MP 2394 Diagnostic ice-ocean model Hibler, W.D., III, et al., (1987,	(1983, p 123-124) MP 1764 Atmosphere subgroup discussions Andreas, E l., (1984,
MP 1851 Modeling the transport of chromium (VI) in soil columns	p.987-1015 ₁ MP 2238	p 97-98 ₁ MP 2603
Selim, H.M., et al. (1989, p.996-1004) MP 2670	Algorithm for extraction of ice-thickness data from short pulse radar signals. Rick, L., et al., §1990, p 137-145 ₁	Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] MP 1752
Materials Thermal emittance of diathermanous materials Munis.	MP 2698	
R.H., et al. (1984, p 209-220) MP 1863	Unfrozen water content and hydraulic conductivity of frozen soil. Black, P.B., (1990, 7p.) CR 90-05	Evaluation of a biaxial ice stress sensor Cox. GFN, i1984, p. 349-361; MP 1836
Emittance and interpretation of thermal images Munis, R.H., et al., [1985, p.72-78] MP 1962	Shortwave radiation and open water in models of sea ice	In-ice calibration tests for an elongated, uniaxial brass ice
Influence of thermal cycling on fiber composites Dutta,	decay. Perovich, D.K., et al. (1990, p.242-246) MP 2759	stress sensor. Johnson, J.B., (1985, p. 244-249) MP 1859
P.K. et al. (1988, p. 141-147) MP 2435 Performance of laminated composites in cold Dutta, P.K.	Measurement	Vertically stable benchmarks a synthesis of existing informa- tion Gatto, L.W., (1985, p.179-188) MP 2069
et al. (1988, p 269-281) MP 2433	Measuring unmetered steam use with a condensate pump- cycle counter. Johnson, P.R., [1977, p.434-442]	Rock stress measurements by wire stressmeter at high temper-
Behavior of materials at low temperatures Dutta, P.K., 1988, 68p.; SR 88-09	MP 957 Physical measurement of ice jams 1976-77 field season	atures Dutis, P.K., et al., [1987, p.43-58] MP 2447
Influence of well casing materials on chemical species in	Wuebben, J L., et al, (1978, 19p) SR 78-03	CRREL Hopkinson bar apparatus Dutta, P.K., et al., 1987, 29p SR 87-24
ground water Parker, L.V., et al. (1988, p.450-461) MP 2456	Physical measurements of river ice jams Calkins D.J., [1978, p.693-695] MP 1159	Uniaxial tension compression tests on ice preliminary results. Cole, D.M., et al., (1989, p. 37-41). MP 2482
Use of geotextiles to mitigate from Neave in soils. Henry, K.,	Le stress measurements around offshore structures. John-	sults Cole, D.M., et al., (1989, p. 37-41) MP 2482 Snow-suitsce competatur, analysis Bates, R.E., et al.
[1988] p 1096-1101 ₁ MP 2369 Response of ad unced composite space materials to thermal	son, JB. (1988, p.55-59) MP 2611 Measurement of the path-averaged turbulent surface heat	[1989, p 109-116] MP 2753 Site-specific meteorology Bates, R.E., et al., (1989, p 13-
cycling. Dutta, P.K., et al., 1988, p.506-517;	flux Andreas, E.L., (1988, p.219-220) MP 2526	151 MP 2641
MP 2478 Graphite-epoxy composites subjected to low temperatures	Measure ment of frost heave forces on H-peles and pipe piles. Johnson, J.B., et al., [1988, 49p]. CR 88-21	Snow concentration and precipitation rate measurements dur- ing SNOW IV Lucembe, J. (1989, p. 25-29)
Dutta, P.K., et al. (1989, 5-429-435) MP 2554	Perspective ground loads and mapping. Tobiasson, W.,	MP 2643
Mathematical models Frediction and validation of temperature in tundra sods	[1989, p.512-513] MP 2614 The manufactor of measuring pathoacerated turbus	Remote water-temperature measurement Daly, S., (1989, 6p.) MP 2722
Brown, J. et al. (19"1, p 193-19") MP 907	Two-wavelength method of measuring path-averaged turbu- lent surface heat fluxes. Andreas, E.L., (1989, p. 280-	Cold regions weather data systems. Bates, R.E. et al.
Heat and moisture flow in freezing and thawing soils a field study Berg, R L., [1975, p. 148-160] MP 1612	2923 MP 2648 SNOW IV field experiment data report Wright, E.A., ed.	1989, p 139-145; MP 2568 Sea see thickness measurement Kosacs A, et al. (1989).
Thermoinsulating media within embankments on perennially	(1989, 250p) SR 89-14	p 394-424) MP 2693
frozen soil. Berg, R. L., [1976, 1615] SR 76-03. Creep theory for a floating see sheet. Nevel, D. E., [1976,	Airborne particle measurements Berger, R.H., 1939, p.31; MP 2644	Development of an underwater framine detector. Daly, S.F., et al. (1990, p. 77-82). MP 2702
98p) SR 76-04	Radar backscattering from artificially grown sea ice. Bre-	Mechanical properties
Galerkin finite element analog of frost heave. Guymon, G.L., et al. (1976, p. 111-113). MP 898.	dow, J. et al, [1989, p.259-264] MP 2667 Vigorithm for extraction of ice-thickness data from short	Resurvey of the "Byrd" Station Antarctica, drill hole Gar- field, D.E., et al. 41976, p. 20-14; MP 846
Excavating rock, ice, and frozen ground by electromagnetic	pulse radar signals. Rick, I., et al., 1,990, p.137-145;	Amematics of axial rotation machines Melor, M. 1976,
radiation Hockstra, P. (1976, 17p.) CR 76-36	NP 2698	45p.; CR 76-16

		A
Movement study of the trans-Alaska pipeline at selected sites Utals, H.T., et al. (1981, 32p) CR 81-04	Comparative model tests in ice of a Canadian Coast Guard R- class icebreaker. Tatinclaux, J.C., et al, [1990, p.31-52]	Comparison of winter climatic data for three New Hampshire sites Govoni, J.W., et al. (1986, 78p.) SR 86-05
	MP 2762	Evaluating trafficability. McKim, H L., [1986, p 237-239]
Investigation into the post-stable behavior of a tube array in cross-flow. Lever, J H., et al, [1989, p.457-465]	Metal snow friction	MP 2002
MP 2561	Ice characteristics in Whitefish Bay and St. Marys River in	Snow hydrology in the upper Yamuna basın, India Malho-
Fate and transport of contaminants in frozen soils. Ayo-	winter. Vance, G.P., [1980, 27p] SR 80-32	tra, R.V., et al., [1988, p.84-93] MP 2633
rinde, O.A., et al. (1990, p.202-211) MP 2679	Kinetic friction of snow. Colbeck, S.C., [1988, p.78-86] MP 2339	Regional climatic trends in northern New England Haugen, R.K. et al. (1988, p.64-71) MP 2748
Mechanical tests	Thermal response of downhill skis Warren, GC, et al.	SNOW IV field experiment data report Wright, E.A. ed.
Report of the ITTC panel on testing in ice, 1978. Frenken- stein, G.E., et al. [1978, p.157-179] MP 1140	[1989, 40p] CR 89-23	(1989, 250p) SR 89-14
Mechanical properties of multi-year pressure ridge samples.	Metals	Site-specific meteorology Bates, R E, et al. (1989, p 13-
Richter-Menge, J A. (1985, p 244-251) MP 1936	Atmospheric trace metals and sulfate in the Greenland Ice	15 ₁ MP 2641
Evaluation of the Caterpillar Challenger tractor for use in	Sheet. Herron, M.M., et al, [1977, p.915-920] MP 949	Hourly meteorological data for SNOW IV Bates, R E. et al. (1989, p. 159-250). MP 2647
Antarctica. Blaisdell, G L., et al, [1989, 12p + figs] MP 2718	Blank corrections for ultratrace atomic absorption analysis	al, (1989, p 159-250) MP 2047 Cold regions weather data systems. Bates, R.E., et al.
Comparative model tests in ice of a Canadian Coast Guard R-	Cragin, J H , et al, [1979, 5p] CR 79-03	(1989, p 139-145) MP 2568
class icebreaker. Tatmclaux, J C., et al. (1989, p 1/1-	Techniques for measuring Hg in soils and sediments Cragin,	Meteorological factors
1/18 ₁ MP 2751	J H., et al, (1985, 16p) SR 85-16	Report on ice fall from clear sky in Georgia October 26, 1959.
Meetings	Retention and release of metals by soms—evaluation of sever-	Harrison, L.P., et al. (1960, 31p. plus photographs) MP 1017
Workshop on permafrost-related research and TAPS (1975, 370.) MP 1122	al models. Amacher, M.C., et al, [1986, p.131-154] MP 2186	Seasonal regime and hydrological significance of stream ic-
Third International Symposium on Ice Problems, 1975.	Theory of particle coarsening with a log-normal distribution	ings in central Alaska. Kane, D.L., et al. (1973, p.528-
Frank:nstein, G.E., ed. (1975, 627p) MP 845	Colbeck, S.C., (1987, p.1583-1588) MP 2250	540 ₃ MP 1026
Symposium: g-ography of polar countries, selected papers	METAMORPHISM (SNOW)	Mesoscale measurement of snow-cover properties Bilello, M.A., et al. (1973, n 624-643) MP 1029
and summaries Brown, J, ed. [1977, 61p] SR 77-06	Snow as a material. Bader, H, et al, [1962, 79p] M II-B	M.A., et al. (1973, p 624-643) Decay patterns of land-fast sea ice in Canada and Alaska.
Proceedings of the Second International Symposium on Cold	Metamorphism (snow)	Bilello, M.A., [1977, p.1-10] MP 1161
Regions Engineering Burdick, J. ed. (1977, 597p)	Thermodynamics of snow metamorphism due to variations in	Computer modeling of atmospheric ice accretion Ackley,
MP 952	curvature. Colbeck, S.C., [1980, p.291-301]	S.F., et al. (1979, 36p) CR 79-04
Symposium on Lad treatment of wastewater, CRREL, Aug	MP 1368	Ablation seasons of arctic and antarctic sea tec. Andreas, E.L., et al., r1982, p.440-447, MP 1517
1978. (1977, 2 vols) MP 1145 Report of the FTTC purel on testing in ice, 1978 Franken-	Overview of seasonal snow metamorphism Colbeck, S.C. [1982, p 45-61] MP 1500	E.L., et al., (1982, p 440-447) MP 1517 Ice jams and flooding on Ottauquechee River, VT. Bates, R.,
stein, G.E., et al. (1978, p 157-179) MP 1140	Workship on the Properties of Snow, 1981. Brown, R L., ed.	et al. (1982, 25p) SR 82-06
Workshop on Ecological Effects of Hydrocarbon Spills in	(1982, 135p.) SR \$2-18	Meteorology and observed snow crystal types during the
Alaska Atlas, R.M., et al. (1978, p 155-157)	Theory of metamorphism of dry snow Colbeck, S.C.	SNOW-ONE experiment Bilello M.A. (1982 p.59-
MP 1183	(1983, p 5475-5482) MP 1603	75 ₁ MP 1983 Snow-cover characterization SADARM support O'Brien,
Proceedings of the secon planetary water and polar pro- cesses colloquium, 1978. (1978, 209p) MP 1193	Comments on the metamorphism of snow Colbeck, S.C., [1983, p.149-151] MP 1650	Snow-cover characterization SADARM support O'Brien, H. et al. [1984, p.409-411] MP 2095
Modeling snow cover runoff meeting, Sep 1978 Colbeck,	Comments on "Theory of metamorphism of dry sn w" by	Numerical simulation of freeze-up on the Ottauquechee Ris-
S C., ed. (1979, 432p) SR 79-36	S.C. Colbeck. Sommerfeld, R.A. (1984, p.4963-4765)	or Calkins, D.J. (1984, p 247-277) MP 1815
International Workshop on the Seasonal Sea Ice Zone, Mon-	MP 1800	Constraints and approaches in high 'atitude natural resource
terey, California, Feb 26-Mar 1, 1979. Andersen, B.G.	New classification system for the seasonal snow cover Col- beck, S.C., (1984, p.179-181) MP 1921	sampling and research. Slaughter, C.W. et al. (1984, p.41-46) MP 2013
ed, r1980, 357p ₃ MP 1292 Problems of the seasonal sea are zone Weeks, W.F., 1980.	beck, S.C., [1984, p.179-181] MP 1921 Classification of seasonal snow cover crystals Colorck.	p.41-46 ₁ MP 2013 New method of measuring the snow-surface temperature
p.1-35 ₁ MP 1293	S C., (1986, p 59S-70S) MP 2164	Andreas, E.L., (1986, p 139-156) MP 2166
Workshop on Environmental Protection of Permafrost Ter-	Snow metamorphism and classification. Colbeck, S.C.	Meteorological instra nentation for characterizing atmo-
rain. Brown, J., et al. [1980, p 30-36] MP 1314	(1987, p.1-35) MP 2265	spheric icing. Bates, R.E. et al. (1967, p.23-30)
U.S -Soviet seminar on building under cold climates and on permafrost, (1980, 365p) SR 80-40	Metamorphism and classification of seasonal snow crystals.	MP 2276
Arctic research of the United States, Vol 2 (1988, 76p)	Colbeck, S.C., (1987, p. 3-34) MP 2438 Snow properties and processes Colbeck, S.C., (1987,	Meteorological instruments Meteorological measurements at Camp Ethan Allen Training
MP 2379	p.145-150 ₁ MP 2413	
Arctic research in the United States, Vol 3, (1989, 72p)	Meteorological charts	Center, Vermont. Batcs, R., (1982, p 77-112) MP 1984
Arctic research in the United States, Vol 3, (1989, 72p.) MP 2653	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed.	MP 1984 Using a Micro-CORA sounding system in the southern ocean.
MP 2653 Arctic research of the United States, Vol 3, (1979, 71p.)	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25-3p.) SR 89-14	Using a MicroCORA sounding system in the southern ocean. Andreas, Edward of the 1982, 17p.; CR 82-28
MP 2653 Arctic research of the United States, Vol 3, (1939, 71p) MP 2530	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25/p) SR 89-14 Synoptic meteorology during the SNOW IV Field Experi-	Using a Micro-CORA sounding system in the southern occur. Andreas, fell., et ., (1982, 17p) CR 82-28 US/USSR Wed? 'I Polynya expedition, Upper air data, 1981
MP 2653 Arctic research of the United States, Vol 3, (1979, 71p) MP 2530 Melting	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25/p) SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 kello, M.A., et *1. (1989, p.5-12) MP 2640	Using a Micro-CORA sounding system in the southern ocean. Andreas, fe.L., et., [1982, 17p] CR 82-28 US/USSR Wedr 1 Polynya expedition, Upper air data, 1981 Andreas, E.L., [1983, 288p] SR 83-13
MP 2653 Arctic research of the United States, Vol 3, (1939, 71p) MP 2530	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed., (1889, 2539; Synoptic meteorology during the SNOW IV Field Experiment 2 1410, M.A., et *1, [1989, p.5-12] MP 2640 METEOROLOGICAL DATA	Using a Micro-CORA sounding system in the southern occan. Andreas, E.L., et a. (1982, 17p) CR 82-28 US/USSR Wed? "I Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) Boom for shipboard deploymen" of meteorological instruments. Vodress, E.L., c. al., (1/33), 14p) SR 83-28
MP 2653 Arctic research of the United States, Vol. 3, {1939,71p} MP 2530 Melting Roof response to icing conditions Lane, J W. et al. {1939, 40p} Melting points	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25/p.) SR 89-14 Synopti, meteorology during the SNOW IV Field Experiment. 25/90, M.A., et *1, (1989, p.5-12) MP 2640 METEOROLOGICAL DATA Heat change at the ground surface Scott, R.F., (1964, 49p., plus append.) M. II-A1	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et ., [1982, 17p] CR 82-28 US/USSR Wed-'1 Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deploymen' of meteorological instru- ments. Vortrexs, E.L., (2, 1, 2), 33, 14p] SR 83-28 Atmosph.i. e dy simics in the antarctic marginal ice zone.
MP 2653 MP 2530 MP 2530 MP 2530 MP 2530 Melting Roof response to icing conditions Lane, J W , et al., (1979, 40p) Melting points Unificate water contents of submarine permafrost determined	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 vivio, M.A., et +1, [1989, p.5-12] MP 2640 METE_CRD_LOGICAL DATA Heat c'iange at the ground surface Scott, R.F., (1964, 49p., n'is append.) Climatology of Antarctic regions Wilson, C., (1968, 77p.)	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.L., et., (1982, 17p) CR 82-28 US/USSR Wedd-1 Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Vodreas, E.L., et.al, (1983, 14p) SR 83-28 Atmospleir, of yamics in the antaretic marginal (see Zone, Andreas, E.L., et.al, (1984, p649-661) MP 1667
MP 263 Arctic research of the United States, Vol. 3, [1999, 71p.] MP 2530 Melting Roof response to icing conditions Lane, J.W., et al., [1979, 40p.] CR 79-17 Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., [1980]	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 (2000, M.A., et al., [1989, p.5-12] MP 2640 METEORIPLOGICAL DATA Heat - Cange at the ground surface Scott, R.F., [1964, 49p., plis append.] M. II-Al Cliniatology of Antarctic regions Wilson, C., [1968, 77p.] M. 1-Alc	Using a Micro-CORA sounding system in the southern ocean. Andreas, E.L., et a., (1982, 17p) CR 82-28 US/USSR Wed? "I Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., c. al., (1933, 14p) SR 83-28 Atmospher of business in the antarctic marginal (see zone, Andreas E.L., et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from
MP 2653 Arctic research of the United States, Vol. 3, [1989, 71p.] MP 2530 Melting Roof response to icing conditions Lane, J.W., et al., [1979, 40p.] CR 79-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., [1980, p.400-412] MP 1412	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25/p.) SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (200, M.A., et al., (1989, p.5-12) MP 2640 METEOROLOGICAL DATA Heat a Cange at the ground surface Scott, R.F., (1964, 49p., plus append.) M. II-AI Cliniatology of Antarctic regions Wilson, C., (1968, 77p.) M.I-A3c Meteorological data	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.L., et., (1982, 17p) CR 82-28 US/USSR Wedd-1 Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteotological instruments. Vodrexs, E.L., et. al., (1983, 14p) SR 83-28 Atmospher of yasmics in the antaretic marginal ice zone, Andreas E.L., et. al., (1984, p. 649-661) MP 1667 Simple boom for use in measuring meteotological data from a ship. Andreas, E.L., et. al., (1984, p. 227-237) MP 1752
MP 263 Arctic research of the United States, Vol. 3, [1999, 71p.] MP 2530 Melting Roof response to icing conditions Lane, J.W., et al., [1979, 40p.] CR 79-17 Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., [1980]	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25/p.) SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (200, M.A., et al., (1989, p.5-12) MP 2640 METEORIOLOGICAL DATA Heat. Clange at the ground surface Scott, R.F., (1964, 49p. of its append.) M. H-AI Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.) M. 1-A3c Meteorological data Au smatte data collection equipment for oceanographic app., (1978, p. 1111-1121)	Using a Micro-CORA sounding system in the southern ocean. Andreas, E.L., et a., (1982, 17p) CR 82-28 US/USSR Wed? "I Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., c. al., (1933, 14p) SR 83-28 Atmospher of by similes in the antarctic marginal (see zone, Andreas E.L., et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p. 227-237) MP 1752 Computer interfacing of meteorological sensors in severe
MP 2653 Arctic research of the United States, Vol 3, [1989, 71p) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., [1979, 40p) CR 79-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., [1980, p 400-412] Temperature and interface morphology in a melting tec-water system Yen, YC., [1984, p.305-325] MP 1727 Meltwater	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed., (1889, 2539) SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 1/410, M.A., et al., (1989, p.5-12) MP 2640 METE.CROOGICAL DATA Heat cchange at the ground surface Scott, R. F., (1964, 49p., pits append.) M 11-A1 Climatology of Antarctic regions Wilson, C., (1968, 77p.) M 1-A3c Meteorological data Automatic data collection equipment for oceanographic appendix models. M 11-11211 MP 1028 MP 1028	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-'! Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., c. al., (1933, 14p) SR 83-28 Atmosple; e. dy semies in the antactic marginal ice rone, Andreas E.L., et. al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship—Andreas, E.L., et al., (1984, p.227-237) MP 1752 Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p.205-211)
MP 263 Melting Roof response to icing conditions Applications Applications Lane, J W., et al., (1979, 40p.) CR 79-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p. 400-412) Temperature and interface morphology in a melting tec-water system Yen, YC., (1984, p.305-325) Meltwater Snow accumulation for arctic freshwater supplies Slaughter.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteovology during the SNOW IV Field Experiment 2 (who, M.A., et +1, [1989, p.5-12] MP 2640 METE, CRO, LOGICAL DATA Heat change at the ground surface Scott, R.F., (1964, 49p., n) is append.; Climatology of Antarctic regions Wilson, C., [1968, 77p.] M.I-Al- Meteorological data Authority and the state of the sta	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.L., et., (1982, 17p) CR 82-28 US/USSR Wedd-"I Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Vodreas, E.L., et.al, (1933, 14p) SR 83-28 Atmospher of yasmics in the antaretic marginal ice zone, Andreas E.L., et.al, (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et.al, (1984, p.227-237) MP 1752 Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et.al, (1985, p.205-211) MP 2175
MP 2653 Arctic research of the United States, Vol 3, [1989, 71p) MP 2530 Melting Roof response to icing conditions 40p	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25/p.) SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 (2000, M.A., et al., (1989, p.5-12) MP 2640 METE.ORIOLOGICAL BATA HeatCange at the ground surface Scott, R.F., (1964, 49p., nlis append.) M. II-Al Cliniatology of Antarctic regions. Wilson, C., (1968, 77p., M. I-Al Meteorological data Au matic data collection equipment for oceanographic approximatic data. All, Jr., (1978, p. 1111-1121) Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.) CR 78-21	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-'! Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., c. al., (1933, 14p) SR 83-28 Atmosple; e. dy semies in the antactic marginal ice rone, Andreas E.L., et. al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship—Andreas, E.L., et al., (1984, p.227-237) MP 1752 Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p.205-211)
MP 2653 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unifrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p. 400-412) Temperature and interface morphology in a melting recewater system Yen, YC., (1984, p.305-325) MP 1412 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed., (1889, 2-3)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (20), M.A., et al., (1989, p.5-12). MP 2640 METEORO (LOGICAL DATA Heat (Local Data) Heat (Local D	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wedt-1 Folynya expedition, Upper air data, 1981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Vadiexs, E.L., ct. al., [1933, 14p] Atmosph.in et dy smiss in the antactic marginal ice zone. Andreas E.L., et al., [1934, p.649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p.227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p.205-211] MP 2175 Victoorological system performance in icing conditions. Bates R.F., (1987, p.73-36) MP 2285
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) CR 79-17 Melting polats Unifrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p. 400-412) Temperature and interface morphology in a melting ice-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) MP 869 Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) MP 1067 Sintering and compaction of strow containing liquid-aster.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3):p.; Sn 89-14 Synoptic, meteorology during the SNOW IV Field Experiment. 2 1/40. M.A., et =1. (1989, p.5-12). MP 2640 METE.CRD'OGICAL DATA Heat cchange at the ground surface. Scott, R. F., (1964, 49p., pits append.). M 11-AI Climatology of Antarctic regions. Wilson, C., (1968, 77p.). M 1-A3c Meteorological data Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). CR 78-21 Soul characteristics and climatology during wastewater ap-	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wedt-I Folynya expedition, Upper air data, 1981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., (c. al., [1933, 14p] SR 83-28 Atmosph.in et dy similes in the antaretic marginal ice zone. Andreas E.L., et al., [1984, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p. 205-211] MP 2175 Victoorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2285 Humbidy a., I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., [1987, p. 35-
MP 2653 Melting Roof response to icing conditions Roof response to icing conditions Lane, J.W., et al., (1979, 40p.) Melting points Unifrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., (1980, p. 400-412) Temperature and interface morphology in a melting see-water system Yen, YC., (1984, p.305-325) MP 14727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., (1917, p. 571-588) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) MP 190	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25.9r.) SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 (who, M.A., et al., [1989, p.5-12]. MP 2640 METEOROLOGICAL DATA Heat colange at the ground surface Scott, R. F., (1964, 49r., p. al.s append.) Climiatology of Antarctic regions. Wilson, C., (1968, 77p.) M 1-A3c Meteorological data Au write data collection equipment for occanographic appearation. Dean, A. M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). Switch characteristics and climatology during wastewater application at CRREL. Iskandar, I. N., et al., (1979, 22p.).	Using a Micro-CORA sounding system in the southern ocean, Andreas, fi.l., et a. [1982, 17p.) CR 82-28 US/USSR Wedt-1 Polynya expedition, Upper air data, 1981. Andreas, E.L., [1983, 288p.] SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., c. al. [1933, 14p.] SR 83-28 Atmosph.is ed y simics in the antarctic marginal ice rone, Andreas E.L., et al. [1984, p.649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al. [1984, p.227-237] MP 1752 Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al. [1985, p.205-211] MP 2175 Meteorological system performance in icing conditions Bates R F., (1987, p.73-56) MP 2285 Humiddly a. 1 temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al. [1987, p.35. MP 2283
MP 2633 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p 400-412) Temperature and interface morphology in a melting ice-water system Yen, YC., (1984, p.305-325) Meltwater Sonw accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p.571-588) MP 1067 Sintering and compaction of srow containing liquid water Colbeck, S.C., et al., (1979, p.13-32) Water flow through heterogeneous snow Colbeck, S.C.	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 (vilo, M.A., et al., [1989, p.5-12] MP 2640 METLGRIDLOGICAL DATA Heat - c'tange at the ground surface Scott, R. F., (1964, 49p., n'is append.) Clinatology of Antarctic regions Wilson, C., (1968, 77p.) M. 1-A3c Meteorological data An imatic data collection equipment for occanographic app., iton Dean, A. M., Jr., (1978, p. 1111-1121) Midwinter temperature regime and snow occurrence in Germany Bilello, M. A., et al., (1978, 56p.) CR 78-21 cand treatment climatic survey at CRREL. Bilelo, M. A. et al., (1978, 17p.) SR 78-21 Soil characteristics and climatology during wastewater application at CRREL. Iskandar, I. K., et al., (1979, 82p.) SR 79-23	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wed ²⁻¹ Folynya expedition, Upper air data, [981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deploymen ² of meteorological instruments. Vorlexx, E.L., (1983, 288p) SR 83-83 Atmosph.: e dy simils in the antiactic marginal ice zone. Andreas E.L., et al., [1984, p 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K. et al., [1985, p 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R F. (1987, p. 73-56) MP 2283 MP 2283 Summanned aerial vehicle. Ballard H. et al., [1987, p. 35-15] Mr 2293 NC-10 feld experiment data report. Wright, E.A. ed.
MP 2653 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) CR 79-17 Melting points Unifrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p. 400-412) MP 1412 Temperature and interface morphology in a melting ice-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) MP 869 Short-term forecasting of water run-off from snow and ice Colbeck, S C., (1977, p. 571-588) MP 1067 Sintering and compaction of strow containing liquid water Colbeck, S C., et al., (1979, p. 13-32) MP 1190 Water flow through heterogeneous snow Colbeck, S C., (1979, p. 37-45) MP 1219	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25.9r.) SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 (who, M.A., et al., [1989, p.5-12]. MP 2640 METEOROLOGICAL DATA Heat colange at the ground surface Scott, R. F., (1964, 49r., p. al.s append.) Climiatology of Antarctic regions. Wilson, C., (1968, 77p.) M 1-A3c Meteorological data Au write data collection equipment for occanographic appearation. Dean, A. M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). Switch characteristics and climatology during wastewater application at CRREL. Iskandar, I. N., et al., (1979, 22p.).	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wed-'H Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deploymen' of meteorological instruments. Voltrexy, E.L., et. al. [35-33, 14p] SR 83-28 Atmosph.is et dy simics in the antaretic marginal ice zone. Andreas E.L., et al. [1984, p 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al. [1984, p 227-237] MP 1752 Gonputer interfacing of meteorological sensors in severe weather. Rancourt, K., et al. [1985, p 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2185 [luminity a. 1 temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al. [1987, p. 33-56] MP 2293 NC- 13 feld experiment data report. Wright, E.A., ed. [1964, 28-p] MP 2293 MR 89-14 Meteorological meteorology. Bates, R.E., et al. [1989, p. 13-40-60] MR 21939, p. 13-40-60.
MP 2633 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p 400-412) Temperature and interface morphology in a melting ice-water system Yen, YC., (1984, p.305-325) Meltwater Sonw accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p.571-588) MP 1067 Sintering and compaction of srow containing liquid water Colbeck, S.C., et al., (1979, p.13-32) Water flow through heterogeneous snow Colbeck, S.C.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; Sn 89-14 Synoptic meteorology during the SNOW IV Field Experiment. 2 1/40, M.A., et al. (1889, p.5-12). MP 2640 METEOROLOGICAL DATA. Heat colonge at the ground surface. Scott, R. F., (1964, 49p. pl. a append.). M 11-A1 Climatology of Antaretic regions. Wilson, C., (1968, 77p.). M 1-A3c Meteorological data. Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p.1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Balello, M.A., et al., (1978, 56p.). CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 21p.). Ser 78-23. Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 71p.). Forceasting ice formation and breakup on Lake Champlain.	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et a., [1982, 17p] CR 82-28 US/USSR Wedt-H Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., ct. al., [19.3], [14p] SR 83-83 Atmosph.in et dy similes in the antarctic marginal ice zone. Andreas E.L., et al., [1984, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p. 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2285 Hummold) a. 1 temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., [1987 p. 35-15] NC'- 0 field experiment data report. Wright, E.A., ed., (1984, 28-p.) MP 2641
MP 2653 Melting Roof response to icing conditions Roof response to icing conditions Roof response to icing conditions Lane, J.W., et al., (1979, 40p) MP 2530 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., (1980, p. 400-412) MP 1412 Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) Sintering and compaction of stow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 13-32) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p) Free convection heat transfer characteristics in a meit water	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (-0)n, M.A., et al., [1989, p.5-12]. MP 2640 METEORO (LOGICAL DATA Heat a change at the ground surface Scott, R. F., [1964, 49p. pl.s append.] M 14-Al Chinatology of Antarctic regions. Wilson, C., [1968, 77p.]. M 1-A3c Meteorological data Au matic data collection equipment for occanographic appin 100 Dean, A.M., Jr., [1978, p.1111-1121]. MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., [1978, 56p.]. CR 78-21 cand treatment climatic survey at CRREL. Bilello, M.A., et al., [1978, 37p.]. SR 78-23 Sul characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., [1979, 82p.]. Prototype wastewater land treatment system. Jenkins, T.F., et al., [1979, 71p.]. SR 79-35 Forecasting ice (streation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.]. CR 79-26	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-'I Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., ct. al., (1931, 14p) SR 83-28 Atmosph.: et dy similer in the antarctic marginal (see zone, Andreas E.L., et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p.227-237) Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p.205-211) MP 2175 Meteorological system performance in icing conditions. Bates R. F., (1987, p.73-86) Humistly a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p.35-15) SC-, th field experiment data report. Wright, E.A., et al., (1947, p.73-15) Site-specific meteorology. Bates, R. E., et al., (1989, p.13-15) Optical measurement of precipitation. Koh, G., (1989, p.13-16)
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p. 400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p.571-588) Sintering and compaction of srow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1978, p. 1978-9) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 13-32) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) CR 80-11 Free convection heat transfer characteristics in a ment water increase.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteovology during the SNOW IV Field Experiment 2 (who, M.A., et +l., [1989, p.5-12]. MP 2640 METEOROLOGICAL DATA Heat change at the ground surface. Scott, R.F., (1964, 49p., nlis append.) Climatology of Antarctic regions. Wilson, C., [1968, 77p.]. M. II-Al. Climatology of Antarctic regions. Wilson, C., [1968, 77p.]. M. II-Al. Meteorological data. Authorized data collection equipment for occanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., [1978, 56p.]. CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A. et al., [1978, 37p.]. SR 78-21 Self characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., [1979, 32p.]. SR 79-23 Prototype wastewater land treatment system. J. E., et al., [1979, 71p.]. SR 79-35 Forceasting ice formation and breakup on Lake Champlain. Bates, R.E., et al., [1979, 21p.]. CR 79-26 Winter thermal size, ture, ice conditions and climatoof Lake.	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedd-'I Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., cal., (1933, 14p) SR 83-28 Atmosph.: e dy semies in the antactic marginal ice rock, Andreas E.L., et al., (1984, p 649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship—Andreas, E.L., et al., (1984, p 227-237) MP 1752 Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p 205-211) MP 2175 Meteorological system performance in icing conditions Bates' R F., (1987, p 73-56) Bates' R F., (1987, p 73-56) MP 2285 Humoidy a. I temperature measurements obtained from an unmanned aerial vehicle—Ballard H., et al., (1987, p 35-55) SC - 43 Feld experiment data report—Wright, E.A., ed., (1947, 28-p) MP 2493 MP 2493 MP 2493 MP 2491 Met-specific meteorology—Bates, R E., et al., (1989, p 13-15) Optical measurement of precipitation—Kr. B., 93-30
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) CR 79-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p.400-412) MP 1412 Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies Slaughter, C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1979, p. 137-588) MP 1067 Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 137-32) MP 1190 Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 37-45) MP 1219 Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, p.550-556) MP 1311 Atmospheric pollutants in snow cover runoff Colbeck, S.C., (1980, p.550-556) MP 1311 Atmospheric pollutants in snow cover runoff Colbeck, S.C.,	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; Snow; Wright experiment data report. Wright, E.A., ed. (1889, 2-3)p.; Snoptiv, meteorology during the SNOW IV Field Experiment 2 1/410, M.A., et al. (1889, p.5-12). MP 2640 METEOROLOGICAL DATA Heat colonge at the ground surface Scott, R. F., (1964, 49p., pl. is append.) M. II-AI Climatology of Antarctic regions. Wilson, C., (1968, 77p.). M. I-A3c Meteorological data Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR. 78-21 cand treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR. 78-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). CR. 78-26 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). CR. 79-26 Winter thermal sire, time, ice conditions and climate of Lake Champlain. Bates, R.E., et al., (1980, 28p.). CR. 88-02.	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-'I Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipbyard deployment of meteorological instruments. Varieties, E.L., (1983, 288p) Atmosph.: et dy similes in the antactic marginal ice zone. Andreas E.L., et al., (1984, p. 649-661) MP 1667 Simple borm for use in measuring meteorological data from a ship Andreas, E.L., et al., (1984, p. 227-237) Computer interfacing of meteorological sensors in secret weather. Rancourt, K., et al., (1985, p. 205-211) MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-36) Himbidy a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p. 33-15) SCC-10 field experiment data report. Wright, E.A., et al., (1964, 28-p) MF 2263 SCC-10 field experiment data report. Wright, E.A., et al., (1987, p. 13-15) Optical measurement of precipitation. Koh, G., (1989, 13) MF 2641 Optical measurement of precipitation.
MP 2653 Melting Roof response to icing conditions Roof response to icing conditions Roof response to icing conditions Lane, J.W., et al., (1979, 40p.) MP 2530 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., (1980, p. 400-412) MP 1402 Temperature and interface morphology in a melting see-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1972, p. 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p. 550-556) MP 1311 Atmospheric pollutants in snow cover runoff Colbeck, S.C., MP 1487	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteovology during the SNOW IV Field Experiment 2 (who, M.A., et +l., [1989, p.5-12]. MP 2640 METEOROLOGICAL DATA Heat change at the ground surface. Scott, R.F., (1964, 49p., nlis append.) Climatology of Antarctic regions. Wilson, C., [1968, 77p.]. M. II-Al. Climatology of Antarctic regions. Wilson, C., [1968, 77p.]. M. II-Al. Meteorological data. Authorized data collection equipment for occanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., [1978, 56p.]. CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A. et al., [1978, 37p.]. SR 78-21 Self characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., [1979, 32p.]. SR 79-23 Prototype wastewater land treatment system. J. E., et al., [1979, 71p.]. SR 79-35 Forceasting ice formation and breakup on Lake Champlain. Bates, R.E., et al., [1979, 21p.]. CR 79-26 Winter thermal size, ture, ice conditions and climatoof Lake.	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et a., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., ct. al., [19.3], 14p] SR 83-83 Atmosph.iz of yasmiss in the antiactic marginal ice zone. Andreas E.L., et al., [1934, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K. et al., [1985, p. 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 228-3 Hummoldy a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H. et al., [1987 p. 35-15] St. of feld experiment data report. Wright, E.A. ed., (1937, 28-p) Meteorology Bates, R.E., et al., [1989, p. 13-15] Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., [1930, p. 1-15] MP 1293
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) CR 79-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p.400-412) MP 1412 Temperature and interface morphology in a melting recewater system Yen, YC., (1984, p.305-325) MP 1472 Meltwater Snow accumulation for arctic freshwater supplies Slaughter, C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p.571-588) MP 1667 Sintering and compaction of snow containing liquid water Colbeck, S.C., (1977, p. 715-788) MP 167 Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) MP 199 Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 37-45) MP 1219 Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, p.550-556) MP 131 Atmospheric pollutants in snow cover runoff Colbeck, S.C., (1981, p.133-1388) Permeability of a melting snow cover Colbeck, S.C., et al. (1982, p. 904-908) MP 1565	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (20), M.A., et al., [1989, p.5-12]. MP 2640 METEORD'LOGICAL DATA Heat a change at the ground surface. Scott, R. F., [1964, 49p. niss append.] M 14-Al Chinatology of Antarctic regions. Wilson, C., [1968, 77p.]. M 1-A3c Meteorological data Automatic data collection equipment for occanographic application. Dean, A.M., Jr., [1978, p.1111-1121]. MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., [1978, 56p.]. CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., [1978, 37p.]. SR 78-23 Sed characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., [1979, 32p.]. SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., [1979, 71p.]. SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., [1979, 21p.]. SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., [1979, 21p.]. CR 79-26 Winter thermal stre. ture, ice conditions and climate of Lake. Champlain. Bates, R.E., [1980, 26p.]. CR 80-02 Winter vurveys of the upper Stantia River, Alaska. Bilello, M.A., [1980, 10p.].	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., et.al., (1931, 14p) SR 83-23 Atmosph.: et dy similes in the antarctic marginal ice zone. Andreas E.L., et al., (1984, p. 649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p. 227-237) Computer interfacing of meteorological sensors in severe weather. Raneouitt, K., et.al., (1985, p. 205-211) MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-36) MP 2283 Humbidy, a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et.al., (1987, p. 35-15) NCC-10 field experiment data report. Wright, E.A., et.al., (1964, 28up) Mr 2293 NCC-10 field experiment data report. Wright, E.A., et.al., (1987, p. 13-15) Optical measurement of precipitation. Koh, G., (1999, p. 135) MP 2641 Optical measurement of precipitation. Koh, G., (1999, p. 135) Cold, Retions Science and Technology. Bibliography. Cum.
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p 400-412) Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1472 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., et al., (1977, p 571-588) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p 13-32) Water flow through heterogeneous snow (1979, p 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., [1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p 550-556) Atmospheric pollutants in snow cover runoff Colbeck, S.C., MP 131 Atmospheric pollutants in snow cover runoff Colbeck, S.C., (1981, p.1331-3188) Permeability of a melting snow cover Colbeck, S.C., et al., (1979, p 94-908) Thermal instability and heat transfer characteristics in water	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteovology during the SNOW IV Field Experiment 2 (1900, M.A., et al., [1989, p.5-12]. MP 2640 METEORD-LOGICAL DATA Heat change at the ground surface. Scott, R.F., (1964, 49p. nl.s append.) Climatology of Antarctic regions. Wilson, C., [1968, 77p.]. M. II-Al. Meteorological data Automatic data collection equipment for occanographic app., "ion. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., [1978, 56p.]. CR 78-21 Sund treatment climatic survey at CRREL. Bilello, M.A. et al., [1978, 37p.]. SR 78-21 Switch characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., [1979, 21p.]. SR 79-23 Prototype wastewater land treatment system. John 1979, 21p.; Forceasting ice formation and breakup on Lake Champlain. Bates, R.E., et al., [1979, 25p.]. CR 30-02 Winter thermal size ture, ice conditions and climate of Lake Champlain. Bates, R.E., (1980, 26p.). CR 30-02 Winter turseys of the upper Santina River, Alaska. Bilello, M.A., [1980, 10p.]. SR 86-19 Ice jams and intercorological data for three winters, Ottauquecher River, VI. Bates, R.E., et al., [1981, 27p.].	Using a Micro-CORA sounding system in the southern ocean. Andreas, fe.l et a. (1982, 17p) CR 82-28 US/USSR Wedt-"I Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Vadiexs, E.L., ct.al., (1931, 14p) SR 83-28 Atmosph.; et dy similes in the antarctic marginal (ex conc. Andreas E.L. et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p.227-237) Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p.205-211) Meteorological system performance in icing conditions. Bates R.F., (1987, p.73-86) Humsity a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p.35-15) NCS- OF eld experiment data report. Wright, E.A., ed., (1967, 25-p) Site-specific meteorology. Bates, R.E., et al., (1989, p.13-15) Optical measurement of precipitation. Koh, G., (1989, p.13-15) Problems of the seasonal sea ice zone. Weeks, W.F., (1950, p.1-15) Cold Regions Science and Technology. Bibliography. Cum.
MP 2653 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) MP 2679-17 Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface morphology in a melting ice-water system Yen, YC., (1984, p.305-325) Meltwater Sonw accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p.571-588) MP 1067 Sintering and compaction of seaw containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 13-32) Roof leaks in cold regions school at Chevae, Alasia Tobiasson, W., et al., (1980, 12p) Free convection heat transfer characteristics in a ment water layer. Yen, YC., (1980, 150-556) (1981, p.1383-1383) Permeability of a melting snow cover runoff Colbeck, S.C., et al., (1982, 1979, p. 13-13) Thermal instability and heat transfer characteristics in water-lice systems. Yen, YC., (1987, 135) CR 87-12	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2539) SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 1/410, M.A., et al. (1989, p.5-12) MP 2640 METEOROLOGICAL DATA Heat a change at the ground surface Scott, R. F., (1964, 49p., plus append.) M 11-A1 Climatology of Antarettic regions—Wilson, C., (1968, 77p.) M 1-A3c Meteorological data Automatic data collection equipment for oceanographic application—Dean, A.M., fr., (1978, p. 1111-1121) MP 1028 Midwinter temperature regime and snow occurrence in Germany—Bilello, M.A., et al., (1978, 56p.)—CR 78-21 cand treatment climatic survey at CRREL.—Bilello, M.A., et al., (1978, 37p.) Seil characteristics and climatology during wastewater application at CRREL.—Iskandar, I.K., et al., (1979, 32p.) Prototype wastewater land treatment system—Jenkins, T.F., et al., (1979, 71p.) Forecasting ice formation and breakup on Lake Champlain—Bates, R.E., et al., (1979, 21p.) Winter thermal stre-time, ice conditions and climate of Lake Champlain—Bates, R.E., (1980, 26p.) Winter viries of the upper Stratina River, Alaska—Bilello, M.A., (1980, 30p.) CR 81-01 CR 81-01 CR 81-01 CR 81-01	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et a., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper ar data, [981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., ct. a., [19.3], 14p] SR 83-28 Atmosph.: et dy similes in the antiactic marginal ice zone. Andreas E.L., et al., [1934, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K. et al., [1985, p. 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2285 Hummoldy a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H. et al., [1987 p. 35-15] St. of feld experiment data report. Wright, E.A. ed., (1984, 28-p) Mr 2641 Optical measurement of precipitation. Kob., G., [1939, 135] Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., [1950, p. 1-35] Cold Regions Science and Technology Bibliography. Cummings, N.H., [1981, p. 73-75] Microbiology
MP 2653 Melting Roof response to icing conditions Lane, J.W., et al., (1979, 409) MP 2530 Melting Roof response to icing conditions Lane, J.W., et al., (1979, 409) MP 2679-17 Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., (1980, p. 400-412) MP 1412 Temperature and interface morphology in a melting recewater system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies Slaughter, C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1977, p. 371-59) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 129) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1981, p. 1383-1388) Atmospheric pollutionts in snow cover runoff Colbeck, S.C., (1981, p. 1383-1388) Permeability of a melting snow cover. Colbeck, S.C., (1981, p. 1383-1388) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 33p) CR 87-12 Sta friction and thermal response. Watren, G. C., et al.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 1/200, M.A., et al. (1989, p.5-12). MP 2640 METEORO/LOGICAL DATA Heat columpe at the ground surface. Scott, R.F., (1964, 49), plist append.) M 1-A3C Meteorological data Au imatic data collection equipment for occanographic appillation. Miles and in the surface of the surface are fine matter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, p.1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21. Surface and treatment chimatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR 78-23. Surface teristics and chimatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 82p.). SR 79-23. Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). CR 79-26. Winter thermal structure, ice conditions and chimate of Lake Champlain. Bates, R.E., et al., (1979, 25p.). CR 30-02. Winter thermal structure, ice conditions and chimate of Lake Champlain. Bates, R.E., (1980, 25p.). CR 30-02. Winter vurseys of the upper Szartia River, Alaska. Bilello, M.A., (1980, 10p.). Ice jams and interevological data for three winters, Ottasquecher River, Vt. Bates, R.E., et al., (1981, 27p.). CR 30-02. Point Batrow, Alaska, t. SA. Brown, J., (1981, p. 75-776).	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipbyard deployment of meteorological instruments. Violicias, E.L., (1983, 288p) Atmosph.; et dy similar in the antactic marginal ice zone. Andreas E.L., et al., (1984, p. 649-661) MP 1667 Simple borm for use in measuring meteorological data from a ship Andreas, E.L., et al., (1984, p. 227-237) Computer interfacing of meteorological sensors in secret weather. Rancourt, K., et al., (1985, p. 205-211) MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-36) MP 2283 Himbidy, a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p. 33-15) NC-10 field experiment data report. Wright, E.A., et al., (1987, p. 13-15) Optical measurement of precipitation. Koh, G., (1989, p. 135) MP 2641 Optical measurement of precipitation. Koh, G., (1989, p. 13-15) Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p. 13-15) Cold, Regions Science and Technology. Bibliography. Cummings, N.H., (1981, p. 73-75) Microbiology Fact of stude and refined oils in North Nope wils.
MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p. 400-412) Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1412 Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and icc Colbeck, S C., et al., (1979, p. 13-23) Sintering and compaction of srow containing liquid water Colbeck, S C., et al., (1979, p. 13-24) Water flow through heterogeneous snow Colbeck, S C., (1979, p. 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., [1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p. 550-556) Afmospheric pollutants in snow cover runoff Colbeck, S C., et al., (1979, p. 37-31) Amospheric pollutants in snow cover runoff Colbeck, S C., (1981, p. 1381-3188) Permeability of a melting snow cover Colbeck, S C., et al., (1982, p. 904-908) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 33p.) GC 87-22 Ski friction and thermal response Warren, GC, et al., (1989, p.223-225)	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (20), M.A., et al. (1989, p.5-12). MP 2640 METEOROLOGICAL DATA Heat a change at the ground surface Scott, R. F., (1964, 49p., pits append.) M 11-AI Chinatology of Antarctic regions. Wilson, C., (1968, 77p.) M 1-A3c Meteorological data Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR 78-23 Seil characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 32p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 71p.). Forecasting ice formation and breakup on Lake Champlain Bates, R. E., et al., (1979, 21p.). CR 79-26 Winter thermal streetine, enconditions and climate of Lake Champlain. Bates, R. E., (1980, 26p.). CR 80-02 Winter unreps of the upper Stratna River, Alaska. Bilello, M.A., (1980, 30p.). CR 80-02 Winter surveys of the upper Stratna River, Alaska. Bilello, M.A., (1980, 30p.). CR 81-01 Point Hatrow, Alaska, I.S.A. Brown, J., (1981, 27p.). CR 81-01 Point Hatrow, Alaska, I.S.A. Brown, J., (1981, 27p.). MP 1434 Synoptic meteorology during the NOW-ONE field experi-	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper ar data, 1981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Vadiexs, E.L., (c. al., [1933, 14p] SR 83-13 Atmosph.iz of hysinism in the antactic marginal ice zone. Andreas E.L., et al., [1984, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p. 205-211] MP 2175 Victoorological system performance in icing conditions. Bates R.F., (1987, p. 73-766) MP 2275 Humbidy a., I temperature measurements obtained from an unmanned aerial vehicle. Ballard II., et al., [1987, p. 35-15] SC-10 field experiment data report. Wright, E.A., ed., (1947, 25-p.) SR 89-14 Mit-specific meteorology. Bates, R.E., et al., [1989, p. 13-15] Optical measurement of precipitation. Koh, G., [1939, 135] MP 2641 Optical measurement of precipitation. Koh, G., [1939, p. 13-15] Cold Regions Science and Technology Bibliography. Cummings, N.H., [1981, p. 71-75] Microbiology Fate of crude and refined oils in North Slope tools. Apr 1372 MP 1372 Microbiology Fate of crude and refined oils in North Slope tools. Apr 1378 Baterial aeronodo resisting from wastewater urrigation in
MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1412 Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forceasting of water run-off from snow and icc Colbeck, S.C., (1977, p.571-588) Sintering and compaction of stow containing liquid water Colbeck, S.C., (1977, p. 77-588) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., [1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p.550-556) MP 1311 Atmospheric pollutants in snow cover runoff Culbeck, S.C., et al., (1979, p.313-31) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 33p.) CR 87-22 Ski friction and thermal response Warren, G., et al., (1982, p.232-225)	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment. 2 volo, M.A., et al. (1989, p.5-12). MP 2640 METEORO'LOGICAL DATA. Heat colange at the ground surface. Scott, R. F., (1964, 49), plus append.). MI-AIC Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). MI-AIC Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). MI-AIC Meteorological data. Au smatte data collection equipment for oceanographic application. Dean, A. M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21. Land treatment chartes survey at CRREL. Bilello, M.A., et al., (1978, 37p.). Sign reaction at CRREL. Iskandar, I. K., et al., (1979, 82p.). Sign reaction at CRREL. Iskandar, I. K., et al., (1979, 82p.). Sign received and treatment system. Jenkins, T., et al., (1979, 21p.). CR 79-26 Winter thermal stre. ture, ice conditions and climate of Lake Champlain Bates, R. E., et al., (1979, 21p.). CR 79-26 Winter thermal stre. ture, ice conditions and climate of Lake Champlain Bates, R. E., et al., (1979, 21p.). CR 79-26 Winter vurseys of the upper Santina River, Alaska. Bilello, M.A., (1980, 30p.). Ice jams and intetorological data for three winters, Ottaque-chee River, Vt. Bates, R. E., et al., (1981, 27p.). Point Batrow, Alaska, I. SA. Brown, J., (1981, p. 75, 776). MP 1434 Synoptic meteorology during the NOW-ONE field experiment. Bilello, M.A., (1981, 55p.). SR 81-27	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, 1981 Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Vorticas, E.L., ct. al., (1931, 14p) SR 83-28 Atmosph. to dy similar in the antactic marginal ice zone, Andreas E.L., et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p.227-237) Computer interfacing of meteorological sensiors in severe weather. Rancourt, K., et al., (1985, p.205-211) MP 2175 Meteorological system performance in icing conditions. Bates R. F., (1987, p.73-86) MP 2285 Humistly a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p.35-15) NC - At Feld experiment data report. Wright, E.A., (1947, 25up) SR 89-14 Micropological measurement of precipitation. Koh., G., (1989, p.13-15) Optical measurement of precipitation. Koh., G., (1989, p.13-15) Cold Regions Science and Technology. Bibliography. Cummings, N.H., (1981, p.23-25) Microbiology. Pate of citude and refined oils in North Slope units. A., et al., (1973, p. 130-147). Baterial aerosols resulting from mastewater irrigation. Onto Bausum, H.T., et al., (1979, 68p.). NR 79-32.
MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1412 Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and 60 Colbeck, S.C., (1977, p.571-588) Sintering and compaction of srow containing liquid water Colbeck, S.C., et al., (1979, p. 13-23) Water flow through heterogeneous snow (1979, p. 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p.550-556) APP 1311 Atmospheric pollutants in snow cover runoff Colbeck, S.C., et al., (1979, p.13-13) Atmospheric pollutants in snow cover runoff Colbeck, S.C., (1981, p.138-13185) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1982, 33p.) CR 87-22 Shi friction and thermal response Warren, G., et al., (1989, p.223-225) Does snow have ton chromatographic properties A.D., et al., (1989, p.165-171) Metal fee friction	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment 2 (100, M.A., et al., [1989, p.5-12]. MP 2640 METEORD/LOGICAL DATA Heat a change at the ground surface. Scott, R. F., (1964, 49p. niss append.) Climatology of Antarctic regions. Wilson, C., (1968, 77p.). M. II-AI Climatology of Antarctic regions. Wilson, C., (1968, 77p.). M. II-AI Meteorological data. An implication of Dean, A. M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bidello, M. A., et al., (1978, 56p.). CR 78-21 cand itreatment climatic survey at CRREL. Bidello, M. A., 21 cand itreatment climatic survey at CRREL. Bidello, M. A., 21 and itreatment climate survey at CRREL. Bidello, M. A., 22 Prototy pe wastewater land treatment system. John SR 79-23 Prototy pe wastewater land treatment system. John J. F., et al., (1979, 21p.). SR 79-35 Forceasting ice formation and breakup on Lake Champlain. Bates, R. E., et al., (1979, 21p.). CR 79-25 Winter thermal site ture, ice conditions and climate of Lake Champlain. Bates, R. E., (1980, 26p.). CR 79-26 Winter turveys of the upper Stantina River, Alaska. Bidello, M. A., (1980, 30p.). SR 80-19 Ice jams and intercorological data for three winters. Oltacquecher River, VI. Bates, R. E., et al., [1981, 27p.]. Point Batrow, Alaska, I. SA. Brown, J., [1981, p. 75-276]. MP 1434 Synoptic preteorology during theNOW-ONE field experiment. Bidello, M. A., [1981, 55p.). SR 81-27 SNOW-ONE-A. Data report. Atten, G. W., ed., [1982, 27p.).	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et ., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., cal., [19.3], 14p] SR 83-13 Atmosph.iz et dy simics in the antarctic marginal ice zone. Andreas E.L., et al., [1984, p. 649-661] MP 1657 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1984, p. 227-237] Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2185 Illimitably a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., [1987, p. 33-51] NC-10 field experiment data report. Wright, E.A., ed., (1967, 25-47) Mrespecific meteorology. Bates, R.E., et al., [1989, p. 33-13] Optical measurement of precipitation. Koh., G., [1930, p. 1-35] Optical measurement of precipitation. Koh., G., [1930, p. 1-35] Cold Regions Science and Technology. Bibliography. Cum. mings., M. J. [1981, p. 71.75] Microbiology. Fast of crude and refined oils in North Nope soils. A., et al., [1981, p. 71.75] Bacterial aerosols resulting from waitewater irrigation in Onto. Baissum, H.T., et al., [1979, 64p.]. SR 89-30 Choanoflagefilates from the Weddell Sca.
MP 2633 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) MP 2679-17 Melting polats Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p.400-412) MP 1412 Temperature and interface morphology in a melting ice-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Sonw accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) MP 1067 Sintering and compaction of stow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 13-32) CR 80-11 Free convection heat transfer characteristics in a ment water layer. Yen, YC., (1980, 12p) Free convection heat transfer characteristics in a ment water specifies, yen, YC., (1981, p.133-1388) Permeability of a melting snow cover runoff Colbeck, S.C., et al., (1982, p. 1931, p. 133-1388) Permeability of a melting snow cover Colbeck, S.C., et al., (1982, p. 904-908) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 13p) CR 87-22 Ski friction and thermal response Warren, G.C., et al., (1989, p. 223-225) Does snow have ton chromatographic properties Heasti, A.D., et al., (1989, p. 165-171) Metal ice friction Ice characteristics in Whitefish Bay and St Marys River in	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (20), M.A., et al. (1989, p.5-12). MP 2640 METEORD/LOGICAL DATA Heat a change at the ground surface. Scott, R. F., (1964, 49p., pits append.). M 14-Al. Chinatology of Antarctic regions. Wilson, C., (1968, 77p.). M 1-A3c Meteorological data Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). C.R 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR 78-23 Seil characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 32p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Winter thermal stre. ture, ice conditions and climate of Lake Champlain. Bates, R. E., (1980, 26p.). CR 80-02 Winter unreps of the upper Santina River, Alaska. Bilello, M.A., (1980, 10p.). SR 80-19 Point Batrow, Alaska, I.SA. Brown, J., (1981, 27p.). CR 81-01 Point Batrow, Alaska, I.SA. Brown, J., (1981, p. 75-276). SN 81-27 SNOW-ONE-A, Data report. Attken, G.W., ed., (1982, 641p.). SR 82-08	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper ar data, 1981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Vardexs, E.L., et.a., [1933, 14p] SR 83-13 Atmosph.iz et yls smiss in the antactic marginal (ec zone, Andreas E.L., et al., [1934, p.649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1934, p.627-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1984, p.227-237] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p.73-76) MP 2175 Humbidy a., I temperature measurements obtained from an unmanned aerial vehicle. Ballard II., et al., [1987, p.35-15] NC - W. field experiment data report. Wright, E.A., ed., (1907, 28-p). St. [1997, 13p] Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., [1930, p.13-15] Cold Regions Science and Technology Bibliography. Cummings, N.H., [1981, p.71-75] Microbiology Fate of crude and refuned only in North Stope soils. A., et al., [1973, p. 119-147] Baternal aeronds resisting from wastewater irrigation in Ohio. Bausum, H.T., et al., [1979, 68-p.] Cheanoflagellates from the Weddell Sea. Rick, K. M.P. 1453.
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p 400-412) Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1472 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., et al., (1979, p 13-32) MP 1067 Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p 13-32) Water flow through heterogeneous snow (1979, p 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p 550-556) Atmospheric pollutants in snow cover runoff Colbeck, S.C., (1981, p.133-1, 1383) Permeability of a melting snow cover runoff Colbeck, S.C., et al., (1982, p 904-908) Thermal instability and heat transfer characteristics in water- lice systems. Yen, YC., (1987, 13p.) CR 87-12 Sti fraction and thermal response Warren, G. C., et al., (1989, p.223-225) Does snow have ton chromatographic properties Hewitt, A.D., et al., (1989, p 165-171) MP 2785 Metal fee friction lee characteristics in Whitefish Bay and St. Mary River in winter. Vance, G.P., (1980, 27p.) SR 86-32	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment. 2 volo, M.A., et al., (1989, p.5-12). MP 2640 METEORO'LOGICAL DATA Heat colonge at the ground surface. Scott, R. F., (1964, 49), plus append.). MI-AI Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). M. II-AI Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). M. II-AI Meteorological data. Au matte data collection equipment for oceanographic applacement. MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Sulf characteristics and climatology during wastewater application at CRREL. Iskandar, I. K., et al., (1979, 82p.). SR 79-25 Prototype wastewater land treatment system. Jenkins, T. et al., (1979, 21p.). SR 79-35 Forecasting ice immation and breakup on Lake Champlain. Bates, R. E., et al., (1979, 21p.). CR 79-26 Winter thermal stre. ture, ice conditions and climate of Lake Champlain. Bates, R. E., et al., (1981, 27p.). CR 80-02 Winter vurseys of the upper Santina River, Alaska. Bilello, M.A., (1980, 30p.). Ice jams and intetorological data for three winters, Oltasquechec River, Vt. Bates, R. E., et al., (1981, 27p.). Point Batrow, Alaska, U.SA. Brown, J., (1981, p. 75-76). MP 1434 Synoptic meteorology during theNOW-ONE field experiment. Bitello, M.A., (1982, 55p.). SR 81-27 SNOW-ONE-A., Data report. Attkin, G.W., ed., [1982, 641p.]. SR 82-68 Meteorology. Bates, R.E., (1982, p. 43-180). MP 1540	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper art data, 1981 Andreas, E.L., [1983, 288p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Vardexs, E.L., et al., [1933, 14p] SR 83-13 Atmosph.iz et dy simils in the antactic marginal ice zone. Andreas E.L., et al., [1984, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p. 205-211] MP 2175 Victoorological system performance in icing conditions. Bates R.F., (1987, p. 73-766) MP 2283 Humbidy a., I temperature measurements obtained from an unmanned aerial vehicle. Ballard II., et al., [1987, p. 35-15] NC-10 field experiment data report. Wright, E.A., ed., (1967, 25-p1) Microfology Problems of the seasonal sea ice zone. Weeks, W.F., [1980, p. 13-15] MP 2641 Optical measurement of precipitation. Koh, G., [1989, p. 13-15] Cold Regions Science and Technology Bibliography. Cummings, N. H., [1981, p. 73-75] Microfology Fate of stude and refined oils in North Nope tools. A., et al., [1973, p. 13-15] Raterial aerosods resulting from wastewater irrigation in Ohio. Bausum, H.T., et al., [1979, 68p] Cheonoflagellates from the Weddell. Sea. Rick, K.R., [1981, p. 74-75] MP 1453.
MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) Roof response to icing conditions Lane, J W., et al., (1979, 40p) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forecasting of water run-off from snow and toc Colbeck, S C., (1977, p.571-588) Sintering and compaction of srow containing liquid water Colbeck, S C., et al., (1979, p. 13-32) Water flow through heterogeneous snow (1979, p.37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p) Free consection heat transfer characteristics in a meit water layer. Yen, YC., (1980, 12p) CR 80-4187 Permeability of a melting snow cover Colbeck, S C., et al., (1981, p.1383-1388) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 33p) CR 87-22 Shi friction and thermal response Warren, G C., et al., (1989, p.223-225) Does snow have ton chromatographic properties. AD, et al., (1989, p.165-171) Metal fee friction lee characteristics in Whitefish Ray and St. Marys River in winter. Vance, G P., (1980, 27p) Ship resistance in thick brash nec. Mellow, M., (1980, 105, 105) Ship resistance in thick brash nec. Mellow, M., (1980, 105, 105)	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 2-3)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 (20), M.A., et al. (1989, p.5-12). MP 2640 METEORD/LOGICAL DATA Heat a change at the ground surface. Scott, R. F., (1964, 49p., pits append.). M 14-Al. Chinatology of Antarctic regions. Wilson, C., (1968, 77p.). M 1-A3c Meteorological data Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). C.R 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR 78-23 Seil characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 32p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Winter thermal stre. ture, ice conditions and climate of Lake Champlain. Bates, R. E., (1980, 26p.). CR 80-02 Winter unreps of the upper Santina River, Alaska. Bilello, M.A., (1980, 10p.). SR 80-19 Point Batrow, Alaska, I.SA. Brown, J., (1981, 27p.). CR 81-01 Point Batrow, Alaska, I.SA. Brown, J., (1981, p. 75-276). SN 81-27 SNOW-ONE-A, Data report. Attken, G.W., ed., (1982, 641p.). SR 82-08	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) US/USSR Wedt-II Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) Boom for shipboard deployment of meteorological instruments. Varieties, E.L., (1983, 288p) Boom for shipboard deployment of meteorological instruments. Varieties, E.L., (1983, 288p) Atmosph.in et dy similes in the antarctic marginal (see zone, Andreas, E.L., et al., (1984, p. 649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship Andreas, E.L., et al., (1984, p. 227-237) Computer interfacing of meteorological sensors in sectre weather. Rancourt, K., et al., (1985, p. 205-211) MP 2175 Victoorological system performance in icing conditions. Bates, R.F., (1987, p. 73-766) MP 2283 NCC- 10 feld experiment data report. Wright, E.A., (1987, p. 35-15) MP 2293 NCC- 10 feld experiment data report. Wright, E.A., (1987, p. 13-15) Optical measurement of precipitation. Koh, G., (1989, 13)-151 MP 2641 Optical measurement of precipitation. Koh, G., (1989, p. 13-15) Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p. 1-35) Cold Regions Science and Technology Bibliography. Cummings, N.H., (1981, p. 7-1.75) Microbiology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Microbiology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Microbiology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Microbiology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Meteorology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Meteorology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Meteorology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Meteorology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Meteorology Fate of stude and refined oils in North Nope soils. N. (1981, p. 7-1.75) Meteorolo
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1412 Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forceasting of water trun-off from snow and icc Colbeck, S C., et al., (1979, p. 13-23) MP 1067 Sintering and compaction of srow containing liquid water Colbeck, S C., et al., (1979, p. 13-24) Water flow through heterogeneous snow Colbeck, S C., (1977, p. 571-588) MP 1219 Water flow through heterogeneous snow Colbeck, S C., (1979, p. 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, Y -C., (1980, 12p.) Thermal instability and heat transfer characteristics in a meit water specific systems. Yen, YC., (1987, 33p.) Shi friction and thermal response Warren, G. C., et al., (1981, p. 223-225) Does snow have ton chromatographic properties Lee characteristics in Whitefish Bay and St. Marys River in winter. Vance, G. P., (1980, 27p.) Ship resistance in thick brash ice. Meller, M., (1950, p. 105-321) Dynamic friction of bobsled runners on ice. Hisber, N. P., et	Meteorological charts SNOW IV field experiment data report. Wright, E. A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment. 2 Volo, M.A., et al., (1989, p.5-12). MP 2640 METEORO-OGICAL DATA Heat colange at the ground surface. Scott, R. F., (1964, 49p. plx append.). MI-AI Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). MI-AI Meteorological data Automatic data collection equipment for oceanographic appile. In Dean, A. M., Jr., (1978, p.1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Sund characteristics and chimatology during wastewater application at CRREL. Iskandar, I. N., et al., (1978, 37p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T. et al., (1979, 21p.). SR 79-35 Forecasting ice formation and breakup on Lake Champlain. Bates, R. E., et al., (1979, 21p.). CR 79-26 Winter thermal stre. ture, ice conditions and climate of Lake Champlain. Bates, R. E., et al., (1981, 27p.). CR 80-02 Winter vurseys of the upper Stanta River, Alaska. Bidello, M.A., (1980, 30p.). Ice jams and intetorological data for three winters, Oltsuquecher River, V. Bates, R. E., et al., (1981, 27p.). SR 80-19 Ice jams and intetorological data for three winters, Oltsuquecher River, V. Bates, R. E., et al., (1981, 27p.). SR 81-27 Synoptic meteorology during theNOW-ONE field experiment. Bidello, M.A., (1982, 55p.). SR 81-27 SNOW-ONE-A. Data report. Attken, G.W., et al., (1982, 641p.). SR 82-08 Meteorology. Bates, R. E., (1982, p.43-180). MP 1540 Sutface meteorology. S. USSR Weddell Polynya Expedition. 1981. Andreas E.L., et al., (1983, 32p.). SR 83-18 Stets-specific and synoptic meteorology. Bates, R. E., (1983, 32p.). SR 83-18 Stets-specific and synoptic meteorology. Bates, R. E., (1984, 1983). Step.). SR 83-18 Stets-specific and synoptic meteorology. Bates, R. E., (1984, 1983). Step.). SR 83-18	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et a., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., et al., [1933, 14p] SR 83-13 Atmosph.iz et dy simics in the antaretic marginal ice zone. Andreas E.L., et al., [1934, p 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2283 Humiosty a. 1 temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., [1937, p. 33-51] St. Co., et seld experiment data report. Wright, E.A., ed., (1967, 25-42) Meteorology Bates, R.E., et al., [1939, p. 33-15] Optical measurement of precipitation. Koh, G., [1939, 135] Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., (1930, p. 1-35) Cold Regions Science and Technology Bibliograph. Cummings, N.H., [1931, p. 73-75] Microbiology Parts of crude and refined oils in North Nope soils. A., et al., [1932, p. 31-32] Racterial aerosids resulting from wastewater irrigation in Ohio. Bausum, H.T., et al., [1970, 64p]. NR 79-32 Choonoflagellates from the Weddell Sea. [1931, p. 34-34] Colonoflagellates from the
MP 2633 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p) CR 79-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) MP 1412 Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p 218-224) Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p 571-588) MP 1067 Sintering and compaction of srow containing liquid water Colbeck, S.C., et al., (1979, p 13-32) MP 1209 Water flow through heterogeneous snow Colbeck, S.C., (1979, p 37-45) MP 1219 Roof leaks in cold regions school at Chevac, Alaska Tobiasson, W., et al., (1980, 12p) CR 80-11 Free convection heat transfer characteristics in a ment water layer. Yen, YC., (1980, 12p) CR 80-11 Fremability of a melting snow cover runoff Colbeck, S.C., (1981, p.1383-1388) Permeability of a melting snow cover Colbeck, S.C., et al., (1982, p 904-908) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 33p) CR 87-22 Shi friction and thermal response Warren, G.C., et al., (1989, p.233-225) MP 2745 Does snow have fon chromatographic properties A.D., et al., (1989, p.135-271) Metal &er friction Ite characteristics in Whitefish Ray and St Marys River in winter. Vance, G.P., (1980, 279) Ship resistance in the bristing of Miles, M., (1980, p. 155, 321) Dynamic friction of bobsled runners on sec Huber, N., (1981, p. 152)	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 2539) SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment 2 1/400, M.A., et al. (1989, p.5-12) MP 2640 METEOROLOGICAL DATA Heat change at the ground surface Scott, R. F., (1964, 49p., plus append) MI-Al Climatology of Antarctic regions Wilson, C., (1968, 77p.) M 1-A3c Meteorological data Automatic data collection equipment for oceanographic application Dean, A.M., fr., (1978, p. 1111-1121) Midwinter temperature regime and snow occurrence in Germany Bilello, M.A., et al., (1978, 56p.) CR 78-21 cand treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.) Seil-characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 87p.) Prototype wastewater land treatment system Jenkins, T.F., et al., (1979, 21p.) Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p.) Winter thermal site ture, ice conditions and climate of Lake Champlain Bates, R.E., (1980, 26p.) Winter universe of the upper Stantina River, Alaska Bilello, M.A., (1980, 30p.) Legiams and interovological data for three winters, Ottauque-chee River, Vt. Bates, R.E., et al., (1981, 27p.) Point Batrow, Alaska, I.S.A. Brown, J., (1981, p. 75-75), SR 80-12 SNOW-ONE-A, Data report. Arthern, G.W., ed., (1982, 641p.) Meteorology. Bates, R.E., (1982, p. 43-180), SR 80-18 Sufface meteorology L.S. USSR Weddell Polynya Evigedition, 1981. Andreav E.L., et al., (1983, 32p.) Site-specific and synoptic meteorology. Bates, R. E., E., (182, p. 71-350). Mid 1885	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., [1982, 17p] CR 82-28 US/USSR Wedt-II Folyny a expedition, Upper art data, 1981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Vardexs, E.L., et.a., [1933, 14p] SR 83-13 Atmosph.: et dy simises in the antactic marginal ice zone, Andreas E.L., et al., [1934, p.649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1934, p.227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p.205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p.73-76) MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p.73-76) Humbidly a., I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., [1987, p.35-15] Sea Cr. d. Feld experiment data report. Wright, E.A., ed., (1907, 25-p.1) MP 2261 Optical measurement of precipitation. Koh, G., (1930, p.1-5) Cold Regions Science and Technology Bibliography. Cummings, N.H., [1981, p.71-5] MP 1293 Optical aerosods resisting from wastewater irrigation in Ohio. Bausum, H.T., et al., [1979, 64p.1] Cheanoflagellates from the Weddell Sea. MP 1453. Sea see microbial communities in Antaretica. Garriso, D.I. et al., [1986, p.241-260] Telest p. 17-21-21 Sea see microbial communities. Antaretica. Garriso, D.I. et al., [1986, p.241-260] MP 2462 Veasee pressure radge microbial communities. Velley, F., [1988, p.17-21-24] Sea see microbial communities. Antaretica. Garriso, D.I. et al., [1986, p.241-260] MP 2463 Sea see microbial communities in Antaretica. Garriso, al., al., al., al., al., al., al., al.
MP 2630 Melting Roof response to icing conditions Lane, J.W., et al., (1979, 409) MP 2730 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., (1970, 9400-412) Temperature and interface morphology in a melting recewater system Yen, YC., (1984, p.305-325) MP 14727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1977, p. 571-588) MP 190 Water flow through heterogeneous snow Colbeck, S.C., et al., (1979, p. 13-32) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, p. 550-556) Alm 1931 Atmospheric pollutants in snow cover runoff Colbeck, S.C., (1981, p.133-1383) Permeability of a melting snow cover Colbeck, S.C., et al., (1982, p. 904-908) MP 1585 Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 13p) St. fraction and thermal response Warren, G.C., et al., (1989, p. 223-225) Does snow have ton chromatographic properties. Heunit, A.D., et al., (1989, p. 165-171) Metal kee friction lee characteristics in Whitefish Ray and St. Marys River in winter. Vance, G.P., (1980, 27p) Shi presistance in thick brash ice. Mellor, M., (1981, p. 165, 321) Dynamic friction of bobsled runners on ice. Huber, N. P., et al., (1985, 26p.) Comparative model tests in ice of a Canadian Coast Guard R.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 2-3):p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment. 2 (-10), M.A., et al. (1989, p.5-12). MP 2640 METEORD', OGICAL DATA Heat a change at the ground surface. Scott, R. F., (1964, 49), plus append.). MI-AIC Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). MI-AIC Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). MI-AIC Meteorological data. Au imatic data collection equipment for occanographic application. M. Jr., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21. And treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR 78-23. Soil characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 82p.). SR 79-23. Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-35. Forecasting ice intraation and breakup on Lake Champlain. Bates, R. E., et al., (1979, 21p.). CR 79-26. Winter thermal streeture, ecconditions and climate of Lake Champlain. Bates, R. E., (1980, 25p.). CR 80-19. Ice jams and interovological data for three winters. Officiaquechee River, Vt. Bates, R. E., et al., (1981, 27p.). CR 81-01. Point Batrow, Alaska, I.S.A. Brown, J., (1981, p. 75-76). MP 1434. Synoptic meteorology during theNOW-ONE-A, Data report. Arthen, G.W., et al., (1982, 641p.). MP 1540. Surface meteorology U.S.R. R. 1, (1983, 17p.). SR 83-14. Site-specific and synoptic meteorology. Bates, R. E., (1983, 17p.). SR 83-14. Site-specific and synoptic meteorology. Bates, R. E., (1983, 17p.). SR 83-16. Climate at CRREL, Hanover, New Hampshure. Bates, R. E., (1983, 17p.). SR 83-16. Climate at CRREL, Hanover, New Hampshure. Bates, R. E., (1983, 17p.). SR 83-16. Climate at CRREL, Hanover, New Hampshure. Bates, R. E., (1983, 17p.). SR 83-16. Climate at CRREL, Hanover, New Hampshure. Bates, R. E., (1983, 17p.). SR 83-16. Climate at	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et a., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition, Upper air data, [981 Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., et al., [1933, 14p] SR 83-13 Atmosph.iz et dy simics in the antaretic marginal ice zone. Andreas E.L., et al., [1934, p 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., [1985, p 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2283 Humiosty a. 1 temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., [1937, p. 33-51] St. Co., et seld experiment data report. Wright, E.A., ed., (1967, 25-42) Meteorology Bates, R.E., et al., [1939, p. 33-15] Optical measurement of precipitation. Koh, G., [1939, 135] Meteorology Problems of the seasonal sea ice zone. Weeks, W.F., (1930, p. 1-35) Cold Regions Science and Technology Bibliograph. Cummings, N.H., [1931, p. 73-75] Microbiology Parts of crude and refined oils in North Nope soils. A., et al., [1932, p. 31-32] Racterial aerosids resulting from wastewater irrigation in Ohio. Bausum, H.T., et al., [1970, 64p]. NR 79-32 Choonoflagellates from the Weddell Sea. [1931, p. 34-34] Colonoflagellates from the
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1412 Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forceasting of water trun-off from snow and icc Colbeck, S C., et al., (1977, p. 571-588) Sintering and compaction of srow containing liquid water Colbeck, S C., et al., (1979, p. 13-24) Water flow through heterogeneous snow Colbeck, S C., et al., (1979, p. 13-24) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, Y-C., (1980, 12p.) Thermal instability and heat transfer characteristics in a meit water specific systems. Yen, Y-C., (1987, 13p.) Shi friction and thermal response Warren, G. C., et al., (1982, p. 904-908) MP 1565 Thermal instability and heat transfer characteristics in water-fice systems. Yen, Y-C., (1987, 13p.) Ski friction and thermal response Warren, G. C., et al., (1989, p.223-225) Does snow have ton chromatographic properties. Hewitt, A.D., et al., (1980, p. 165-171) Metal ke friction lee characteristics in Whitefish Bay and St. Marys River in winter. Vance, G.P., (1980, 27p.) Skip resistance in thick brash ice. Meller, M., (1950, p. 165, 321) Dynamic friction of bobsled runners on ice. Hibber, N. P., et al., (1985, 26p.) Comparative model tests in ice of a Canadian Coast Guard R. class techreaker. Tatinclaux, J C., et al., (1950, al.).	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 2539) SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment. 2 Volo, M.A., et al., [1989, p.5-12] MP 2640 METEOROLOGICAL DATA Heat collange at the ground surface. Scott, R.F., [1964, 49p. pl.s append.] Climatology of Antarctic regions. Wilson, C., [1968, 77p.] M.I-A3C Meteorological data Automatic data collection equipment for occanographic application. Dean, A.M., Jr., [1978, p. 1111-1121]. MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., [1978, 56p.]. CR 78-21 Sund characteristics and climatology during masterwater application at CRREL. Iskandar, I.K., et al., [1979, 27p.]. SR 79-23 Prototype mastemater land treatment system. Jenkins, T.F., et al., [1979, 21p.]. SR 79-35 Forecasting ice formation and breakup on Lake Champlain. Bates, R.E., et al., [1979, 21p.]. CR 79-26 Winter thermal structure, ice conditions and climate of Lake Champlain. Bates, R.E., [1980, 26p.]. CR 80-02 Winter turietys of the upper Stratina River, Alaska. Bilello, M.A., [1980, 30p.]. SR 80-19 Ice jams and interorological data for three winters. Oltasquecher River, VI. Bates, R.E., et al., [1981, 27p.]. Point Harrow, Alaska, I.SA. Brown, J., [1981, 275-76]. MP 1434 Synoptic meteorology during theNOW-ONE field experiment. Bilello, M.A., [1981, 15p.]. SR 81-27 SNOW-ONE-A, Data report. Aitken, G.W., ed., [1982, 841p.]. Meteorology, Bates, R.E., [1982, p.43-180]. MP 1540 Surface meteorology, U.S. U.SSR Weddell Polynya Expedition, 1981. Andreas E.L., et al., [1981, 32p.]. SR 83-148 Steespecific and synoptic meteorology. Bates, R.F., [1983, p.13-80]. CR 84-24 CR 1982. SR 84-24 CR 1983. SR 84-24 CR 1983. SR 84-24 Marchael E.L., et al., [1984, 27p.]. SR 83-18 Steespecific and synoptic meteorology. Bates, R.F., [1983, p.13-80]. CR 84-24 CR 1983. SR 84-24	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.l., et., (1982, 17p) US/USSR Wedt-II Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., et. al., (1931, 14p) SR 83-13 Atmosph.; et. dy, tunios in the antarctic marginal (ec. zone, Andreas E.L., et al., (1984, p. 649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p. 227-237) Computer interfacing of meteorological sensiors in severe weather. Rancourt, K., et al., (1985, p. 205-211) MP 2175 Meteorological system performance in icing conditions. Bates R F., (1987, p. 73-86) Humosity, a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p. 35-15) NC - A Feld experiment data report. Wright, E.A., (1947, 25up) SR 89-14 Micropological measurement of precipitation. Koh, G., (1989, p. 13-15) Optical measurement of precipitation. Koh, G., (1989, p. 13-15) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seasonal sease cone. Weeks, W.F., (1980, p. 1-35) Meteorology. Problems of the seas
MP 2653 Melting Roof response to icing conditions Lane, J.W., et al., (1979, 409) MP 27-17 Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al., (1970, p. 400-412) MP 1412 Temperature and interface norphology in a melting recewater system Yen, YC., (1984, p.305-325) MP 1412 MP 1412 Temperature and interface roorphology in a melting recewater system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for actic freshwater supplies Slaughter, C.W., et al., (1975, p. 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p. 13-32) Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 129) Free convection heat transfer characteristics in a meit water layer. Yen, YC., (1980, 1950-556) Almospheric pollutants in snow cover runoff Colbeck, S.C., (1981, p.1383-1388) Permeability of a melting snow cover Colbeck, S.C., (1981, p.1383-1388) Thermal instability and heat transfer characteristics in water-fice systems. Yen, YC., (1987, 33p) St. friction and thermal response Warren, G.C., et al., (1982, p. 202-205) Does snow have ton chromatographic properties. A.D., et al., (1989, p. 165-171) Metal kee friction Ice characteristics in Whitefish Bay and St. Marys River in winter. Vance, G.P., (1980, 27p) Shi presistance in thick brash ice. Meller, M., (1980, p. 105, 121) Dynamic friction of bobsled runners on ice. Huber, N. P. et al., (1985, 20p) Comparative model tests in ice of a Canadian Coast Guard R. class receivaler. Tatinclasis, J.C., et al., (1985, 9p) 1, 1718	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 25)p.; SR 89-14 Synoptiv, meteorology during the SNOW IV Field Experiment. 2 volo, M.A., et al., (1989, p.5-12). MP 2640 METEORO'LOGICAL DATA Heat colange at the ground surface. Scott, R.F., (1964, 49), plus append.). MI-AI Cliniatology of Antarctic regions. Wilson, C., (1968, 77p.). MI-AI Meteorological data Au smatte data collection equipment for oceanographic application. Dean, A.M., Jr., (1978, p.1111-1121). MP 1028 Midwinter temperature regime and show occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 Sul characteristics and climatology during wastewater application at CRREL. Iskandar, I.N., et al., (1979, 82p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-35 Forecasting ice furnation and breakup on Lake Champlain. Bates, R.E., et al., (1979, 21p.). CR 79-26 Winter thermal stre. ture, ice conditions and climate of Lake Champlain. Bates, R.E., et al., (1979, 21p.). CR 79-26 Winter vurseys of the upper Santina River, Alaska. Bilello, M.A., (1980, 30p.). Ite jams and intetorological data for three winters, Ottauquechee River, VI. Bates, R.E., et al., (1981, 27p.). SR 80-19 Ite jams and intetorological data for three winters. Ottauquechee River, VI. Bates, R.E., et al., (1981, 27p.). SR 80-19 Point Batrow, Alaska, U.S.A. Brown, J., (1981, p. 75-76). MP 1434 Synoptic meteorology during theNOW-ONE field experiment. Bilello, M.A., (1982, 55p.). SR 81-27 SNOW-ONE-A. Data report. Attkin, G.W., ed., (1982, 641p.). SR 2-82 Meteorology. Bates, R.E., (1982, p. 43-130). MP 1540 Surface meteorology L.S. USSR Weddell Polynya. Expedition. 1981. Andreas EL., et al., (1983, 32p.). SR 83-27 Force precipitation and weather, Munchen Ricen, West. (1984, 47p.). SR 83-28 Forcer precipitation and weather, Munchen Ricen, West. (1984, 47p.). SR 84-32 Forcer precipitation and calleder. Munchen Ricen, West. (1984, 47p.). SR 84-32	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.L., et., (1982, 17p) US/USSR Wedt-II Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., et. al., (1931, 14p) SR 83-13 Atmosph.; et. dy, tunks in the antarctic marginal (ec. rone, Andreas) E.L., et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p.227-237) Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p.205-211) MP 2175 Meteorological system performance in using conditions. Bates R.F., (1987, p.73-56) MP 2285 Humosily a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p.35-15) NCC-, (1 % eld experiment data report. Wright, E.A., (1987, p.35-15) NF 200-15, (1987, p.73-75) MP 2293 NGC-, (1 % eld experiment data report. Wright, E.A., (1987, p.35-15) Optical measurement of precipitation. Koh, G., (1939, p.13-15) MP 2641 Optical measurement of precipitation. Koh, G., (1939, p.13-15) MP 2642 Cold Regions Science and Technology Bibliography. Cummings, N.H., (1981, p.73-75) Microbiology. Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p.13-15) MP 1293 MP 1372 Microbiology. Actual and refined oils in North Slope toils. Season, MP 1193, p.13-75, MP 1293 Cold Regions Science and Technology Bibliography. Cummings, N.H., (1981, p.73-75) Meteorological season, MP 118-18 Sea ice microbial communities in Antarctica. Garriso, D.I., et al., (1936, p.231-25) NR 79-32 Cheanoflagellates from the Weddell Sea. Rick, K.R., (1981, p.4*-54) Sea ice microbial communities in Antarctica. Garriso, D.I., et al., (1986, p.231-25) MP 2232 Microclimatology. Absolic exercise of the Lundra Boome Program, 1971
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p400-412) Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1412 Temperature and interface roorphology in a melting tec-water system Yen, YC., (1984, p.305-325) MP 1727 Meltwater Snow accumulation for arctic freshwater supplies C.W., et al., (1975, p.218-224) Short-term forceasting of water trun-off from snow and icc Colbeck, S C., et al., (1977, p. 571-588) Sintering and compaction of srow containing liquid water Colbeck, S C., et al., (1979, p. 13-24) Water flow through heterogeneous snow Colbeck, S C., et al., (1979, p. 13-24) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, Y-C., (1980, 12p.) Thermal instability and heat transfer characteristics in a meit water specific systems. Yen, Y-C., (1987, 13p.) Shi friction and thermal response Warren, G. C., et al., (1982, p. 904-908) MP 1565 Thermal instability and heat transfer characteristics in water-fice systems. Yen, Y-C., (1987, 13p.) Ski friction and thermal response Warren, G. C., et al., (1989, p.223-225) Does snow have ton chromatographic properties. Hewitt, A.D., et al., (1980, p. 165-171) Metal ke friction lee characteristics in Whitefish Bay and St. Marys River in winter. Vance, G.P., (1980, 27p.) Skip resistance in thick brash ice. Meller, M., (1950, p. 165, 321) Dynamic friction of bobsled runners on ice. Hibber, N. P., et al., (1985, 26p.) Comparative model tests in ice of a Canadian Coast Guard R. class techreaker. Tatinclaux, J C., et al., (1950, al.).	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1989, 2-3)/p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment. 2 (20), M.A., et al. (1989, p.5-12). MP 2640 METEORO/LOGICAL DATA Heat colonge at the ground surface. Scott, R.F., (1964, 49), plist append.) M. H-AI Climatology of Antarctic regions. Wilson, C., (1968, 77p). M. I-AI Meteorological data Automatic data collection equipment for oceanographic application. Dean, A.M., Ir., (1978, p. 1111-1121). MP 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p). CR 78-21 Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p). SR 78-21 Soil characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 87p). SR 78-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p). Winter thermal site time, ice conditions and climate of Lake Champlain. Bates, R.E., et al., (1980, 26p). CR 89-02 Winter unreps of the upper Stantia River, Alaska. Bilello, M.A., (1980, 30p). CR 80-02 Winter unreps of the upper Stantia River, Alaska. Bilello, M.A., (1980, 30p). CR 80-02 Winter unreps of the upper Stantia River, Alaska. Bilello, M.A., (1980, 30p). CR 80-02 Winter unreps of the upper Stantia River, Alaska. Bilello, M.A., (1980, 30p). CR 80-02 Winter unreps of the upper Stantia River, Alaska. Bilello, M.A., (1980, 30p). SR 80-12 Synoptic meteorology during the L-NOW-ONE field experiment. Bilello, M.A., (1981, 55p). SR 81-27 SNOW-ONE-A, Data report. Arthern, G.W., ed., (1982, 641p). SR 83-14 Site-specific and synoptic meteorology. Bates, R. F., (1981, 35p). SR 83-14 Site-specific and synoptic meteorology. Bates, R. F., (1981, 45p). SR 83-14 Site-specific and synoptic meteorology. Bates, R. F., (1981, 45p). SR 83-14 Site-specific and synoptic meteorology. Bates, R. F., (1981, 45p). SR 83-14 Site-s	Using a Micro-CORA sounding system in the southern ocean, Andreas, fi.l., et a., [1982, 17p] CR 82-28 US/USSR Wedt-II Polynya expedition. Upper air data, [981, Andreas, E.L., [1983, 238p] SR 83-13 Boom for shipboard deployment of meteorological instruments. Varieties, E.L., ct. al., [1933, 14p] SR 83-13 Atmosph.iz et dy similes in the antiactic marginal ice zone. Andreas E.L., et al., [1934, p. 649-661] MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., [1984, p. 227-237] Computer interfacing of meteorological sensors in severe weather. Rancourt, K. et al., [1985, p. 205-211] MP 2175 Meteorological system performance in icing conditions. Bates R.F., (1987, p. 73-56) MP 2283 Humioldy a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H. et al., [1987, p. 35-15] Mr 2493 NCC- 0. Celd experiment data report. Wright, E.A. ed., (1932, 25-15) Mr 2493 Mr 2493 Mr 2494 Mr 2494 Mr 2494 Mr 2494 Mr 2494 Mr 2495 Mr 2495 Mr 2495 Mr 2496 Mr 2497 Mr 2496 Mr 2497 Mr 2496 Mr 2497 Mr 2497 Mr 2497 Mr 2497 Mr 2498 Mr 249
MP 2630 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) MP 2530 Melting Roof response to icing conditions Lane, J W., et al., (1979, 40p.) Melting points Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A R., et al., (1980, p 400-412) Temperature and interface morphology in a melting rec-water system Yen, YC., (1984, p.305-325) MP 1472 Meltwater Snow accumulation for arctic freshwater supplies Slaughter, C.W., et al., (1975, p 218-224) Short-term forceasting of water run-off from snow and ice Colbeck, S C., (1977, p 571-588) Sintering and compaction of snow containing liquid water Colbeck, S C., et al., (1979, p 13-32) Water flow through heterogeneous snow Colbeck, S C., (1979, p 37-45) Roof leaks in cold regions school at Chevae, Alaska Tobiasson, W., et al., (1980, 12p.) Free convection heat transfer characteristics in a meit water layer. Yen, Y-C., (1980, p 550-556) Atmospheric pollutants in snow cover runoff Colbeck, S C., (1981, p.1381-31881) Permeability of a melting snow cover runoff Colbeck, S C., (1981, p.1381-31883) Permeability of a melting snow cover Colbeck, S C., et al., (1982, p 904-908) Sti friction and thermal response Warren, G C, et al., (1982, p 904-908) Sti friction and thermal response Warren, G C, et al., (1989, p.223-225) Does snow have ton chromatographic properties. Hewitt, A.D., et al., (1989, p. 165-171) Metal fee friction lee characteristics in Whitefish Bay and St Marys River in winter. Vance, G P., (1980, 27p.) Shi frecistance in thick brash ice. Meller, M., (1980, p. 165-171) Dynamic friction of bobsted runners on ice. Huber, N. P., et al., (1985, 28p.) Comparative model tests in ice of a Canadian (east Guard Redss icebreaker. Tatinclaux, J C, et al., (1980, p. 16-11) Meddl tests on an icebreaker at two friction factors.	Meteorological charts SNOW IV field experiment data report. Wright, E.A., ed. (1889, 25)p.; SR 89-14 Synoptic meteorology during the SNOW IV Field Experiment. 2 (20), M.A., et al. (1989, p.5-12). MP 2640 METEORD'LOGICAL DATA Heat a change at the ground surface. Scott, R. F., (1964, 49p., pl. st append.). MI-AI Chinatology of Antarctic regions. Wilson, C., (1968, 77p.). M. I-A3c Meteorological data. Au smatic data collection equipment for occanographic application. Mp 1028 Midwinter temperature regime and snow occurrence in Germany. Bilello, M.A., et al., (1978, 56p.). CR 78-21 and treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.). SR 78-23 Soil characteristics and climatology during wastewater application at CRREL. Iskandar, I.K., et al., (1979, 32p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Prototype wastewater land treatment system. Jenkins, T.F., et al., (1979, 21p.). SR 79-23 Winter thermal stre. ture, ice conditions and climate of Lake Champlain Bates, R.E., et al., (1981, 27p.). SR 83-14 Synoptic meteorology during theNOW-ONE field experiment. Bilello, M.A., (1981, 55p.). SR 83-14 Synoptic meteorology d	Using a Micro-CORA sounding system in the southern ocean, Andreas, fe.L., et., (1982, 17p) US/USSR Wedt-II Polynya expedition, Upper air data, 1981. Andreas, E.L., (1983, 288p) SR 83-13 Boom for shipboard deployment of meteorological instruments. Voltexs, E.L., et. al., (1931, 14p) SR 83-13 Atmosph.; et. dy, tunks in the antarctic marginal (ec. rone, Andreas) E.L., et al., (1984, p.649-661) MP 1667 Simple boom for use in measuring meteorological data from a ship. Andreas, E.L., et al., (1984, p.227-237) Computer interfacing of meteorological sensors in severe weather. Rancourt, K., et al., (1985, p.205-211) MP 2175 Meteorological system performance in using conditions. Bates R.F., (1987, p.73-56) MP 2285 Humosily a. I temperature measurements obtained from an unmanned aerial vehicle. Ballard H., et al., (1987, p.35-15) NCC-, (1 % eld experiment data report. Wright, E.A., (1987, p.35-15) NF 200-15, (1987, p.73-75) MP 2293 NGC-, (1 % eld experiment data report. Wright, E.A., (1987, p.35-15) Optical measurement of precipitation. Koh, G., (1939, p.13-15) MP 2641 Optical measurement of precipitation. Koh, G., (1939, p.13-15) MP 2642 Cold Regions Science and Technology Bibliography. Cummings, N.H., (1981, p.73-75) Microbiology. Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p.13-15) MP 1293 MP 1372 Microbiology. Actual and refined oils in North Slope toils. Season, MP 1193, p.13-75, MP 1293 Cold Regions Science and Technology Bibliography. Cummings, N.H., (1981, p.73-75) Meteorological season, MP 118-18 Sea ice microbial communities in Antarctica. Garriso, D.I., et al., (1936, p.231-25) NR 79-32 Cheanoflagellates from the Weddell Sea. Rick, K.R., (1981, p.4*-54) Sea ice microbial communities in Antarctica. Garriso, D.I., et al., (1986, p.231-25) MP 2232 Microclimatology. Absolic exercise of the Lundra Boome Program, 1971

Microclimatology (cont.) Land treatment climatic survey at CRREL. Bilello, M.A., et al., (1978, 37p.) SR 78-21	Performance based wheeled vehicles.
Microelement content Urban waste as a source of heavy metals in land treatment.	Military facilities Wastewater treatme [1976, 15p]
Iskandar, I.K., (1976, p.417-432) MP 977 Elemental compositions and concentrations of microspherules in snow and pack ice from the Weddell Sea. Kumai, M., et al., (1983, p.128-131) MP 1777	Notes on conductin method. Ledbet Window performan
Kumai, M., et al. (1983, p.128-131) MP 1777 Microscopy Producing strain-free flat surfaces on single crystals of ice:	(1982, 21p) Utility services for a
comments. Tobin, T.M., (1973, p.519-520) MP 1000	al, (1984, 66p) Secondary stress wi 1983. Ueda, H.
Microstructure Acoustic emission and deformation response of finite ice plates. Xirouchakis, P.C., et al, (1981, p.385-394)	Megastructures for p.10-11
MP 1455 Ice crystal formation and supercooled fog dissipation.	Assessment of a fiel et al. (1986, 6p)
Kumai, M., (1982, p.579-587) MP 1539 Polycrystalline ice creep in relation to applied stresses. Cole. D.M., (1983, p.614-621) MP 1582	Military wastewate Reed, S.C., f1986 Measured insulation
Crystalline structure of urea ice sheets used in modeling in the CRREL test basin. Gow, A.J., [1984, p 241-253] MP 1835	Army buildings.
MF 1835 Effect of size on stresses in shear flow of granular marrials. Pt.1. Shen, H.H., (1985, 18p.) CR 85-82	Shasta waterless sy Martel, C.J., (198 Buildings and utiliti
Effect of size on stresses in shear flow of granular materials, Pt.2. Shen, H H., (1985, 20p.) CR 85-03	search needs. To
Microstructure and the resistance of rock to tensile fracture. Peck, L., et al. (1985, p.11,533-11,546) MP 2157	et al, (1988, 10p) Composite building
Evaluation of the rheological properties of columnar ridge sea ice. Brown, R.L., et al., ¿1986, p.55-66) MP 2177 Microstructure of frozen soils examined by SEM. Kumai,	(1988, 25p) Buildings and utility
M., (1988, p.390-395) MP 2361 Microwaves	Search needs. To
Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al. (1976, p.53-76) Interaction of a surface wave with a dielectric slab discon-	TNT. Zhang, Y Roofer: a_managen
tinuity. Arcone, S.A., et al., (1978, 10p.) CR 78-86 Disinfection of wastewater by microwaves. Iskandar, I K., et	Bailey, D.M., et : Military operation Arctic environment
al, [1980, 15p.] SR 80-01 Inlet current measured with Seasat-1 synthetic aperture radar. Shemdin, O.H., et al, [1980, p.35-37] MP 1443	er, J.E., ed, ¿196; Defensive works of
Shemdin, O.H., et al. (1980, p.35-37) MP 1443 Antarctic sea ice microwave signatures. Comiso, J.C., et al. [1984, p.662-672] MP 1668	23p. ₃ Projectile and frag Swinzow, G.K., c
Dielectric properties at 4.75 GHz of saline ice slabs. Arcone, S.A., et al, [1985, p.83-86] MP 1911	Snow and snow co (1978, p 1-239-1-
Dielectric measurements of snow cover. Burns, B.A., et al. (1985, p.829-834) MP 1913 Remote sensing of the Arctic seas. Weeks, W.F., et al.	Abele, G, et al., Snow Symposium,
[1986, p.59-64] • MP 2117 Microwave dielectric, structural and salinity properties of sea	324p j Frozen soil charzet
ice. Arcone, S.A., et al. (1986, p.832-839) MP 2188 Scientific challenges at the poles. Welch, J.P., et al. (1987, p.23-26) MP 2228	Richmond, P.W., SNOW-ONE-B de 284p. ₁
Microwave and structural properties of saline ice. Gow. A.J., et al. (1987, 36p.) CR 87-20	Operation of the U
Multifrequency passive microwave observation of saline ice grown in a tank. Grenfell, T.C., et al., [1988, p.1687- 1690] MP 2459	28p. ₃ Observations during (1984, 36p. ₃
Millimeter-wave performance during mixed precipitation. Botes, R.E., et al. (1989, p.113-120) MP 2630	SNOW-TWO data Jordan, R., ed. (1
Radar backscatter in snow at millimeter wave frequencies. Berger, R.H., et al. (1989, p.133-136) MP 2631 Passive microwave in situ observations of winter Weddell Sea	Field sampling of a TWO/Smoke We
ice. Comiso, J.C., et al, [1989, p.10,891-10,905] MP 2655	Helscopter snow (1984, p.359-376
Antarctic ice sheet brightness temperature variations. Jezek, K.C., et al, (1990, p.217-223) MP 2736 Milgration	Snow-cover charac H., et al. (1984) Effects of snow on
Brine zone in the McMurdo Ice Shelf, Antarctica Kovacs, A., et al. (1982, p.166-171) MP 1550	bert, D.G., (1984 Change in orientati
Chemical migration in snowpack. Murphey, B.B., et al., [1989, p.282-284] MP 2757	snow, Bigl, S R Effect of snow on v bert, D G., (1984
Military engineering Test of snow fortifications. Farrell, D.R., (1979, 15p.) SR 79-33	Review of antitan P.W., (1984, 12p
Seasonal soil conditions and the reliability of the M15 land mine. Richmond, P.W., et al. (1984, 35p.) SR 84-18	Frozen precipitation Germany, Bilel Snow Symposium,
Conventional land mines in winter. Richmond, P.W., 1984, 23p.; SR 84-30 Cold factor. Abele, G., 1985, p.480-481; MP 2024	Overview of meteo
Corps of Engineers research in the Arctic. Smallidge, P.D., et al., §1927, p.81-273 MP 2411	Workshop on Ice
Arctic construction working group report. Marsin, E.L., et al., [1987, p.311-314] MP 2426 Field water supply on the winter battlefield Bouroun, J.R.,	June 12-13, 1984 Penetration of shap p.137-148 ₁
[1988, 7p.] SR 88-02 Imjin River ice boom Perham, R.E., [1988, 10p.]	Tank E. O sensor s Lacombe, I, et a
SR 88-22 Smart weapons operability enhancement Link, L.E., Jr., [1929, p.165-173] MP 2539	Clear improvement p 476-477 ₁
Military equipment Baseplate design and performance mortar stability report	Soom in the construction of milital Societion of milital
Aithen, G.W., §1977, 28p.; CR 77-22 Snow and snow cover in military science Swintow, G.K., §1978, p.1-239-1-262; MP 926	drilling muds 1 Intensity of snowfal et al. (1986, p. 20
Radist fire demonstration	les interaction will marsh, BA, (19)

Performance based tire specification system for wheeled vehicles. Blaisdell, G.L., (1985, p.277-	military 280 ₁ MP 2101
llitary facilities Wastewater treatment in cold regions. Sletten, R [1976, 15p]	
Notes on conducting the behavior setting survey by:	MP 965 Interview SR 76-14
Window performance in extreme cold. Flanders. S (1982, 21p)	.N., et al, CR 82-38
Utility services for remote military facilities. Reco al, (1984, 66p)	l, S.C., et S R 84 -14
Megastructures for mobilization. Flanders, S.N.	SR 84-26 . ₍ 1986,
p.10-11j Assessment of a field water purification unit. Bouz	MP 2153 oun, J.R., S R 86 -20
et al. [1986, 6p] Military wastewater treatment systems in cold Reed, S.C., [1986, 23p]	regions CR 86-07
Measured insulation improvement potential for Army buildings. Flanders, S.N., 1987, p.202-2	ten U.S.
Shasta waterless system as a remote site sanitation Martel, C.J., (1987, 24p)	n facility. SR 87-16
Buildings and utilities in very cold regions, overvie search needs. Tobiasson, W., (1987, p 299-303)	w and re- MP 2424
Winter field testing of U.S. Navy fleet hospital Sleter al, (1988, 10p 1	ten, R.S., MP 2512
Composite buildings for military bases. Flands [1988, 25p]	:13, S.N., CR 88-04
	MP 2552
Development of a membrane for in-situ optical de TNT. Zhang, Y., et al. (1988, 6p.) Roofer: a management tool for maintaining built-	SR 88 -24
Bailey, D.M., et al. (1989, p.6-10) ilitary operation	MP 2488
Arctic environmental factors affecting army operation, J.E., ed., (1962, 11p.) Defensive works of subsective space. Johnson, B.R.	MP 984
Defensive works of subarctic snow. Johnson, P.R. 23p.; Projectile and fragment penetration into ordina Swinzow, G.K., [1977, 30p.]	CR 77-06 ty_snow.
Swinzow, G.K., ₍ 1977, 30p. ₁ Snow and snow cover in military science. Swinz ₍ 1978, p 1-239-1-262 ₁	MP 1750 ow, G.K., MP 926
Effects of winter military operations on cold region Abele, G, et al. (1978, 34p.)	is terrain. S R 78- 17
Snow Symposium, 1st, Hanover, NH, Aug. 1981	i. ₍ 1982, SR 82-17
Richmond, P.W., ₍ 1983, 18p. ₎ SNOW-ONE-B data report. Bates, R.E., ed.	SR 83-05 . ₍ 1983,
Operation of the U.S. Combat Support Boat (USC	SŘ 83-16 SBMK 1) L 71984
Observations during BRIMFROST 13. Bouzoun.	IR., et al.
SNOW-TWO data report Volume 2 System peri	SR 84-16 formance SR 84-26
Field sampling of snow for chemical obscurants at TWO/Smoke Week VI — Cragin, J.H., (1984, p. 2)	SNOW-
Helicopter snow obscuration sub-test. Ebers- (1984, p.359-376)	MP 2090 ole, J.F., MP 2094
Snow-cover characterization. SADARM support H., et al. (1984, p. 409-41)	O'Bnen MP 2095
Effects of snow on vehicle-generated seismic signati bert, D.G., (1984, p. 83-109) Change in orientation of artillery-delixered anti-tanl	MP 2074
snow, Bigl, S.R., (1984, 20p.) Effect of snow on vehicle-generated setsmic signati	CR 84-20 Hes. Al-
Review of antitank obstacles for winter use. R	CR 84-23 schmond CR 84-25
Frozen precipitation and weather, Munchen Ric Germany. Bilello, M.A., [1984, 47p.]	
Overnamy mucuo, M.A., [1794, 475] Snow Symposium, 4th, Hanover, NH, Vol. 1. [1984 Overview of meteorological and snow cover charac	tentature
at SNOW-TWO Bates, R.E., et al. (1984, p. 17) Workshop on Ice Penetration Technology, Hand	MP 1861
June 12-13, 1984 (1984, 345p.) Penetration of shaped charges into ice - Mellor M	SR 84-33 (1954.
Fank E. O sensor system performance in minter an	MP 1995 mersien MP 2073
Clear improvement in obscuration. Palmer, R.A.	. (1985.
p comes 13 from in the construction of see bridges. Conterna et al. (1985, 12p; Sortion of military explosive contaminants on	155, B.A., SR 85-11 benteere
Sorption of military explosive contaminants on drilling muds. Leggett, D.C., [1985, 33p.] Intensity of snowfall at the SNOW experiments. B.	atos, R.E.,
les interaction with the U.S. Arms ribbon bridge	MP 2287 (mstet (R 84-0)

```
Ice heat sinks. Part I: Vertical systems. Lunardini, V.J. SR 86-14 lee heat sinks Part 2 Horizontal systems. [1986, 104p] SR 86-16 SR 86-16 SR 86-16
 Utilization of Unmanned Aerial Vehicles in the ALBE Thrust.
Greeley, H.P., et al. (1986, p. 249-257)

MP 2663
  Effects of water and ice on the scattering of diffuse reflectors.
Jezek, K.C., et al. (1986, p 259-269) MP 2644
 Some developments in shaped charge technology. Mellor, M., (1986, 29p.) SR 86-18
  M., (1986, 29p.)
After-action report—Reforger '85. Liston, R.A., (1986, SR 86-22
  20p<sub>1</sub>
Winter field fortifications. Farrell. D., [1986, 50p<sub>1</sub>
SR 86-25
 Second Workshop on Ice Penetration Technology, 1986, 659p;
SR 26-30
Effect of snow on vehicle-generated seismic signatures. Albert, D G., (1987, p 881-887)
MP 2229
  bert, D.G., (1987, p. 001-007)
Comparison of extraction techniques for munitions residues in soil. Jenkins, T.F., et al. (1987, p.1326-1331)
MP 2350
  Development of an analytical method for explosive residues
in soil Jenkins, T.F., et al., [1987, 51p.] CR 87-87
 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A. (1987, 23p) SR 87-13
Preview of the SNOW-III West data base. Lacombe, I., (1987, p.3-11) MP 2291
 (1787, p.3-11)
Saline ice penetration a joint CRREL-NSWC test program.
Cole, D.M., et al., [1937, 34p.]
Military snow removal problems.
p.452-453
Minsk, L.D., [1987, MP 2248
  Persistence of chemical agents on the winter battlefield.
Leggett, D.C., (1987, 20p)
CR 87-12
  Surption of chemical agents and simulants. Leggett, D.C. (1987, 15p.)

SR 87-18
  [1987, 15p.]
Field observations of mine detection in snow using UHF short-pulse radar. Arcone, S.A., et al., [1987, 24p.]
SR 87-19
 Environments and standards for military operation. Opits. B K., et al., [1987, 137p] MP 2309
Corps of Engineers research in the Arctic. Smallidge, P.D., et al., [1987, p.81-87] MP 2411
DOD floating ice groblems. Cox. G F.N., [1987, p.151-154] MP 2414
  Mechanical and physical properties of soils in cold regions.
Chamberlain, E.J., (1987, p.155-161) MP 2415
Obscuration and background dynamics in and over snow, 169an, A.W., (1987, p.181-185) MP 2417.
  Recent research on acoustic to seise D.G., (1987, p.223-225)
  Analytical method for determining tetrazane Walsh, M.E., et al., (1987, 34p.)
                                                                                                      in water.
SR 87-25
 Exaporation of chemical agents from ice and snow. Leggett, D.C., (1988, 10p.)
Snowfall amounts and snow depths in Germany and NEUSA.
Bates, R.E., et al., (1988, p.107-117)
MP 2401
  Prediction of winter battlefield weather effects.
C.C., et al. (1928, p.357-362)
                                                                                                       Ryerson,
MP 2402
  Decontamination of chemical agents on the winter battlefield.

Parker, L.V., (1988, 48p.)

CR 29-07
  Experimental and theoretical studies of acoustic-to-seismic coupling. Aftert, D.G., (1988, p.19-31). MP 2432
  Development of analytical methods for military-unique com-
pounds. Walsh, M.E., et al., [1988, p.370-380]
MP 2454
  Deployment of floating bridges in ice-covered rivers. Mel-
lor, M., et al., [1933, 32p.] SR 88-20
  Antitank obstacles for winter use Richmond, P.W., 1988, 110 t
 Ling the Grownd Emplaced Mine Scattering System in win-
ter Richmond, P.W., et al. [1983, 13p.; SR 88-23.7
SNOW III WEST field experiment report: Volume 1 La-
combe, J., et al. [1988, 170p.; SR 88-28.7
  Land mines in winter Richmond, P.W., [1939, 10p.]
SR 89-11
  Factors affecting rates of see cutting with a chain saw Cou-
termarsh, B.A., [1989, 14p.] SR 89-24
 injust of the winter environment on infrared target signatures. Lacombe, J., [1889, n.p.] MP 2547.
CBR operations in cold weather a bibliography. Vol.1. Carlon, 118., ct. al., [1989, 889.] MP 2574.
Freecedings. [1989, 475p.] SR 89-39.
  Models of the mechanical properties of see Richter-Menge, JA., et al. [1986, p. 87-95]. MP 2887. Whiter bridging exercise on thick see Fort MCOs, Wisconsin, 1988. Contermarsh, B.A., [1990, 24p].
                                                                                                       SR 90-10
  Thermal infrared survey of winter trails at Fort Wamwight
Collins, C.M., et al. 1999, 1494 SR 98-17
Military research
  Mine detection using non-unussodal radar laborators lests. Dean, A.M., Jr., et al., [1984, 25p.] SR 84-22. Ice penetration tests. Garcia, N.B., et al., [1985, p.225-236]. MP 2814
  Use and apprecation of PRESTO in Snow-III West Stallings,
E.S., et al. (1936), p. 11-24; MP 2658
      LS, at 21, (1984, p. 11-24)
  Field water supply on the winter buttlefield. B
```

et al, [1988, p.269-281] MP 2433	honen, C., et al. (1977, p.41-44) MP 961	Andreas, E.L. (1986, 19p.) CR 86-09
Behavior of materials at low temperatures. Dutta, P.K.,	Detection of moisture in construction materials. Morey, R.M. et al. [1977, 9p] CR 77-25	Thermal and size evolution of sea spray droplets. Andreas, E.L., (1989, 37p.) CR 89-11
Octanol-water partition coefficients for organophosphonates.	CRREL roof moisture survey, Building 208 Rock Island Arse-	Environment of wintertime leads and polynyas. Andreas,
Britton, K.B., et al. (1988, 24p.) SR 88-11	nal. Korhonen, C., et al. (1977, 6p.) SR 77-43 Effects of moisture and freeze-thaw on rigid thermal insula-	E.L., (1989, p. 273-288) MP 2669 Sludge dewatering by natural freeze-thaw Martel, C.J.,
Analytical method for determining tetrazene in soil. Walsh, M.E., et al, [1988, 22p.] SR 88-15	tions. Kaplar, C.W., (1978, p.403-417) MP 1965	(1990, p.116-122) MP 2714
Smart weapons operability enhancement. Link, L.E., Jr., (1969, p.165-173) MP 2539	Detecting wet roof insulation with a hand-held infrared cam- era. Korhonen, C., et al. (1978, p A9-A15)	Molecular structure
Military transportation	MP 1213	Octanol-water partition coefficients for organophosphonates. Britton, K.B., et al. (1988, 24p.) SR 88-11
Air-transportable Arctic wooden shelters. Flanders, S.N., et	Infrared thermography of buildings—a bibliography with abstracts. Marshall, S.J., [1979, 67p] SR 79-01	Menitors
al, (1982, p.385-397) MP 1558 Mineralogy	Drainage and frost action criteria for a pavement design.	Automatic data collection equipment for oceanographic ap- plication, Dean, A.M., Jr., (1978, p.1111-1121)
Examining antarctic soils with a scanning electron micro-	Berg, R L., (1979, 51p.) SR 79-15 Roof moisture survey—U.S. Military Academy. Korhonen,	MF 1028
scope. Kumai, M., et al, [1976, p.249-252] MP 931 Mines (ordnessee)	C, et al. (1979, 8 refs.) SR 79-16	Dynamic ice breakup control for the Connecticut River near Wiralsor, Vermont. Ferrick, M.G., et al. (1988, p.245-
Frozen soil characteristics that affect land mine functioning.	Roofs in cold regions. Tobiasson, W., [1980, 21p.; MP 1408	258 ₃ MP 2449
Richmond, P.W., (1983, 18p.) SR 83-05 Mine detection using non-sinusoidal radar: laboratory tests.	Window performance in extreme cold. Flanders, S.N., et al.	Monitoring pavement performance in seasonal frost areas. Berg, R L., [1989, p.10-19; MP 2564
Dean, A.M., Jr., et al. (1984, 99p.) SR 84-22	[1981, p.396-408] MP 1393	Moraines
Conventional land mines in winter. Richmond, P.W., [1984, 23p.] SR 84-30	Roof moisture surveys. Tobiasson, W., et al. (1981, 189.) SR 81-31	Antarctic soil studies using a scanning electron microscope. Kurasi, M., et al. (1978, p.10a-112) MP 1306
Mine detection in cold regions using short-pulse radar. At-	Can wet roof insulation be dried out. Tobiasson, W., et al., (1983, p.626-639) MP 1509	Diamictons at the margin of the Matanuska Glacier, Alaska.
cone, S.A., [1985, 16p.] SR 85-23 Land mines in winter. Richmond, P.W., [1989, 10p.]	(1983, p 626-639) MP 1509 Condensation control in low-slope roofs. Tobiasson, W.,	Lawson, D.E., (1981, p.78-84) MP 1462 Moses
SR 89-11	(1985, p 47-59) MP 2039	Tundra environment at Barrow, Alaska. Bunnell, F.L., et al.
Mining Tour Consultant plants forming study Achten C.D.	Vapor drive maps of the U.S.A. Tobiasson, W., et al., [1986, 7p. + graphs] MP 2041	(1975, p.73-124) MP 1030 Motor vehicles
Isun, Greenland: glacier freezing study. Ashton, G.D., [1978, p.256-264] MP 1174	Vents and vapor retarders for roofs. Tobiasson, W. (1986,	Winter air pollution at Fairbanks, Alaska. Courts, H.J., et al.
Mobilley	11p ₂ MP 2245 Vents and vapor retarders for roofs. Tobiasson, W., 1987,	(1981, p.512-528) MP 1395
Vehicle mobility over snow. Bloisdell, G.L., (1987, p.265- 2661 MP 2420	p.\$0-90 ₁ MP 2352	Shallow snow model for predicting vehicle performance. Harrison, W.L., [1981, 21p.] CR 81-20
Arctic mobility problems. Abele, G., (1987, p.267-269)	Wood-frame roofs and moisture. Tobiassen, W., [1988, p.33-37] MP 2340	ISTVS workshop on tire performance under winter condi-
MP 2421 Mobility: working group report. Blaisdell, G L., et al,	Moisture detection	tions, 1983, (1985, 177p) SR 95-15 Vehicle for cold regions manifely measurements. Blainfell.
(1967, p.273-274) MP 2423	Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) MP 1390	G.L., (1985, p.9-20) Ser 2000
Models Synthesis and modeling of the Berrow, Alaska, ecosystem.	Roof moisture surveys. Tobiasson, W., (1982, p.163-166)	Winter tire tests: 1980-81. Blaisdell, G.L., et al. (1985, p.135-151) MP 2015
Coulombe, H.N., et al. (1970, p.44-49) MP 944	MP 1505	Field demonstration of traction testing procedures. Mais-
Abiotic overview of the Tundra Biome Program, 1971. Weller, G., et al. (1971, p. 173-181) MP 906	Moisture detection in roofs with cellular plastic insulation. Korhopen, C., et al. (1982, 22p.) SR 82-07	dell, G L., (1985, p.176) MP 2016 Instrumented vehicle for the measurement of mobility param-
Weller, G., et al. (1971, p.173-181; MP 906 lee forces on model structures. Zabilansky, L.J., et al.	Infrared inspection of new roofs. Korhonen, C., (1982, 140.)	eters. Blaisdell, G L., (1988, p.377-348) MP 2406
(1975, p.400-407) MP 963	Roof moisture surveys, current state of the technology.	MOUNTAINS
Ice forces on simulated structures. Zabilansky, L.J., et al., [1975, p.387-396] MP 864	Tobiasson, W., [1983, p.24-31] MP 1628	Geology and physiography of cold regions. Steams, S.R., [1965, 40p.] M I-A1
Thickness and roughness variations of arctic multiyear sea ice.	Locating wet cellular plastic insulation in recently constructed roofs Korhonen, C., et al. (1983, p.168-173)	Mountains
Ackley, S.F., et al. (1976, 25p.) CR 76-18 Generation of runoff from subsectic snowpacks. Dunne, T.	MP 1729	Atmospheric icing rates with elevation on northern New Eng- land mountains, U.S.A. Ryerson, C.C., (1990, p.90-97)
et al., (1976, P.677-685) MP 883	Comparison of acrial to on-the-roof infrared moisture surveys. Korhonen, C., et al. (1983, p.95-105) MP 1799	MP 2509
Computer program for determining electrical resistance in nonhomogeneous ground. Accord. S.A., (1977, 16p.)	U.S. Air Force roof condition index servey: Ft. Greely, Alas-	Municipal engineering
CR 77-02	ka. Contermatsh, B.A., (1984, 67p.) SR 86-03 Roof moisture surveys: yesterday, today and tomorrow.	Pothole primer; a public administrator's guide to understand- ing and managing the pothole problem. Eaton, R.A.
CR 77-02 Computer modeling of terrain modifications in the arctic and	Roof moisture surveys: yesterday, today and tomorrow, Tobiasson, W., et al. (1985, p.438-443 + figs.)	ing and managing the pathole problem. Eston, R.A., coord, [1921, 24p.] MP 1416
CR 77-02 Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al., [1977, p.24-32] MP 971	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. [1985, p.438-443 + figs.] MP 2000 Aerial roof moisture surveys. Tobiasson, W., [1995, p.424-	ing and managing the pothole problem. Eaton, R.A., coord, [1921, 24p.] MP 1416 Nobels Thermal infrared survey of winter trails at Fort Wanninght.
CR 77-02 Computer modeling of terrain modifications in the arctic and subarctic. Outcalt, S.I., et al., [1977, p.24-32]	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1995, p.424- 425) MP 2022	ing and managing the pothole problem. Eaton, R.A., coord, [1921, 249.] MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 169.] SR 98-17
CR 77-02 Computer modeling of terrain modifications in the artic and subsertic. Outcalt, S.I., et al., (1977, p.24-32) MP 971 Resiliency of silt under asphalt during freezing and thawing. Johnson, T.C., et al., (1978, p.662-648) MP 1106 Lysimeters validate wastewater renovation models.	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1995, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1996, p.277-290)	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 24p.] MP 1416 Noleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 14p.] SR 90-17 Noticeal resources Cold climate withties delivery design manual. Smith D.W.
CR 77-02 Computer modeling of terrain modifications in the arctic and subserctic. Outcalt, S.I., et al., (1977, p.24-32) MP 971 Resiliency of sist under asphalt during freezing and thawing. Johnson, T.C., et al., (1978, p.662-668) MP 1106 Lynineters validate wastewater renovation models. [Alander, I.K., et al., (1978, 11p.) SR 78-12	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. [1925, p.438-443 + figs.] MP 2000 Acrial roof moisture surveys. Tobiasson, W., [1995, p.424-425] Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. [1916, p.277-290] MP 2003	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 24p.] MP 1416 Noteds Thermal infrared servey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 16p.] SR 98-17 Natural resources Cold climate withies delivery design manual. Smith, D.W., et al. [1979, c100 leaves] MP 1373
CR 77-02 Computer modeling of terrain modifications in the artic and subserctic. Outcalt, S.I., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thawing, Johnson, T.C., et al., (1978, p.662-648) Lysimeters validate wastewater renovation models. Iskander, I.K., et al., (1978, 11p.) Hydraulic model investigation of drafting snow J.L., (1978, 27p.) CR 78-16	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2040 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) MP 2003 Airhoene roof moisture surveys. Tobiasson, W., 1986, p.45-47; MP 2199	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 24p.] MP 1416 Noleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 14p.] SR 90-17 Noticeal resources Cold climate withties delivery design manual. Smith D.W.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al. (1977, p.24-32) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-668) MP 1196 Lysimeters validate masterization models. Islamder, Isl., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1972, 27p.) Regelation and the deformation of wet snow Colbeck, S.C.	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) MP 2022 Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airhoene roof moisture surveys. Tobiasson, W., (1984, p.45-47) p.45-47; Infrared testing for leaks in new roofs. Korhonen, C.,	ing and managing the pothole problem. Eaton, R.A., coord, (1981, 249.) Nileds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. (1990, 169.) Notional resources Cold climate utchiries delivery design manual. Smith, D.W., et al. (1979, c300 leaves) Offshore cell in the Alaskan Arciic. Weeks, W.F., et al. (1984, p.171-178) Constraints and approaches in high latitude natural resource
CR 77-02 Computer modeling of terrain modifications in the artic and subserctic. Outcalt, S.I., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thawing. Johnson, T.C., et al., (1978, p.662-646) Lysimeters validate wastewater renovation models. Iskander, I.K., et al., (1978, 119.) Hydraulic model investigation of drafting snow J.L., (1978, 29p.) Regeletion and the deformation of wet snow Collect, S.C., et al., (1978, p.639-650) MP 1122 Modeling snow cover ranoff meeting, Sep. 1978. Collects,	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2040 Aerial roof moisture surveys. Tobiasson, W., (1995, p.424-425) Lessons learned from examination of membrase roofs in Alasta. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korboren, C., (1987, p.49-54) Method for conducting airborne infrared roof meisture surveys.	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 24p.] MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 14p.] SR 99-17 Noternal resources Cold climate withties delivery design manual. Smith, D.W., et al. [1979, 6300 leaves] MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. [1984, p.371-373] MP 1743
Computer modeling of terrain modifications in the arctic and subarctic. Outcalt, S.I., et al. (1977, p.24-32) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) MP 1196 Lysimeters validate master renovation modes. Iskandor, Isk., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Regelaterion and the deformation of wet snow CR 78-16 MP 1172 Modeling snow cover ranoff meeting. Sep. 1978. Collect., S.C., ed. (1979, 432p.) S.C., ed. (1979, 432p.)	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airbectic roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.48-54) Method for conducting airborne infrared roof moisture roofs. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moistures. Tobiasson, W., (1988, p.50-61)	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 Notural resources Cold climate utilities delivery design manual. Smith, D.W., et al. §1979, c300 leaves Offshore oil in the Aleskan Arctic. Weeks, W.F., et al. §1984, p.371-1733 Constraints and approaches in high latitude natieral resource sampling and research. Slaughter, C.W., et al. §1994, p.41-443 Novigation
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-646) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-646) MP 1196 Lysimeters validate wastewater renovation models. Islamder, I.K., et al., (1978, 11p.) SR 78-12 Hydraulic model investigation of drifting snow J.L., (1978, 29p.) Hydraulic model investigation of wet snow CR 78-16 Registerion and the deformation of wet snow CR 78-16 Registerion and the deformation of wet snow SR 79-17 Medeling snow cover runoff meeting, Sep. 1975. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.222-228) MP 1246	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.48-54) MP 2003 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-61) MP 2436 Neodestructive evaluation of moesture migration in misulation material. Avenade, O.A., (1989, p.111-121)	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 246.] MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al., [1990, 146.] SR 98-17 Noteral resources Cold climate utilities delivery design manual. Smith, D.W., et al., [1979, 6300 leaves] MP 1373 Offshore out in the Alaskan Arctic. Weeks, W.F., et al., [1984, p.371-378] MP 1743 Constraints and approaches in high latitude natural resource sampling and research. Slaughter, C.W., et al., [1984, p.41-44]
Computer modeling of terrain modifications in the arctic and subarctic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate materianter renovation models. Islamder, Isl., et al. (1978, 11p.) SR 78-12 Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Regeletion and the deformation of wet snow Collect, S.C., et al. (1979, p.639-650) Medicing snow cover runoff meeting. Sep. 1978. Collects, S.C., ed. (1979, 432p.) Acoustic emission response in polycrystaline materials. SR 79-34 Medeling of ice in rivers. Alstron, G.D., (1979, p.24-1)	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korborne, MP 2195, p.49-54; Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) MP 2282 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) MP 2436 Nondestructive evaluation of moisture migration in misulation material. Ayounde, O.A., (1989, p.111-121) MP 2716	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Nateds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 98-17 Notural resources Cold climate utshtics delivery design manual. Smith, D.W., et al. §1979, ¢100 (caves) MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. §1984, p.371-3783 MP 1743 Constraints and approaches in high latitude nateral resource sampling and research. Staughter, C.W., et al. §1984, p.374-469 MP 2013 Notigiblion Helicopter stown obscuration sub-test. Ehersole, J.F., §1984, p.359-376) Data acquisition for refrigerated physical model. Zufelt.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al., (1977, p.24-32) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-664) MP 1106 Lysimeters validate mastermater renovation models. Islamder, I.K., et al., (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 29p.) Hydraulic model investigation of wet snow CR 78-16 Registerion and the deformation of wet snow CR 78-16 Registerion and the deformation of wet snow SR 79-36 Acoustic emission response in polycrystaline materials. Lavence, W.F., (1979, p.22-328) MP 1246 Modeling of ice in rivers. Ashton, G D., (1979, p.14'1-14/26) Mythi year pressure ridges in the Canadian Beaufort Sea	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.46-54) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-61) MP 2436 Nendestructive evaluation of moesture magration in misslation material. Ayounder, O.A., (1989, p.111-121) Moisture meters.	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 246.] MP 1416 Noleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 186.] SR 98-17 Notural resources Cold climate utilities delivery design manual. Smith, D.W., et al. [1970, 6300 leaves] MP 1373 Offshore out in the Alaskan Arctic. Weeks, W.F., et al. [1984, p.371-378] MP 1743 Constraints and approaches in high latitude natural resource sampling and research. Slaughter, C.W., et al. [1984, p.41-46] Novigation Helcopter snow obscuration sub-test. Electsole, J.F., [1984, p.359-376] MP 2004
Computer modeling of terrain modifications in the arctic and subarctic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate matterienter renovation models. Islandor, I.K., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Collect., S.C., et al. (1978, p.639-650) Medicing snow cover runoff meeting. Sep. 1978. Collects, S.C., et al. (1978, 232-p.) Acoustic emission response in polycrystalline materials. St. Lawrence, W.F., (1979, p.23-228) Medeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Multi year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al. (1979, p.107-126) MP 1229	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Kochonen, C. (1987, p.49-54) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Nondestructive evaluation of moisture migration in misulation material. Ayounde, O.A., (1989, p.111-121) Moisture meters. Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271). MP 1390	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Naleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 98-17 Notural resources Cold climate utshtics delivery design manual. Smith, D.W., et al. §1979, ¢100 Icaves; MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. §1984, p.371-1783 MP 1793 Constraints and approaches in high latitude nateral resource sampling and research. Staughter, C.W., et al. §1984, p.374-463 MP 2013 Notigation Helicopter store obscuration sub-test. Electrole, J.F., §1994, p.359-3763 Data acquisition for refrigerated physical model. Zufek, J.E., §1917, p.358-3413 Nitrate deposits Nitrate deposits Nitrate forceatness in natarctic snow and firm. Parker, B.C.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al., (1977, p.24-32) MP 971 Resiliency of sist under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-668) Lysimeters validate mosterienter renovation models. Islamder, I.K., et al., (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 29p.) Regelation and the deformation of wet snow et al., (1978, 198, 9-650) Modeling snow cover round? meeting, Sep. 1978. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.22-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14*1-14/26) Modeling of ice in rivers. Ashton, G.D., (1979, p.14*1-14/26) Mytit year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al., (1979, p.107-126) MP 1229 Volumetric constitutive law for snow. Brown, R. L., (1950, MP 1803)	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) MP 2000 Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.46-54) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-61) MP 2436 Nendestructive evaluation of moesture magration in misslation material. Ayounder, O.A., (1989, p.111-121) Moisture meters.	ing and managing the pothole problem. Eaton, R.A., coord, [1981, 24p.] MP 1416 Naleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al., [1990, 16p.] SR 98-17 Notural resources Cold climate utchtics delivery design manual. Smith, D.W., et al., [1979, c300 leaves] MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al., [1984, p.371-378] MP 1743 Constraints and approaches in high latitude natural resources sampling and research. Staughter, C.W., et al., [1984, p.41-46] Norigation Helicopter snow obscuration sub-test. Ehersole, J.F., [1984, p.359-376] MP 2003 Data acquisition for refingerated physical model. Zulek, J.E., [1987, p.358-341] MP 2351 Nitrate deposits Nitrate fructuations in natarctic snow and firm. Parker, B.C., et al., [1982, p.243-248] MP 1551
Computer modeling of terrain modifications in the arctic and subarctic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate materienter renovation models. Islandar, I.K., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Collect., S.C., et al. (1978, p.639-650) Medicing snow cover runoff meeting. Sep. 1978. Collect., S.C., et al. (1978, 232-p.) Acoustic emission response in polycrystalline materials. St. Lawrence, W.F., (1979, p.23-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Multi year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al. (1979, p.107-126) Welson of the seasonal sea ice zone. Weeks, W.F., (1950, MP 1903) Problems of the seasonal sea ice zone.	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Kothonen, MP 2195 Infrared testing for leaks in new roofs. Kothonen, MP 2292 Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Nendestructive evaluation of moisture migration in insulation material. Alyoninde, O.A., (1989, p.111-121) Melibure meters. Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271). MP 1390 Lysimeters validate waterwater renovation models. Iskandar, I.k., et al. (1978, IIp.) SR 78-12 Recommendations for implementing roof moisture savitys in	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Naleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 98-17 Notural resources Cold climate utshtics delivery design manual. Smith, D.W., et al. §1979, ¢100 Icaves; MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. §1984, p.371-1783 MP 1743 Constraints and approaches in high latitude nateral resource sampling and research. Staughter, C.W., et al. §1984, p.374-149; MP 2013 Notigation Helicopter stown obscuration sub-test. Electrole, J.F., §1942, p.359-376; MP 2019 Data acquisition for refrigerated physical model. Zufek, J.E., §1917, p.358-341; MP 2351 Nitrate deposits Nitrate fluctuations in antarctic show and firm. Parker, B.C., et al. §1982, p.323-245; MP 1551 Nitrogen biotopes Methodology for interprintsotope analysis at CRREL. Jen.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-668) Lysimeters validate mostemater renovation models. Islamder, Isl., et al., (1978, 11p.) Regelation and the deformation of drifting snow J.L., (1978, 27p.) Regelation and the deformation of wet snow J.L., (1978, 25p.) Medeling snow cover ranoff meeting. Sep. 1978. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.22-228) Medeling of ice in rivers. Ashton, G.D., (1979, p.14/1-14/26) Medeling of ice in rivers. Ashton, G.D., (1979, p.14/1-14/26) Medicing some constitutive law for snow gright, B., et al., (1979, p.107-126) Volumetric constitutive law for snow g. Rown, R. L., (1950, p.161-165) Problems of the seasonal sea ice zone. Weeks, W.F., (1980, MP. 1293) Sea ice growth, drift, and decay. Hibler, W.D., III, (1950,	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airhoene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korhonen, C., (1987, p.46-54) Method for conducting airhoene infrared roof moisture veys. Tobiasson, W., (1988, p.50-61) Method for conducting airhoene infrared roof moisture meters. Mayounde, O.A., (1989, p.111-121) Moisture meters. Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) My 1390 Lyameters validate wastewater renovation models. Iskandar, 1 k., et al., (1978, 11p.) SR 78-12	ing and managing the pothole problem. Enton, R.A., coord, [1981, 24p.] MP 1416 Noleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 16p.] SR 98-17 Notural resources Cold climate utchtics delivery design manual. Smith, D.W., et al. [1979, c300 leaves] MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. [1984, p.371-178] MP 1743 Constraints and approaches in high latitude nateral resources sampling and research. Strughter, C.W., et al. [1984, p.41-46] MP 2013 Norigation Helicopter snow obscuration sub-test. Ehersole, J.F., [1984, p.359-376] MP 2019 Data acquisition for refingerated physical model. J.E., [1987, p.338-341] MP 2019 Nitrate deposits Nitrate froctunities in natarctic snow and firm. Parker, B.C., et al. [1982, p.243-248] MP 1551 Nitrate incutanties in natarctic snow and firm. Parker, B.C., et al. [1982, p.243-248] MP 1551 Nitrate observed in tragent isotope analysis at CRREL. Jen-lins, T.F., et al. [1978, 57p.]
Computer modeling of terrain modifications in the arctic and subarctic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate materiaster renovation models. Islandar, I.K., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Collect., S.C., et al. (1978, p.639-650) Medicing snow cover runoff meeting, Sep. 1978. Collect., S.C., et al. (1978, 232-23) Acoustic emission response in polycrystalline materials. St. Lawrence, W.F., (1979, p.223-224) Medeling of ice in rivers. Ashton, G.D., (1979, p.16-11-14/26) Multi-year pressure ridges in the Canadian Bearder Sea Wright, B., et al. (1979, p.107-126) Volumetric constitutive law for snow p.161-165. MP 1293 Sea ice growth, drift, and decay. Hibler, W.D., III, (1950, p.141-209) MP 1298	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) MP 2002 Lessons learned from examination of membrane roofs in Alsaka. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korborne, MP 2109 Infrared testing for leaks in new roofs. Korborne, MP 2292 Method for conducting airborne infrared roof missiture surveys. Tobiasson, W., (1988, p.50-41) MP 2282 Method for conducting airborne infrared roof missiture surveys. Tobiasson, W., (1988, p.50-41) MP 2346 Nondestructive evaluation of moisture migration in misulation material. Ayounde, O.A., (1989, p.111-121) MP 2716 Moisture meters. Iland-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyameters validate waterwater removation models. Iskandar, I.k., et al., (1978, IIp.) SR 78-01 Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and remost from a subarctic snowpack.	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Naleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 99-17 Notural resources Cold chimate utshtics delivery design manual. Smith, D.W., et al. §199, £100 Carvey. MP 1373 Offshore oil in the Alaskan Arcine. Weeks, W.F., et al. §1984, p.371-1783 MP 1743 Constraints and approaches in high latitude naterial resource sampling and research. Straighter, C.W., et al. §1984, p.376-1978 MP 2013 Notigation Helicopter show obscuration sub-test. Electsole, J.F., §1984, p.359-176; MP 2009 Data acquisition for refingerated physical model. Zufelt, J.E., §1987, p.338-341; MP 2351 Nitrate deposits Nitrate finetuations in natarctic show and firm. Parker, B.C., et al. §1982, p.323-245; MP 1551 Nitrogen hostopies Methodology for intergen isotope analysis at CREEL. Jenkus, T.F., et al. §1978, \$7p.) Noise (sound) Johanson, J.B.,
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-668) Lysimeters validate materianter renovation models. Islamder, Ikk, et al., (1978, 11p.) Rysimeters validate materianter renovation models. Islamder, Ikk, et al., (1978, 11p.) SR 78-12 Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Regelerion and the deformation of wet snow CR 78-16 Regelerion and the deformation of wet snow CR 78-16 MP 1172 Modeling snow cover ranoff meeting. Sep. 1978. Colseck, S.C., ed., (1979, 432p.) SR 79-34 Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.223-228) MP 1246 Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Multi year pressure ridges in the Canadian Besidort Sea. Wright, B., et al., (1979, p.107-126) Welling of the seasonal sea ice zone. Brown, R. L., (1950, p.161-165) Problems of the seasonal sea ice zone. Weeks, W.F., (1960, p.1-35) Sea ice growth, drift, and decay. Hibler, W.D., III, (1950, p.141-209) Hydrologic modeling from Landstat land cover data MKKim, H.L., et al., (1944, 1954). SR 84-81	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1986, p.277-290) Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) MP 2003 Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Kochonen, C., (1987, p.48-54) Method for conducting airborne infrared roof moisture verys. Tobiasson, W., (1988, p.50-61) Nendestructive evaluation of moesture migration in misslation material. Ayounder, O.A., (1989, p.111-121) Moisture meters. Iland-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyumeters validate wavewater renovation models. Iskandar, I.k., et al., (1978, Ilp.) Recommendations for implementing roof moesture surveys in the U.S. Army (1978, 8p.) Moisture transfer. Energy balance and runoff from a subarcitic surveys in CR 76-27.	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Noleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 98-17 Notural resources Cold climate utilities delivery design manual. Smith, D.W., et al. §1979, c300 leaves; MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. §1984, p.371-378; MP 1743 Constraints and approaches in high latitude natural resource sampling and research. Staughter, C.W., et al. §1994, p.41-46; MP 2013 Norigation Helicopter snow obscuration sub-test. Ehersole, J.F., §1994, p.359-376; MP 2013 Norigation Securities of refingerated physical model. Zufelt, J.E., §1937, p.335-341; MP 2094 Nitrate fluctuations in antarctic snow and firm. Parket, B.C., et al. §1992, p.323-245; MP 1591 Nitrate fluctuations in antarctic snow and firm. Parket, B.C., et al. §1992, p.323-245; MP 1591 Nitrate fluctuations in antarctic snow and firm. Parket, B.C., et al. §1992, p.324-245; MP 1591 Nitrate fluctuations. In antarctic snow and firm. Parket, B.C., et al. §1992, p.324-245; MP 1591 Nitrogen biotopics Methodology for introgen isotopic analysis at CRREL. Jenkins, T.F., et al. §1978, 57p; SR 78-88 Nolic (sound) Andshelry within and outside deposited snow. Johanson, J.B., §1916.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under apphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysineters validate material renovation models. Islandar, I.K., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Colleck, S.C. et al. (1978, p.639-650) Medicing snow cover runoff meeting, Sep. 1978. Colleck, S.C., et al. (1978, 232-23) Acoustic emission response in polycrystalline materials. St. Lawrence, W.F., (1979, p.223-224) Medeling of ice in rivers. Ashton, G.D., (1979, p.16-1-14/26) Mythi year pressure ridges in the Canadian Bearder Sea Wirght, B., et al. (1979, p.107-126) Volumetric constitutive law for snow p.161-165; Problems of the seasonal sea ice zone. Weeks, W.F., (1990, p.141-209) Hydralagic modeling from Landsat land cover data SR 84-91 Ocean circulation: its effect on seasonal sca-ece similations.	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) MP 2022 Lessons learned from examination of membrane roofs in Alsaka. Tobiasson, W., et al. (1986, p.277-290) Mr 2003 Airhoene roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korhoene, MP 2109 Infrared testing for leaks in new roofs. Korhoene, MP 2292 Method for conducting airhoene infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) MP 2384 Nendestructive evaluation of moisture migration in misulation material. Ayounde, O.A., (1989, p.111-121) Moisture meters. Iliand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyameters validate waterwater removation models. Iskandar, I.k., et al. (1978, IIp) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Resource and remoff from a subarctic showpack Proc. A.G., et al. (1976, 29p.) Tracer movement through snow. Colbeck, S. C., (1977, p.255-242)	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Naleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 98-17 Notural resources Cold climate utshtics delivery design manual. Smith, D.W., et al. §199, ¢100 feaves) MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. §1984, p.371-1783 MP 1743 Constraints and approaches in high latitude naterial resource sampling and research. Staughter, C.W., et al. §1984, p.41-463 MP 2013 Notigation Helicopter same obscuration sub-test. Electrole, J.F., §1994, p.359-3763 Data acquisition for refingerated physical model. Zufek, J.E., §1997, p.358-3413 Nitrate deposits Nitrate fluctuations in natarctic show and firm. Parker, B.C., et al. §1992, p.243-2453 Nitrate fluctuations in natarctic show and firm. Parker, B.C., et al. §1992, p.243-2453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.243-2453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.243-2453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.243-2453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3413 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3453 Nitrate fluctuations in aniarctic show and firm. Parker, B.C., et al. §1992, p.343-3453
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-664) Lysimeters validate materianter renovation models. Islamder, I.K., et al., (1978, 11p.) SR 78-12 Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Golbeck, S.C., et al., (1978, 432p.) Modeling snow cover runoff meeting. Sep. 1978. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.223-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Myling of ice in rivers. Ashton, G.D., (1979, p.14-14/26) Myling of ice in rivers. Ashton, G.D., (1979, p.14-14/26)	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korborn, C., (1987, p.49-54) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Method for conducting airborne imparation in insulation material. Alyoninde, O.A., (1989, p.111-121) Moisture meters. Iland-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyumeters validate waters after removation models. Islandar, I.A., et al. (1978, Ilp.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 183) Response transfer. Energy. Material removed from a subartice snowpack. Proc. A. G., et al. (1976, 293) Tracer movement through same. Colbeck, S.C., (1977) Tracer movement through same.	ing and managing the pothole problem. Enton, R.A., coord, [1981, 24p.] MP 1416 Noleds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al., [1990, 16p.] SR 98-17 Notural resources Cold climate utchtics delivery design manual. Smith, D.W., et al., [1979, c300 leaves] Offshore oil in the Alaskan Arctic. Weeks, W.F., et al., [1984, p.371-378] Constraints and approaches in high latitude nateral resources sampling and research. Staughter, C.W., et al., [1984, p.41-46] Nolegation Helicopter snow obscuration sub-test. Ehersole, J.F., [1994, p.359-376] Data acquisition for refingerated physical model. Zudek, J.E., [1937, p.338-341] Nitrate deposits Nitrate fructuations in natarctic snow and firm. Parker, B.C., et al., [1982, p.243-248] Mrthodology for intergen indoops analysis at CRREL. Jen-lins, T.F., et al., [1978, 57p.] Nole (sound) Audibity within and outside deposited snow. Johanne, J.B., [1935, p.134-142] Model studies of surface noise interference in ground-probing radar. Accone, S.A., et al., [1955, 23p.] CR 85-19 Norway
Computer modeling of terrain modifications in the arctic and subserctic. Outcalt, S.L., et al., (1977, p.24-32) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-646) Lyimeters validate wastewater renovation models. Iskander, I.K., et al., (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 25p.) Regelation and the deformation of wet snow J.L., (1978, p.639-650) Regelation and the deformation of wet snow Coffect, S.C., et al., (1979, 432p.) Acoustic emission response in polycrystalline material. S.C., ed., (1979, 432p.) Acoustic emission response in polycrystalline material. Lavernee, W.F., (1979, p.222-228) MP 1235 Multi year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al., (1979, p.107-126) MP 1335 Multi year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al., (1979, p.107-126) MP 1395 Publicans of the seasonal sea ice zone. Weeks, W.F., (1950, p.141-207) Hydrologic modeling from Landsat land cover data. MCKim, H.L., et al., (1944, 193) Ocean circulation: tes effect on seasonal sea-ice semilations. Hiller, W.D., Ill., et al., (1944, 193) Heat and moisture transfer in frost-heaving sols. MP 1768	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Amberne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korboorn, C., (1987, p.49-54) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Method for conducting airborne infrared roof moisture mays. Tobiasson, W., (1988, p.50-41) Method for conducting airborne infrared roof moisture. MP 2282 Method for conducting airborne infrared roof moisture mays. Tobiasson, W., (1988, p.50-41) Mendestructive evaluation of moesture magration in misulation material. Ayounde, O.A., (1989, p.111-121) Moisture meters Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al., (1977, p.261-271) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 1891) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 1892) Tacer movement through snow Colbeck, S.C., (1977, p.255-262) Maintaning bindings in the Arctic (1977, p.244-251) Recearch on roof moisture detection. Tobiasson, W., et al., MP 1998 Mendestructive surveys in the Arctic (1977, p.244-251) Recearch on roof moisture detection. Tobiasson, W., et al., MP 1998	ing and managing the pothole problem. Eaton, R.A., coord, §1981, 249.3 MP 1416 Nileds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. §1990, 169.3 SR 98-17 Notural resources Cold climate utshtics delivery design manual. Smith, D.W., et al. §1995, ¢300 Icaves; MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. §1984, p.371-1783 MP 1743 Constraints and approaches in high latitude nateral resource sampling and research. Staughter, C.W., et al. §1984, p.376-1783 MP 2013 Notigation Helicopter same obscuration sub-test. Electrole, J.F., §1994, p.359-376; MP 2009 Data acquisition for refrigerated physical model. Zufek, J.E., §1917, p.358-341; MP 2351 Nitrate deposits Nitrate fluctuations in antarctic show and firm. Parker, B.C., et al. §1982, p.323-245; MP 1551 Nitrogen biotopes Wellbedousey for interperationspecial anion. Jahason, J.B., MP 2008 Noise (sound) Audoblity within and outside deposited show. Johason, J.B., MP 1908 Model studies of surface mose interference in ground-probing radias. Arcone, S.A., et al. §1955, 239.3 CR 85-19
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate materianter renovation models. Islamder, I.K., et al. (1978, 11p.) Registerion and the deformation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Golleck, S.C., et al., (1978, 232p.) Medicing snow cover runoff meeting, Sep. 1978. Colseck, S.C., et al., (1978, 232p.) S.R. 79-36 Acoustic emission response in polycrystalinne materials. St. Lawrence, W.F., (1979, p.223-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-7). 14/26j Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., (1979, p.107-126) MP 1303 Problems of the seasonal sea ice zone. Weeks, W.F., (1990, p.161-165) Residency of the seasonal sea ice zone. Weeks, W.F., (1990, p.141-209) Hydrologic modeling from Landsat land cover data McKim, H.L., et al., (1994, p.489-422) MP 1298 Hydrologic modeling from Landsat land cover data McKim, H.L., et al., (1994, p.499-422) MP 1298 Hote and moisture transfer in frost-heaving seals. Guymon, G.L., et al., (1994, p.316-142) B.M., et al., (1994, p.316-342) MP 1765 Carenovia Creek Model data acquisition system. Bennett. B.M., et al., (1995, p.142-1425) MP 2099	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moistute surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Airborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Kochonen, O., (1987, p.49-54) Method foe conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Method foe conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Mendestructive evaluation of moisture migration in misulation material. Ayounde, O.A., (1989, p.111-121) Moisture meters. Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lysimeters validate waters after renovation models. Islandar, I.A., et al. (1918, IIp.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 29p.) Tracer movement through snow. Colbeck, S.C., (1977, p.255-242) Minimaximg buildings in the Arctic. Tobiasson, W., et al. (1977, p.244-251)	ing and managing the pothole problem. Eaton, R.A., coord, (1981, 249.) MP 1416 Nobels Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. (1990, 169.) SR 98-17 Noticeal resources Cold climate utchies delivery design manual. Smith, D.W., et al. (1919, c)00 (caves) MP 1373 Offshore cell in the Alaskan Arctic. Weeks, W.F., et al. (1984, p.371-)78; MP 1763 Constraints and approaches in high latitude natural resource sampling and research. Slaughter, C.W., et al. (1984, p.371-)78; MP 2013 Novigation Helicopter snow obscuration sub-test. Ebersole, J.F., (1981, p.359-)376; MP 2013 Novigation Helicopter snow obscuration sub-test. Ebersole, J.F., (1981, p.359-)376; MP 2018 Nierose deposits Nierose deposits Nierose deposits Nierose deposits Nierosen biotoges Methodeoxy for introgen isotoge analysis at CREEL. Jenkins, T.F., et al. (1978, 579.) MP 1891 Nodel studies of surface noise interference in ground-probing radar. Accome, S.A., et al. (1985, 239.) CR 85-19 Novices.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-464) Lysimeters validate materization freezing and thaving. Johnson, T.C., et al., (1978, p.662-464) MP 1106 Lysimeters validate materization renovation models. Islamder, I.K., et al., (1978, 11p.) SR 78-12 Hydrasdic model investigation of drifting snow J.L., (1978, 29p.) Registerion and the deformation of wet snow J.L., (1978, p.639-650) MP 1173 Medeling snow cover runoff meeting. Sep. 1976. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. Lavenee, W.F., (1979, p.22-228) Medeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Mylti year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al., (1979, p.107-126) MP 1393 Mylti year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al., (1979, p.107-126) MP 1393 Problems of the seasonal sea ice zone. Weeks, W. F., (1950, p.14-16) Problems of the seasonal sea ice zone. Weeks, W. F., (1950, p.14-17) MP 1293 Sea ice growth, drift, and decay. Hibler, W.D., III, (1950, p.141-204) MP 1293 Ocean carculation: its effect on seasonal sea-ice similations thiller, W.D., III, et al., (1984, p.839-492) MP 1708 Heat and moisture transfer in frost-heaving soils. Guymon, G.L., et al., (1948, p.849-492) MP 1708 Heat and moisture transfer in frost-heaving soils. Guymon, G.L., et al., (1948, p.849-492) MP 1708 Heat and moisture transfer in frost-heaving soils. Guymon, G.L., et al., (1948, p.348-482) MP 1709 Heat and moisture transfer in frost-heaving soils. Guymon, G.L., et al., (1948, p.348-482) MP 1709 Heat and moisture transfer in frost-heaving soils. Guymon, G.L., et al., (1948, p.348-482) MP 1709 Heat and moisture transfer in frost-heaving soils. Guymon, G.L., et al., (1948, p.348-482) MP 1709 Heat and moisture transfer in frost-heaving soils. Guymon, MP 1709 Heat and	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1986, p.277-290) Amboene roof moisture surveys. Tobiasson, W., (1986, p.45-47) Amboene roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.48-54) Method foe conducting sirborne infrared roof moisture veys. Tobiasson, W., (1988, p.50-61) Method foe conducting sirborne infrared roof moisture veys. Tobiasson, W., (1988, p.50-61) Method foe conducting sirborne infrared roof moisture. Tobiasson, W., (1988, p.50-61) Moisture meters Hand-held infrared systems foe detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyameters validate wastewater tenovation models. Iskandar, I.k., et al. (1978, IIp.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and ramoelf from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and ramoelf from a subarctic surveys in the U.S. Army (1978, 8p.) Tacer movement through snow Colbeck, S.C., (1977, p.255-25) Minimissing buildings in the Arctic Tobiasson, W., et al. (1977, p.24-251) Records not roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Records not roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Records not roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection.	ing and managing the pothole problem. Eaton, R.A., coord, (1981, 249.) Nileds Thermal infrared survey of winter trails at Fort Wainwright, Callin, C.M., et al. (1990, 169.) Noticeal resources Cold climate utilities delivery design manual. Smith, D.W., et al. (1979, cl00 leaves) Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. (1984, p.371-378) Constraints and approaches in high latitude nateral resource sampling and research. Saughter, C.W., et al. (1984, p.371-376) Noticeal and research. Saughter, C.W., et al. (1984, p.41-46) Data acquisition for refrigerated physical model. Zufek, J.E., (1987, p.358-341) Nitrate deposits Nitrate froctuations in antarctic show and firm. Parker, B.C., et al. (1982, p.323-245) Nitrogen bastopes Methodology for introgen isotope analysis at CRREL. Jenkins, T.F., et al. (1978, 57p.) Node (sound) Audobity within and outside deposited show. Johanson, J.B., MP 1969 Model studies of surface noise interference in ground-probing radar. Accome, S.A., et al. (1985, 33p.) CR 85-19 Norwey Los pressure weather systems in and around. Norwegian waters. Bilefle, M.A., (1984, p.53-64) Met it transfer between water gets and see Mocks. Yen, YC.,
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate materials are renovation models. Islamider, I.K., et al. (1978, 11p.) Hydraulic model investigation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Collect., S.C., et al. (1978, p.639-650) Medicing snow cover runoff meeting. Sep. 1978. Collect., S.C., et al. (1978, 23p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.23-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-7). 14/26j Multi year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al. (1979, p.107-124) Wellington of the seasonal sea ice zone. Brown, R. L., (1950, p.161-165) Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p.13-15) Sea ice growth, drift, and decay. Hibler, W.D., III, (1950, p.141-209) Hydrologic modeling from Landsat land cover data McKim, H.L., et al. (1984, p.319-422) Mest and moisture transfer in front-heaving soils. Guymon, G.L., et al., (1984, p.316-343) Carenovia Creek Model data acquisition system. Remeet, B.M., et al., (1985, p.142-1425) MP 2091 Instrumentation for an uplifting see force model. Zablansky, L.J., (1985, p.1430-1435) Carps of engineers seek ice redstions. Frankensten, G.E., M.P. 2091 Carps of engineers seek ice redstions. Frankensten, G.E.,	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Arrhoene roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Arrhoene roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.49-54) Method foe conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Method foe conducting airborne infrared roof moisture surveys. Tobiasson, W., (1989, p.111-121) Moisture meters. Iland-held infrared systems foe detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyumeters validate wastewater removation models. Islandar, I.A., et al. (1978, Ipp.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and ramed from a subarctic snowpack. Proc. A.G., et al. (1976, 29p.) Tracer movement through snow Colbeck, S.C., (1977, p.253-25). Manitaning bindings in the Arctic Tobiasson, W., et al., (1977, p.244-251) Research on roof moisture detection. Tobiasson, W., et al., (1977, p.244-251) Research on roof moisture detection. Tobiasson, W., et al., (1977, p.244-251) Research on roof moisture detection. Tobiasson, W., et al., (1977, p.244-251) Research on roof moisture detection. Tobiasson, W., et al., (1977, p.244-251) Research on roof moisture detection. SR 78-93 Research on roof moisture detection. SR 78-93 Research on roof moisture detection. SR 78-93 Research on roof moisture detection of common roof common roof moisture survey. Korhonen, C., et al., (1980, 31p.) Methods of the p.272 of the common roof comm	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Nobeds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. (1990, 169.) SR 96-17 Notional resources Cold climate utchies delivery design manual. Smith, D.W., et al. (1979, c300 (cave) MP 1373 Offshore cell in the Alaskan Arctic. Weeks, W.F., et al. (1984, p.371-)783 Constraints and approaches in high latitude natural resource sampling and research. Slaughter, C.W., et al. (1984, p.41-46) Norigation Helicopter snow obscuration sub-test. Electrole, J.F., (1984, p.359-376) Data acquisition for refrigerated physical model. Zufek, J.E., (1982, p.359-374) Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) Nitrate fluctuations of surface deposited snow. Johanson, J.B., alias. Arcone, S.A., et al. (1985, 23p.) Noblet (sound) Audibitry within and outside deposited snow. Johanson, J.B., (1985, p.184-142) Model studies of surface noise interference in ground-probing radar. Arcone, S.A., et al. (1985, 23p.) Norther Los pressure wrather systems in and around Norwegian waters. Bitche, M.A., (1986, p.53-66) MP 2181 Norther C. M. (1986, p.53-66) NP 2182 Norther capholisms
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.I., et al., (1977, p.24-32) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-664) Lysimeters validate masterize renovation models. Islamder, I.K., et al., (1978, 11p.) Registerion and the deformation of drifting snow J.L., (1978, 29p.) Registerion and the deformation of wet snow Colbect, S.C., ed., (1979, 432p.) Modeling mow cover moself meeting. Sep. 1978. Colbect, S.C., ed., (1979, 9.43p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.22-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) My 1335 My 1292 Volumetric constitutive law for snow. Brown, R. L., (1990, p.14-1-16/5) Problems of the seasonal sea ice zone. Weeks, W.F., (1990, p.1-15) Sea ice growth, drift, and decay. Hibler, W.D., III, (1990, p.141-207) Hydrologic modeling from Landsat land cover data McKim, H.L., et al., (1914, 19p.) Ocean circulation: its effect on seasonal sea-oce similations. MP 1293 Hydrologic modeling from Landsat land cover data McKim, H.L., et al., (1914, 19p.) Ocean circulation: its effect on seasonal sea-oce similations. Hibler, W.D., III, et al., (1914, 19p.) Carenovia Creek Model data acquisition system. Rennett, MP 1765 Carenovia Creek Model data acquisition system. Rennett, B.M., et al., (1919, p.14-14-14-17) International contents of the special content of the c	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessonis learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1986, p.277-290) Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.46-54) Method for conducting airborne infrared roof moisture verys. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moisture. MP 2892 Nendestructive evaluation of moesture migration in misulation material. Ayounder, O.A., (1989, p.111-121) Moisture meters. Iland-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyameters validate wastewater renovation models. Iskandar, I.k., et al. (1978, 11p.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer. Energy. Sultance and runoff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer. Energy. Sultance and runoff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer. Energy. Sultance and runoff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer. Energy. Sultance and runoff from a subarctic runoyacian for the surveys in the U.S. Army (1978, 8p.) Meisture for mosement through sawe. Cocheck, S.C., (1977, p.255-26); Manistaning buildings in the Arctic Tobiasson, W., et al. (1977, 9p.) R. 88-18 Mesture gain and its shermal consequence for common roof involutions. Tobiasson, W., et al. (1980, p.4-18) MP 1361	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) Nileds Thermal infrared survey of winter trails at Fort Wainwright, Callin, C.M., et al. (1990, 169.) Noticeal resources Cold climate utilities delivery design manual. Smith, D.W., et al. (1979, cl00) leaves; Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. (1984, p.371-378) Constraints and approaches in high latitude nateral resource sampling and research. Saughter, C.W., et al. (1984, p.371-376) Noticeal and research. Saughter, C.W., et al. (1984, p.371-376) Data acquisition for refrigerated physical model. Zufek, J.E., (1987, p.358-341) Nitrate deposits Nitrate fluctuations in antarctic show and firm. Parker, B.C., et al. (1982, p.323-245) Nitrogen bastopes Methodeology for introgen isotope analysis at CRREL. Jenkins, T.F., et al. (1978, 57p.) Model stonado. Modelsty within and outside deposited show. Johanson, J.B., MP 1969 Notice (sound) Audobility within and outside deposited show. Johanson, J.B., MP 1969 Model studies of surface noise interference in ground-probing radar. Accone, S.A., et al. (1985, 23p.) CR 85-19 Noteins Heat transfer between water jets and see Mocks. Yen, YC., (1976, p. 298.)67; Notless Capitalisis of explosions.
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al. (1977, p.24-32) Resiliency of silt under anphalt during freezing and thaving. Johnson, T.C., et al. (1978, p.662-664) Lysimeters validate materianter renovation models. Islamder, I.K., et al. (1978, 11p.) Registerion and the deformation of drifting snow J.L., (1978, 27p.) Registerion and the deformation of wet snow Golleck, S.C., et al., (1978, 432p.) Medeling snow cover runoff meeting. Sep. 1978. Colseck, S.C., ed., (1979, 432p.) SR 79-34 Acoustic emission response in polycrystaliane materials. St. Lawrence, W.F., (1979, p.22-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) Multi year pressure ridges in the Canadian Beaufort Sea. Wright, B., et al., (1979, p.107-126) MP 1229 Volumetric constitutive law for snow Rrown, R. L., (1990, p.161-165) Problems of the seasonal sea ice zone. Weeks, W.F., (1990, p.161-165) MP 1290 Problems of the seasonal sea ice zone. Weeks, W.F., (1990, p.141-209) Hylrologic modeling from Landsat land cover data McKim, H.L., et al., (1994, p.489-492) MP 1290 Ocean circulation: its effect on seasonal sea-see similations. Hibler, W.D., III, et al., (1994, p.489-492) MP 1290 Hots and moisture transfer in frost-heaving seels. Guymon, G.L., et al., (1994, p.316-142) MP 1290 least and moisture transfer in frost-heaving seels. Guymon, G.L., et al., (1994, p.316-142) MP 1290 Intransitation for an uphthing see force model. Zablaniaky, L.J., (1995, p.1430-1435) MP 2091 Corps of engineers seek ice solutions. Frankensten. G.E.	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaska. Tobiasson, W., et al. (1986, p.277-290) Amborne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korboorn, C., (1987, p.49-54) Method for conducting airborne infrared roof moisture surveys. Tobiasson, W., (1988, p.50-41) Method for conducting airborne infrared roof moisture mays. Tobiasson, W., (1988, p.50-41) Method for conducting airborne infrared roof moisture mays. Tobiasson, W., (1988, p.50-41) Medistree meters Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Method for water surveys in the Collection models. Islandar, I.k., et al. (1978, IIp.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, Sp.) Moisture transfer Energy bulince and remoeff from a subatetic snowpack Price, A.G., et al. (1976, 29p.) Tracer movement through snow Collect, S.C., (1977, p.255-252) Maintaining buildings in the Arctic Tobiasson, W., et al. (1977, p.244-251) Recearch on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al. (1978, 6p.) Research on roof moisture detection.	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al., (1990, 169.) SR 99-17 Notural resources Cold climate utchies delivery design manual. Smith, D.W., et al., (1979, c300 leaves) MP 1373 Offshore oil in the Aleskan Arctic. Weeks, W.F., et al., (1984, p.371-178) MP 1743 Constraints and approaches in high latitude natieral resource sampling and research. Slaughter, C.W., et al., (1984, p.371-178) MP 2013 Novigation Helicopter snow obscuration sub-test. Ehersole, J.F., (1984, p.359-376) MP 2013 Novigation Helicopter snow obscuration sub-test. Ehersole, J.F., (1984, p.359-376) MP 2013 Novigation Helicopter snow obscuration sub-test. Ehersole, J.F., (1987, p.359-376) MP 2019 Data acquisition for refrigerated physical model. Zufek, J.F., (1987, p.359-376) MP 2019 Nitrage deposits Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., (1982, p.323-224) MP 1551 Nitrage histopies Methodology for intringen insologe analysis at CRREL. Jen-lims, T.F., et al., (1978, 57p.) SR 78-68 Noble (seemd) Andshifty within and outside deposited snow. Johanne, J.B., (1985, p.136-142) MP 1990 Model studies of surface noise interference in ground-probing radar. Arcone, S.A., et al., (1985, 23p.) CR 85-19 Norwey Los pressure wrather systems in and around Norwegian waters. Bilefin, M.A., (1986, p. 59-64) MP 2181 Northes Heat transfer between water yets and see Mocks. Yea, YC., (1976, p. 29-307) Norther emploises. Analysis of explosively generated ground motions using Fourier techniques. Biomis, S.F., et al., (1976, 56p.) CR 76-28
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-668) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-668) MP 1196 Lysimeters validate materianter renovation models. Islamder, I.K., et al., (1978, 11p.) SR 78-12 Hydrasdic model investigation of drifting snow J.L., (1978, 29p.) Registerion and the deformation of wet snow Colbects, S.C., ed., (1978, 432p.) Modeling snow cover ramed? meeting, Sep. 1978. Colbects, S.C., ed., (1979, 432p.) Modeling snow cover ramed? meeting, Sep. 1978. Colbects, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. St. Lawrence, W.F., (1979, p.22-228) MP 1246 Modeling of ice in rivers. Ashton, G.D., (1979, p.14*1-14/26) Myling year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., (1979, p.107-126) MP 1239 Volumetric constitutive law for snow Brown, R. L., (1980, p.16*1-165) Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p.16*1-165) MP 1293 Sea ice growth, drift, and decay. Hibler, W.D., III, (1980, p.14*2-09) Hydralague, modeling from Landsat land cover data McKim, H.L., et al., (1984, 19p.) Otean circulation: its effect on seasonal sea-ce similations thiler, W.D., III, et al., (1984, p.349-42) MP 1293 Carenovia Creek Model data acquisition system. Remert, B.M., et al., (1985, p.1426-1429) MP 2091 Carenovia Creek Model data acquisition system. Remert, B.M., et al., (1985, p.1426-1429) MP 2091 Carenovia Creek Model data acquisition system. Remert, B.M., et al., (1985, p.1426-1429) MP 2091 Carenovia Creek Model data acquisition system. Remert, B.M., et al., (1985, p.1426-1429) MP 2091 Carenovia Creek Model data acquisition system. Remert, B.M., et al., (1985, p.1426-1429) MP 2091 Carenovia Creek Model data acquisition system. Remert, B.M., et al., (1985, p.1426-1429) MP 2091 Care	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1986, p.277-290) Airhoene roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Airhoene roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Airhoene roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Mr 2009 Method for conducting airhorne infrared roof moisture verys. Tobiasson, W., (1988, p.50-41) Method for conducting airhorne infrared roof moisture serveys. Tobiasson, W., (1989, p.111-121) Moisture meters Hand-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) MP 2716 Moisture substact wastewater renovation models. Islamdar, I.k., et al. (1978, 11p.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy Malance and ramoeff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy Malance and ramoeff from a subarctic surveys in the U.S. Army (1978, 8p.) Mesture transfer Energy Malance and ramoeff from a subarctic surveys in the U.S. Army (1978, 8p.) Mp 1999 Manataming buildings in the Arctic Tobiasson, W., et al. (1977, p.244-251) Research on roof moisture detection. Tobiasson, W., et al. (1977, 9p.) SR 78-29 Roof moisture gain and its shermal consequence for common roof itsudations. Tobiasson, W., et al. (1980, p.416) MP 1941 Two-dimensional model of compled heat and moisture transport in front heaving soils. Guymon, G.L., et al. (1984, p.91-48) MP 1943	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Nileds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. (1990, 169.) SR 98-17 Notural resources Cold climate utilities delivery design manual. Smith, D.W., et al. (1978, cl00 leaves) MP 1373 Offshore oil in the Alaskan Arctie. Weeks, W.F., et al. (1984, p.371-178) MP 1743 Constraints and approaches in high latitude nateral resource sampling and research. Strughter, C.W., et al. (1984, p.376-178) MP 2013 Notigotion Helicopter same obscuration sub-test. Electsole, J.F., (1984, p.359-376) MP 2013 Nitrage deposits Nitrate deposits Nitrate fluctuations in antarctic same and firm. Parker, B.C., et al. (1982, p.359-376) MP 2351 Nitragen isotopes Methodology for introgen isotope analysis at CREEL. Jenkins, T.F., et al. (1978, 57p.) SR 78-08 Noile (sound) Audibility within and outside deposited same Johanson, J.B., MP 1909 Model studies of surface noise interference in ground-probing radar. Arcone, S.A., et al. (1985, 23p.) CR 85-19 Noeury Los pressure wrather systems in and around Normegian waters. Bileflo, M.A., (1986, p.53-46) MP 2181 Notices Heat transfer between water jets and see blocks. Yea, YC., (1976, p.290-307) MP 202 Prediction of explosively density relative displacements in general relative displacements. Blosin, S.F., et al. (1976, 1976, 1977) Prediction of explosively density relative displacements in
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-464) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-464) MP 1196 Lysimeters validate wastewater renovation models. Islamder, I.K., et al., (1978, 11p.) SR 78-12 Hydrasdic model investigation of drifting snow J.L., (1978, 29p.) Registerion and the deformation of wet snow J.L., (1978, p.639-650) MP 1173 Medeling moor cover runoff meeting. Sep. 1978. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. Lawrence, W.F., (1979, p.22-228) MP 1246 Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) My 1393 My 1426 My 1393 My 1426 Volumetric constitutive law for snow Brown, R. L., (1980, p.14-5) NP 1293 Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p.14-5) MP 1293 Sea ice growth, drift, and decay. Hibler, W.D., III, (1980, p.14-6) My 1293 Carenovia Creek Model data acquisition system. Brancett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1425) My 1293 Carenovia Creek Model data acquisition system. My 1264 Camparative model tests in sec of a Canadian Co	Roof moisture surveys: yesterday, today and tomocrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessonis learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1986, p.277-290) Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Amboene roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.46-54) Method for conducting airborne infrared roof moisture verys. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moisture. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moisture. Tobiasson, W., (1988, p.50-61) Mesture meters Iland-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyameters validate wastewater renovation models. Iskandar, I.k., et al. (1978, 11p.) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and runoff from a subarctic transpared from oreof mosture detection. Tobiasson, W. et al. (1977, p.255-26) Manistaning buildings in the Arctic Tobiasson, W. et al. (1977, p.244-251) Research on roof mosture detection. Tobiasson, W. et al. (1977, 9p.) Research on roof mosture detection. Tobiasson, W. et al. (1978, 9p.) Research on roof mosture detection. Tobiasson, W. et al. (1978, 9p.) Research on roof mosture detection. Tobiasson, W. et al. (1978, 9p.) Research on roof mosture detection. Tobiasson, W. et al. (1978, 9p.) Research on roof mosture detection. Tobiasson, W. et al. (1978, 9p.) Research on roof mosture detection. Tobiasson, W. et al. (1978, p.1) MP 1678 MP 1678	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al., (1990, 169.) SR 99-17 Notural resources Cold climate utchies delivery design manual. Smith, D.W., et al., (1979, c300 leaves) MP 1373 Offshore oil in the Aleskan Arctic. Weeks, W.F., et al., (1984, p.371-178) MP 1743 Constraints and approaches in high latitude natieral resource sampling and research. Slaughter, C.W., et al., (1984, p.371-178) MP 2013 Novigation Helicopter snow obscuration sub-test. Ehersole, J.F., (1984, p.359-376) MP 2013 Novigation Helicopter snow obscuration sub-test. Ehersole, J.F., (1984, p.359-376) MP 2013 Novigation Helicopter snow obscuration sub-test. Ehersole, J.F., (1987, p.359-376) MP 2019 Data acquisition for refrigerated physical model. Zufek, J.F., (1987, p.359-376) MP 2019 Nitrage deposits Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., (1982, p.323-224) MP 1551 Nitrage histopies Methodology for intringen insologe analysis at CRREL. Jen-lims, T.F., et al., (1978, 57p.) SR 78-68 Noble (seemd) Andshifty within and outside deposited snow. Johanne, J.B., (1985, p.136-142) MP 1990 Model studies of surface noise interference in ground-probing radar. Arcone, S.A., et al., (1985, 23p.) CR 85-19 Norwey Los pressure wrather systems in and around Norwegian waters. Bilefin, M.A., (1986, p. 59-64) MP 2181 Northes Heat transfer between water yets and see Mocks. Yea, YC., (1976, p. 29-307) Norther emploises. Analysis of explosively generated ground motions using Fourier techniques. Biomis, S.F., et al., (1976, 56p.) CR 76-28
Computer modeling of terrain modifications in the arctic and subsettic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-664) Lysimeters validate materianter renovation models. Islamder, I.K., et al., (1978, 11p.) Regeleiron and the deformation of drifting snow J.L., (1978, 27p.) Regeleiron and the deformation of wet snow J.L., (1978, 25p.) Modeling snow cover ranoff meeting. Sep. 1978. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystalinie materials. St. Lawrence, W.F., (1979, p.22-228) Modeling of ice in rivers. Ashton, G.D., (1979, p.14/1-14/26) Modeling of ice in rivers. Ashton, G.D., (1979, p.14/1-14/26) My 1335. My 1	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Lessons learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1986, p.277-290) Arrhorne roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Arrhorne roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 Arrhorne roof moisture surveys. Tobiasson, W., (1986, p.45-47) MP 2003 MP 2003 MP 2003 MP 2004 MP 2004 MP 2005 MP 2005 MP 2006 MP 2006 MP 2007 MP 2007 MP 2007 MP 2008 Nondestructive evaluation of moesture migration in misiation material. Ayounde, O.A., (1989, p.111-121) Moisture meters. Handbed infrared systems for detecting roof moisture. Tobiasson, W., et al., (1977, p.261-271) My 2016 Moisture surveys and remed from a subarctic sonwack. Islandar, Isl., et al., (1978, 197) Recommendations for implementing roof moesture surveys in the U.S. Army (1978, 85) Moisture transfer. Energy Sulance and remed from a subarctic sonwack. Proc. A. G., et al., (1976, 299) Tracer movement through snow. Colbeck, S.C., (1977, p.255-282) Manitaming buildings in the Arctic. Tobiasson, W., et al., (1977, p.24-251) Recearch on roof moesture detection. Tabiasson, W., et al., (1977, p.24-251) Resolutions. Tobiasson, W., et al., (1980, p.116) Two-dimensional model of compled heat and moesture transport in frost heaving soils. Guymon, G.L., et al., (1984, p.91-104) Two-dimensional model of compled heat and moesture transport in frost heaving soils. Guymon, G.L., et al., (1984, p.91-104) MP 1961 Two-dimensional model of compled heat and moesture transport in frost heaving soils. Guymon, G.L., et al., (1984, p.91-104) MP 1962 Supple model of see segregation using an analytic function to model lear and soil-nater form. Heromadia, T. J.I., et al., (1984, p.91-104). MP 2104	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Nileds Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. (1990, 169.) SR 98-17 Notural resources Cold climate utilities delivery design manual. Smith, D.W., et al. (1978, cloo) leaves; MP 1373 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al. (1984, p.371-173) MP 1743 Constraints and approaches in high latitude nateral resource sampling and research. Staughter, C.W., et al. (1984, p.371-376) MP 2013 Notigation Helicopter stown obscuration sub-test. Electrole, J.F., (1984, p.359-376) MP 2013 Notigation Helicopter stown obscuration sub-test. Electrole, J.F., (1984, p.359-376) MP 2014 Nitrate deposits Nitrate fluctuations in antarctic shown and firm. Parker, B.C., et al. (1982, p.359-374) MP 2351 Nitrate deposits Nitrate fluctuations in antarctic shown and firm. Parker, B.C., et al. (1982, p.323-245) MP 1531 Nitrogen hostopes McDedotogy for nitrogen isotope analysis at CREEL. Jenkins, T.F., et al. (1978, 57p.) SR 78-08 Noise (soond) Andebelity within and outside deposited shown. Johanson, J.B., MP 1904 Model studies of unfact mose interference in ground-probang radar. Accone, S.A., et al. (1985, 23p.) CR 85-19 Noeusy Los pressure wrather systems in and around Normegian waters. Bileflo, M.A., (1986, p. 53-64) MP 2181 Notices Heat transfer between water jets and see Mocks. Yea, YC., (1976, p. 299-307) MP 202 Norlean emphasize despositely generated ground motions using Fourier techniques. Elouin, S.F., et al. (1976, 36p.) CR 76-28 Preduction of explosively device relative displacements in rocks. Elouin, S.E., (1881, 23p.) CR 81-11 Noclean magnetic resonatore. NMR 2018
Computer modeling of terrain modifications in the arctic and subsectic. Outcalt, S.L., et al., (1977, p.24-32) Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-464) MP 971 Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., (1978, p.662-464) MP 1196 Lysimeters validate wastewater renovation models. Islamder, I.K., et al., (1978, 11p.) SR 78-12 Hydrasdic model investigation of drifting snow J.L., (1978, 29p.) Registerion and the deformation of wet snow J.L., (1978, p.639-650) MP 1173 Medeling moor cover runoff meeting. Sep. 1978. Colbeck, S.C., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. S.L., ed., (1979, 432p.) Acoustic emission response in polycrystaline materials. Lawrence, W.F., (1979, p.22-228) MP 1246 Modeling of ice in rivers. Ashton, G.D., (1979, p.14-1-14/26) My 1393 My 1426 My 1393 My 1426 Volumetric constitutive law for snow Brown, R. L., (1980, p.14-5) NP 1293 Problems of the seasonal sea ice zone. Weeks, W.F., (1980, p.14-5) MP 1293 Sea ice growth, drift, and decay. Hibler, W.D., III, (1980, p.14-6) My 1293 Carenovia Creek Model data acquisition system. Brancett. B.M., et al., (1985, p.142-1429) My 1295 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1429) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1429) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1429) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1429) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1429) My 1293 Carenovia Creek Model data acquisition system. Reunett. B.M., et al., (1985, p.142-1429) My 1293 Carenovia Creek Model data acquisition system. My 126 My 1293 My 1293 My 1294 Carenovia Creek Model	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1935, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1935, p.424-425) Lessons learned from examination of membrane roofs in Alaka. Tobiasson, W., et al. (1936, p.277-290) Amborne roof moisture surveys. Tobiasson, W., (1984, p.45-47) Amborne roof moisture surveys. Tobiasson, W., (1984, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.46-54) Method for conducting airborne infrared roof moisture verys. Tobiasson, W., (1988, p.50-61) Method for conducting airborne infrared roof moisture. Tobiasson, W., (1988, p.50-61) Mendestructive evaluation of moesture ingration in misslation material. Ayounder, O.A., (1989, p.111-121) Moisture meters. Iland-held infrared systems for detecting roof moisture. Tobiasson, W., et al. (1977, p.261-271) Lyameters validate wastewater renovation models. Iskandar, I.k., et al. (1978, Ilp.) Recommendations for implementing roof moesture surveys in the U.S. Army (1978, Sp.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, Sp.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, Sp.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, Sp.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, Sp.) Meisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, Sp.) Meisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1978, Sp.) Moisture transfer Energy balance and runoff from a subarctic surveys in the U.S. Army (1988, D.) MP 1991 Mesture pain and its hermal consequence for onemon roof insolations. Tobiasson, W., et al. (1978, p.) NP 1993 Mentandama model of complete for an analytic function in model lear and woll after me. Hermadia, T. V. 11, et al., p. 19-19	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Noteds Thermal infrared survey of winter trails at Fort Wainwright, Callin, C.M., et al. (1990, 169.) SR 98-17 Notural resources Cold climate utchies delivery design manual. Smith, D.W., et al. (1979, ci00) leaves; MP 1373 Offshore oil in the Aleskan Arctic. Weeks, W.F., et al. (1984, p.371-173) MP 1403 Constraints and approaches in high latitude natieral resource sampling and research. Slaughter, C.W., et al. (1984, p.371-173) MP 2013 Notingation Helicopter snow obscuration sub-test. Ehersole, J.F., (1984, p.359-376) MP 2013 Notingation of refrigerated physical model. Zufels, J.E., (1987, p.358-341) MP 2015 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al. (1982, p.324-245) MP 2351 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al. (1982, p.324-245) MP 1591 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al. (1982, p.324-245) MP 1591 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al. (1982, p.324-245) MP 1591 Notingup into acoupt. Methodology for introgen interference in ground-probing radar. Arcone, S.A., et al. (1985, 23p.) CR 85-19 Notices Methodology introduction of uncertaintee in ground-probing radar. Arcone, S.A., et al. (1985, 23p.) CR 85-19 Notices Heat transfer between water jets and see blocks. Yea, YC., (1976, p.298-307) Notices explosion: Analysis of explosively generated ground motions using Fourier techniques. Blocus, S.F., et al., (1976, p.298-307) Notices magnetic resonance NMR place composition metasurements on most soft. Tech. R. et al., (1978, p.11-14) Netter magnetic resonance NMR place composition recoverage permateus determined. Techniques. Accountered determined. Te
Computer modeling of terrain modifications in the arctic and subsertic. Outcalt, S.L., et al., [1977, p.24-32] Resiliency of silt under asphalt during freezing and thaving. Johnson, T.C., et al., [1978, p.662-646] Lyimeters validate wastewater renovation models. Iskander, I.K., et al., [1978, 11p.] Hydraulic model investigation of drifting snow J.L., [1978, 25p.] Regelation and the deformation of wet snow J.L., [1978, p.639-650] Medeling snow cover runoff meeting. Sep. 1978. Colbeck, S.C., et al., [1978, p.639-650] Medeling snow cover runoff meeting. Sep. 1978. Colbeck, S.C., ed., [1979, p.639-650] Medeling snow cover runoff meeting. Sep. 1978. Colbeck, S.C., ed., [1979, p.32p.] Acoustic emission response in polycrystalline material. MP 1335 Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., [1979, p.107-126] MP 1335 Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., [1979, p.107-126] MP 1395 Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., [1979, p.107-126] MP 1395 Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., [1979, p.107-126] MP 1395 Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., [1979, p.107-126] MP 1395 Multi year pressure ridges in the Canadian Beaufort Sea Wright, B., et al., [1979, p.107-126] MP 1395 Mp 1390 Problems of the seasonal sea ice zone. Weeks, W. F., [1980, p.141-1209] Hydrologic modeling from Landsat land cover data McKim, H.L., et al., [1984, 1944, 1949] MP 1298 Hydrologic modeling from Landsat land cover data McKim, H.L., et al., [1984, 1944, 1949] MP 1298 Hydrologic modeling from Landsat land cover data McKim, H.L., et al., [1984, p.419-492] MP 1299 Heat and moisture transfer in frost-heaving soils. Gypt al., [1980, p.141-129] MP 1290 Heat and moisture transfer in frost-heaving soils. Gypt al., [1987, p.1430-1315] MP 1290 Intramentation for an uphthing see force model. And Particular J.C., et al., [1987, p.131-14129] MP	Roof moisture surveys: yesterday, today and tomorrow. Tobiasson, W., et al. (1985, p.438-443 + figs.) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) Aerial roof moisture surveys. Tobiasson, W., (1985, p.424-425) MP 2003 Althorne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Althorne roof moisture surveys. Tobiasson, W., (1986, p.45-47) Infrared testing for leaks in new roofs. Korbonen, C., (1987, p.48-54) Method for conducting sirborne infrared roof moisture mys. Tobiasson, W., (1988, p.50-61) MP 2013 Method for conducting sirborne infrared roof moisture mys. Tobiasson, W., (1988, p.50-61) Method for conducting sirborne infrared roof moisture. Tobiasson, W., (1988, p.50-61) Method for conducting sirborne infrared roof moisture. Tobiasson, W., et al., (1977, p.261-271) MP 2716 Moisture meters Iliand-held infrared systems for detecting roof moisture. Tobiasson, W., et al., (1977, p.261-271) Recommendations for implementing roof moisture surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and ramself from a subarcise surveys in the U.S. Army (1978, 8p.) Moisture transfer Energy balance and ramself from a subarcise surveys in the U.S. Army (1978, 8p.) Minimaning buildings in the Arcise Tobiasson, W., et al., (1977, p.264-251) Mr 1978, 6p.) Recearch on roof moisture detection. Tobiasson, W., et al., (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al., (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al., (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al., (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al., (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al., (1978, 6p.) Research on roof moisture detection. Tobiasson, W., et al., (1978, p.29-104) Mr 1040 Ton-dimensional model of complete heat and moisture transport in front heating soils. Guymon, G.L., et al., (1984, p.91-04) Ton-dimensional model of complete heat and moisture to model heat and soof o	ing and managing the pothole problem. Enton, R.A., coord, (1981, 249.) MP 1416 Nobels Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. (1990, 169.) SR 96-17 Noticeal resources Cold climate utchies delivery design manual. Smith, D.W., et al. (1919, c)00 leaves; MP 1373 Offshore cell in the Alaskan Arctic. Weeks, W.F., et al. (1984, p.371-)783 Constraints and approaches in high latitude natural resource sampling and research. Slaughter, C.W., et al. (1984, p.371-)783 Novigation Helicopter snow obscuration sub-test. Electrole, J.F., (1984, p.359-376) Data acquisition for refrigerated physical model. Zufek, J.E., (1987, p.3)8-341; MP 2391 Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) MP 1591 Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) MP 1591 Nitrate fluctuations is naturetic snow and firm. Parker, B.C., et al. (1982, p.243-245) MP 1591 Nitragen leadops: Methodeoxy for introgen isotope analysis at CREEL. Jenkins, T.F., et al. (1985, 57p.) Noble (snomb) Audshifty within and outside deposited snow. Johasson, J.B., (1985, p. 134-142) Model studies of surface noise interference in ground-probing radar. Accomp. S.A., et al. (1985, 23p.) CR 85-19 Nortes Heat transfer between water jets and see blocks. Yea, YC., (1976, p. 299-307) Nortes explosions Analysis of explosively generated ground motions using Fourier explosions. Analysis of explosively driven refaired displacements on rocks. Blossin, S.E., (1981, 23p.) CR 83-11 Nortes anagisely explosively driven refaired displacements on rocks. Blossin, S.E., (1981), p. 11-14; MP 1210

Nuclear magnetic resonance (cont.) Relationship between the ice and unfrazen water phases in	Ocean currents Buscline data on tidal flushing in Cook Inlet, Alaska. Gatto,	Distribution and properties of subsea permafrost of the Beau- fort Sea. Selimann, P.V., et al. (1979, p.93-115) MP 1207
frozen soil. Tice, A.R., et al. (1962, 8p.) CR 82-15 Effects of magnetic particles on the unfrozen water content in	L.W., (1973, 11p.) MP 1523 Circulation and sedument distribution in Cook Inlet, Alaska.	Permateut beneath the Besufort Sex: near Produce Boy.
soils. Tice, A.R., et al., [1984, p.63-73; MP 1790 Soil-water potential and unfrozen water content and tempera-	Gatte, L.W., (1976, p.205-227) NP 895 Baseline data on the occanography of Cook Inlet, Alnaka.	Aluka. Sciimane, P.V., et al. (1980, p.35-48) MP 1346
ture. Xu, X., et al. (1985, p.1-14) MP 1932	Gatto, LW., [1976, 84p.] CR 76-25	Problems of the seasonal sea ice zone. Weeks, W.F., (1900, p.1-35) MP 1293
Relationship between freezing and water content in sandy loam. Black, P.B., et al. (1988, 37p.) CR 88-26	Radar anisotropy of sea ice. Kovacs, A., et al., (1978, p.171- 201) MP 1111	Foundations of structures in polar waters. Chamberlain E.J., (1981, 16p : SR 81-25
Unfrozen water content of soils. Smith, M.W., et al., (1928, 11p.) CR 86-18	Preferred crystal orientations in Arctic Ocean fast ice Weeks, W.F., et al. (1978, 24p.) CR 78-13	Site investigations and submarine soil mechanics in polar re-
Unfrozen water content of undisturbed frozen silt. Tice, A.R., et al. [1988, 17p.] CR 88-19	Radar anisotropy of sea ice. Koracs, A., et al., (1978, 9.6037-4046) MP 1139	gions, Chamberlain, E.J., (1991, 1892) SR 81-20 Offshore mechanics and Arctic engineering, symposium
Predicting unfrozen water content behavior of a soil. Black, P.B., et al., (1990, p.54-60) MP 2677	Some results from a linear-viscous model of the Arctic ice	1983, §1983, 813p.; MP 1861 for scoring on the Alaskan shelf of the Bernfort Sen. Weeks
Nucleating agents	cover. Hibler, W.D., III, et al., (1979, p.293-304) MP 1241	W.F., ct al. (1983), 34p. + map; CR 83-21 Offshore oil in the Alaskan Arctic. Weeks, W.F., et al.
lee nucleation activity of antarctic marine microorganisms. Parker, L.V., et al. (1965, p.126-128) MP 2217	Anisotropic properties of sea ice. Kovaca, A., et al., (1979, p.5749-5759) MP 1256	(1984, p.371-)78; MP 174)
Nucleation Strain energy failure criterion for \$2 freshwater see in flexure.	Crystal alignments in the fast ice of Arctic Alaska. Weeks, W.F., et al. (1979, 21p.) CR 79-22	Offshore Mechanics and Arctic Engineering Symposium, 4th 1985, §1985, 2 vols.; 34P 2100
Cole, D.M., (1988, p.206-215) MP 2494	Crystal alignments in the fast ice of Arctic Alaska. Weeks,	Topical databases: Cold Regions Technology on-line. Lin ton, N., et al., (1915, p.12-15) MP 2027
Potrient cycle fragact of orban wastewater reme in cold regions on land	Physical properties of sea ice and under-ice current orienta-	Offshore Mechanics and Arctic Engineering Symposium, 5th 1916, §1916, 4 vols.; MP 2031
treatment systems. Iskander, I.K., (1976, 32p.) MP 2452	tion. Kovacs, A., et al. (1900, p.109-153) MP 1323 Occasic boundary-layer features and oscillation at drift sta-	Partable hat water ice drift. Tucker, W.R., et al. (1996,
Uptake of nutrients by plants irrigated with wastewater, Clapp, C.E., et al. (1978, p.395-404) MP 1151	tions. McPhee, M.G., (1900, p.870-884) MP 1369 Sea ice anisotropy, electromagnetic properties and strength.	International Offshore Mechanics and Arctic Engineering
Adaptability of forage granes to wastewater irrigation, Palazza, A.J., et al., (1978, p.157-163) MP 1153	Karacs, A., et al. (1900, 18p.) CR 86-20	Symposium, 1987, §1987, 4 vols. Conference on offshore mechanics and Arctic engineering
Model for nitrogen behavior in land treatment of wastewater.	Infet current measured with Seasot-1 synthetic aperture rador. Shemdon, O.H., et al., §1900, p.35-37; MP 1401	Sth. 1989. (1997, 476p.) 34P 3461 Conference on offshore mechanics and servic engineering
Selim, H.M., et al. (1900, 49p.) CR 80-12 Nitragen in an overland flow wastewater treatment system.	Review of sea-ice weather relationships in the Southern Hem- isphere. Ackley, S.F., (1981, p.127-159) MP 1426	9th, 1990, ₁ 1990, 339 ₇₁₃ 34P 2986
Chen, R.L., et al., (1900, 33p.) 5R 80-16 Dynamics of NH4 and NO3 in cropped soils irrigated with	lee distribution and winter surface circulation, Kachemak Bay, Alaska. Gatto, L.W., §1981, p.995-10012	Offichere seructures Structures in ice infested water. Assur, A., (1972, p.93-97)
wastewater. Islander, I.K., et al. (1990, 20p.) SR 86-27	MP 1442	MP 1016 Investigation of ice forces on vertical structures. Historians
Arctic ecosystem: the countal tundra at Barrow, Alaska.	Ice distribution and winter occase circulation, Kachemak Boy, Alaska. Gotto, L.W., §1961, 43p.; CR 81-22	K., et al., (1974, 153p.) MP 1001 Statistical variations in Arctic sea ice ridging and deformation
Analysis of processes of primery production in tundra growth	lce granth and circulation in Kachemak Bay, Alaska. Duly, S.F., (1982, p.(C)1-(C)9; MP 1901	rates. Hilder, W.D., HIL, (1975, p.11-116) MP 850
forms. Tieszen, L.L., et al. (1981, p.285-356) MP 1433	Ice distribution and water circulation, Kachemak Bay, Alaska. Gasto, L.W., (1912, p.421-435) MP 1569	Ice forces on simulated structures. Zahilansky, L.J., et al. (1975, p.387-796) SEP 86
Float growth on a gravel soil: greenhouse studies. Palazzo, A.J., et al., [1961, \$6.] SR \$1-04	Effects of conductivity on high-resolution impulse rates	Yukon River breakup 1976. Johnson, P., et al. (1977, p.592-596; MP 900
Modeling N transport and transformations in soils. Selim. H.M., et al., (1961, p.233-241) MP 1440	sounding. Morey, R.M., et al. (1982, 12p.) CR 82-42	Horizontal forces exerted by finating see on structures. Kerr A.D., §1978, 9p.; CR 78-15
Modeling nitrogen transport and transformations in seeds: 2.	Ocean circulation: its effect on seasonal sea-ice simulations. Hilder, W.D., III, et al. (1984, p.489-492) MP 1700	lee laboratory facilities for solving see problems. Franken stein, G.E., [1980, p.93-103]
Validation. Iskander, I.K., et al. (1981, p 303-312) MP 1441	Diagnostic ice-ocean model. Hibler, W.D., III, et al., (1987, p. 987-1015) MP 2238	Foundations of structures in polar waters. Chamberlain E.J., (1981, 1693) SR 81-22
Seasonal growth and uptake of nutrients by orchardgrass irri- gated with wastewater. Palazzo, A.J., et al., §1931, 1992.	Coupled sir-ice-ocean models. Hiller, W.D., III, 1987,	Sice investigations and submacase and mechanics in polar re-
Seasonal growth and uptake of outrients by orchardgrass irri- gated with wastewster. Palazzo, A.J., et al. (1921, 195). CR 81-08 Seven-year performance of CRREI, sion-rate land treatment	p.131-137; MP 3412 On modeling the baroclinic adjustment of the Arctic Octon.	Size investigations and submarine soil mechanics in polar regions. Chamberlain, E.J., [1981, 1893 SR 81-30 Sea ice rubble formations in the Beriot Sea and Norton
gated with wastewater. Palazze, A.J., et al. (1981, 1993) CR 81-08 Seven-year performance of CRREL sion-rate land treatment prototypes. Jenkins, T.F., et al. (1981, 25p.)	p.131-1373 MP 3412	Site investigations and submarine soil mechanics in polar regions. Chunderlain, E.J., [1981, 18p.; SR 81-36 Sea ice raddle formations in the Bering Sea and Northe Sound, Alaska. Kovacs, A., [1981, 23p.; SR 81-36
gated with wastewater. Palazzo, A.J., et al., [1981, 1992] CR 81-08 Seven-year performance of CRREL show-rate innel treatment prototypes. Jenkins, T.F., et al., [1981, 2592] Sil 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44]	p.131-137; MP 3412 On modeling the baroclinic adjustment of the Arctic Octon, Habitr, W.D., III, [1990, p.247-250; MP 2739 Ocean environments Chromodagelists from the Weddell Sea, summer 1977.	Site investigations and submarine soil mechanics in polor re- gion. Chunderlain, E.J. (1991, 189). SER 1-30. Sea: ice rubble formations in the Bering Sea and Norton Sound, Alaska. Kovaco, A., (1991, 239). SR 81-30. Offshore mechanics and Arcsic engineering. Symposium 1993, (1993, 8139).
gated with wastewater. Palazzo, A.J., et al. (1981, 1991) CR 81-48 Seven-year performance of CRREL shon-rate land treatment prototypes. Jenkins, T.F., et al. (1981, 2593) SR 81-12 Soil microbiology. Bosatta, E., et al. (1981, p.38-44) MP 1753 Wastewater treatment by a prototype slow rate land treatment	p.131-1373 MP 3412 On modeling the baroclinic adjustment of the Arcic Ocean. Haber, W.D., III. p1940, p.247-2503 MP 2739 Ocean environments Cheanoflaptilists from the Weddell Sca., summer 1977. Boch, K.R., p1940, 246,3 Oceanography	Site investigations and submarine soil mechanics in polar regions. Chamberlain, E.J., (1981, 1894 SR 81-38 Sea ice rubble formations in the Bering Sea and Nortee Sound, Alaska. Kovace, A., (1981, 2394 SR 81-39 Offshore mechanics and Arctic engineering. symposium 1993, (1993, 8139). Dynamic involvanture interaction decong continuous crub mg. Malitimen, M., (1993, 456). CR 83-66
gated with wastewster. Palazzo, A.J., et al., (1981, 1992). CR 81-08 Seven-year performance of CRREL show-rate isand treatment prototypes. Jenkins, T.F., et al., (1981, 2592). SR 81-12 Soil microbiology. Bosatta, E., et al., (1981, p.38-44). MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., (1981, 4493). CR 81-14 Effect of soil temperature on nitrification kinetics. Parker,	p.131-137; MP 2412 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III. [1990, p.247-250; MP 2739 Ocean environments Chean-flagelists from the Weddell Sea, summer 1977. Back, K.R., [1990, 24p.; CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., H., [1978, p.1811-1121]	Site investigations and submarine soil mechanics in polar regions. Chunherlain, E.J., [1981, 1891] SR 81-36 Sea: ice radble formations in the Beriop Sea and Nortee Sound, Alaska. Kovacs, A., [1981, 2392] SR 81-36 Offshore mechanics and Arctic engineering. symposium 1983, [1993, 81394] Dynamic involvaceure interaction decong continuous crashing. Mattriacus, M., [1983, 4552] Method See determining are louds on offshore structures. Johnson, J.B., [1993, p.1224-1232] SP 2006
gated with wastewster. Palazzo, A.J., et al., (1981, 1992). CR 81-08 Seven-year performance of CRREL show-rate fand treatment prototypes. Jenkins, T.F., et al., (1981, 2592). SR 81-12 Soil microbiology. Bosatta, E., et al., (1981, p.38-44). MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., (1981, 4492). CR 81-14	p.131-1373 MP 2412 On modeling the baroclinic adjustment of the Arctic Ocean, Habier, W.D., III., §1990, p.247-2503 MP 2729 Ocean environments: Chomodagelists from the Weddell Sca. summer 1977, Buch, K.R., §1990, 269.3 CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., §1978, p.1111-1121; MP 1028 Countal marine geology of the Beaufort, Chukchi and Berrag	Site investigations and submarine soil mechanics in polor region. Chunderlain, E.J. [1991, 1983, 1894] Sen ice rubble formations in the Bering Sea and Norton Sound, Alaska. Kovaco, A., [1911, 2394] Offshore mechanics and Arcsic cagineering. symposium 1993, [1993, 81394] Dynamic irrotracture interaction dering continuous crush many Mattimers, M., [1983, 4504] Method See determining are loads on offshore structure.
gated with wastewster. Palazzo, A.J., et al., (1981, 1992) CR 81-08 Seven-year performance of CRR EL show-rate issued treatment prototypes. Jenkins, T.F., et al., (1981, 2592) SSR 81-12 Soit microbiology. Boastra, E., et al., (1981, p.38-44) MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., (1981, 4492) CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., (1981, 2793) Overview of models used in land treatment of materials of various likender, L.K., (1982, 2793) SR 82-01	p.131-137; MP 3412 On modeling the haroclinic adjustment of the Artic Ocean, Haber, W.D., III. [1990, p.247-259; MP 2739] Ocean environments Chean-dagelint from the Weddell Sea, summer 1977, Buch, K.R., [1990, 24p.] CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., H., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benofort, Chukchi and Berrag Seas. Gatto, L.W., [1980, 357p.] SR 80-05	Site investigations and submarine soil mechanics in polar region. Chunherlain, E.J., [1981, 188]. SR 81-36 Sea for rubble formations in the Beriop Sea and Nortee Sound, Alaska. Kovacs, A., [1981, 23p.] SR 81-36 Offshore mechanics and Arctic engineering, symposium 1983, [1983, 813p.] Dynamic involvacture interaction during continuous crushing. Mattriners, M., [1983, 45p.] CR 83-66 Method for determining are louds on offshore structures Johnson, J.B., [1983, p.310-322]. Protection of offshore arctic structures by explosives. Method. M., [1983, p.310-322]. Its forces on model nature structures. Haynes, F.D., et al.
gated with wastewater. Palazzo, A.J., et al., (1981, 1992) CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., (1981, 2592) SR 81-12 Soil microbiology. Bosatta, E., et al., (1981, p.38-44) MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., (1981, 4492) CR 81-14 Effect of soil temperature on nitrification kinetics. Parket, L.V., et al., (1981, 2792) Overview of models used in land treatment of wastewater likander, L.K., (1982, 2792) Mothemosical simulation of nitrogen interactions soil. Section, H.M., et al., (1993, p.241-2492) MP 2051	p.131-1373 MP 2412 On modeling the baroclinic adjustment of the Artic Occas, Haber, W.D., III. [1990, p.247-259] MP 2779 Ocean environments Chomoflogelists from the Weddell Sca. summer 1977. Buch, K.R., [1990, 26p.] CR 80-16 Oceanography Assumate data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1111-1121] MP 1028 Constal marine geology of the Beaudort, Chukchi and Berrag Scas. Gatta, L.W., [1990, 357p.] SR 80-05 International Workshop on the Seasonal Sca. Lee Zone, Montercy, Childrenn, Feb. 26-Maril, 1979. Andersen, B.C.	Site investigations and submarine soil mechanics in poles region. Chundrelini, E.J. (1981, 1891 SE 81-38 Sen ice rabble formation in the Bering Sen and Nortee Sound, Alaska. Kovacs, A., (1911, 239.) SR 81-38 Offshore mechanics and Arctic cagineering, symposium 1993, (1993, 8129). Dynamic involvancture interaction dening continuous crashing. Maximizer, M., (1993, 45). MP 1808 Method for determining are londs on offshore structures Johnson, J.B., (1993, p. 124-124). MP 2008 Protection of offshore arctic structures by explosives. Method, (1993, p. 310-323). MP 1808 MP (1993, p. 375-7257). MP 1809 MP 18
gated with wastewater. Palazzo, A.J., et al., (1981, 1991, CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., (1981, 2592, SR 81-12 Soil microbiology. Bosatta, E., et al., (1981, p.38-44), MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., (1981, 4492). CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., (1981, 2792). SR 81-33 Overview of models used in land treatment of wastewater likunder, L.K., (1992, 2792). Mathematical simulation of nitrogen underactioness in socia.	p.131-1373 MP 3412 On modeling the haroclinic adjustment of the Artic Octan. Haber, W.D., III., §1940, p.247-2503 MP 2739 Ocean environments: Choundlagelists from the Weddell Sca., summer 1977. Back, K.R., §1940, 26p.3 Oceanography Automated data collection equipment for oceanographic application. Dean, A.M., Jr., §1978, p.1811-1812; MP 1028 Constal marine geology of the Beaudori, Chukchi and Berrage Seas. Gatto, L.W., §1940, 357p.3 International Workshop on the Seasonal Sea Lee Zone, Monterey, Caldonius, Feb. 26-Mar.I., §1979. Anderson, B.G., od., §1940, 357p.3 Troblems of the seasonal sea ice zone. Weeks, W.F., §1940,	Site investigations and submarine soil mechanics in poles regions. Chumberlain, E.J. (1991, 1891) SR 81-36 Sea ice rubble formations in the Bering Sea and Nortice Sound, Alatha. Kowaco, A. (1991, 2361) Offshore mechanics and Arcise engineering. SWR 1380-30 Offshore mechanics and Arcise engineering. SWR 1380 D 1380, (1993, 1674) Dynamic irrostructure interaction dering continuous crush ing. Materianes, M., (1993, 675) Method for determining see Isods on offshore structures Johnson, J.B., (1993, p. 124-123) Method for determining see Isods on offshore structures Johnson, J.B., (1993, p. 124-124) Method for determining see Isods on offshore structures Johnson, J.B., (1993, p. 120-122) Method for determining see Isods on offshore structures Isodomore, J.B., (1993, p. 130-322) MP 1600 Inc., M., (1993, p. 130-322) MP 1600 MP 1601 MP
gated with wastewster. Palazzo, A.J., et al., [1981, 1992. CR 81-08 Seven-year performance of CRREL show-rate issued treatment prototypes. Jenkins, T.F., et al., [1981, 2592. SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44]. MP 1753 Wastewaster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4492. CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793. SR 81-33 Overview of models used in land treatment of wastewaster likander, L.K., [1992, 2792. Mathematical simulation of nitrogen interactions in soils, Scim, H.M., et al., [1993, p.241-243]. MP 2051 U.S., tundra biome publication lot. Beown, J., et al., [1993,	p.131-1373 MP 3412 On modeling the haroclinic adjustment of the Artic Ocean. Hilbert, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Cheanoflagelists from the Weddell Sea, summer 1977. Back, K.R., [1990, 26p.] CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1811-1121] MP 1028 Constal marine geology of the Benufort, Chukchi and Berrag Seas. Gatta, L.W., [1990, 357p.] SR 80-05 International Workshop on the Seasonal Sea Lee Zone, Mentercy, Colobernia, Feb. 26-Mar.l, 1979. Andersea, B.G., ed., [1990, 357p.] Problems of the seasonal sea ire zone. Weeks, W.F., [1990, 37-157] Physical oceanography of the seasonal sea see zone.	Site investigations and submarine soil mechanics in polar region. Chunherlain, E.J., [1981, 1891] SR 81-36 Sea: for rubble formations in the Bering Sea and Nortee Sound, Alaska. Kovacs, A., [1981, 2392] SR 81-36 Offshore mechanics and Arcise engineering, symposium 1983, [1983, 81393] Dynamic icrostructures interaction dening continuous crushing. Matthians, M., [1983, 4553] CR 83-66 Method for determining are books on offshore structures. Johnson, J.B., [1983, p.124-124] SIP 1066 Ioc., M., [1983, p.310-323] SIP 1067 Protection of offshore arche structures by explosives. Method, M., [1983, p.310-323] SIP 1068 [1984, p.774-783] SIP 1069
gated with wastewster. Palazzo, A.J., et al., [1981, 1992, CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 25p.3 SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-42], MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 44p.3]. CR 81-14 Effect of soil temperature on mitrification kinetics. Parker, L.V., et al., [1981, 27p.3]. SR 81-33 Overview of models used in land treatment of materiater blander, L.K., [1992, 27p.3]. SR 82-81 Mathematical simulation of nitrogen inferactiones in socia, Sciim, H.M., et al., [1931, p.241-243]. MP 3051 U.S. tonders biome publication list. Beown, J., et al., [1981, 27p.3]. SR 82-29 Otens: bottom Hyperbolic reflections on Brandort Sea seismic records. Neave, K.G., et al., [1981, 14p.3]. CR 81-02	p.131-1373 MP 2412 On modeling the haroclinic adjustment of the Artic Ocean. Haber, W.D., III. [1990, p.247-250] MP 2739 Ocean environments Choundingslists from the Weddell Sca., summer 1977. Buch, K.R., [1990, 26p.] Cressography Antonated data collection equipment for oceanographic application. Dean, A.M., 3r., [1978, p.1111-1121]. MP 1028 Constal marine goology of the Beaudort, Chalchin and Berrag. Seas. Gatta, L.W., [1990, 357p.] SR 89-05 International Workshop on the Seasonal Sea Lee Zone, Monterey, Calderina, Feb. 26-Mac.1, 1979. Andersen, B.G., ed., [1990, 157p.] MP 1222 Problems of the seasonal sea ice zone. Weeks, W.F., [1990, p.1-15] Physical oceanography of the seasonal sea see zone. McThree, M.G., [1990, p.9-132] MP 1294	Site investigations and submarine soil mechanics in polor region. Chumberlain, E.J. [1991, 1891, 188-195. Sen ice rubble formations in the Bering Sea and Nortice Sound, Alaska. Kovaco, A., [1911, 2391. SR 81-34 Offshore mechanics and Arctic cagineering. symposium 1993, [1993, 8139]. Dynamic irrottructure interaction dening continuous crush ing. Mattiliners, M., [1983, 4551. SR 83-64 Method for determining are loads on offshore structures Johnson, J.B., [1913, p.126-123]. SRP 200 Protection of offshore article structures by explosives. Method for, M., [1993, p.310-323]. SRP 200 Protection of offshore article structures by explosives. Method, M., [1993, p.310-323]. SRP 100 [1993, p.775-237]. SRP 100 [1993, p.175-137]. SRP 200 [1993, p.175-137].
gated with wastewster. Palazzo, A.J., et al., [1931, 1991, CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1931, 2593] SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-43] MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1901, 4493] Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793] Overview of models used in land treatment of wastewater lukander, L.K., [1982, 2793] Mothemotical simulation of nitrogen interactions in soils. Seim, H.M., et al., [1932, p.241-249] My 2051 U.S. tundra bisone publication list. Beown, J., et al., [1982, 2793] Overs, bottom Hyperbolic reflections on Bendort Sea seisanc records. Newsy, K.G., et al., [1991, 1992] Soluca treaching in the Arctic. Mellor, M., [1991, p.542).	p.131-1373 MP 2412 On modeling the haroclinic adjustment of the Artic Ocean. Hilbert, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Cheanoflagelists from the Weddell Sea, summer 1977. Buch, K.R., [1990, 24p.] CR 89-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., H., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benofort, Chukchi and Berng Seas. Gatto, L.W., [1990, 357p.] SR 89-05 International Workshop on the Scanonal Sea (or Zone, Monterey, Collifornia, Feb. 26-Mac.I., 1979. Anderson, Be. ed., [1990, 357p.] MP 1292 Problems of the seasonal sea ice zone. Weeks, W.F., (1990, p.1-15) Physical oceanography of the seasonal sea see zone McPher, M.G., [1990, p.9-1132] MP 1293 Article Ocean temperature, saluncy and density, March-May 1979. McPher, M.G., [1910, p.9-1132] SR 81-95	Site investigations and submarine soil mechanics in poles regions. Chamberlain, E.J. [1991, 1891] SR 81-36 Sea ice rubble formations in the Bering Sea and Northe Sound, Alatha. Kovaci, A. [1911, 2361] Offshore mechanics and Arcise engineering. SR 81-36 Offshore mechanics and Arcise engineering. SR 81-36 Offshore inchanics and Arcise engineering. SR 81-36 Offshore increases in the state of the same state income continuous crush ing. Matterner, M., [1913, 615) Method for determining see louds on offshore structures Johnson, J.B., [1913, p. 124-122] Method for determining see louds on offshore structures Johnson, J.B., [1913, p. 124-123] Method for determining see louds on offshore structures by explosives. Mel lot, M., [1913, p. 310-322] Ice forces on model statement structures. Hapter, F.D., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for determining for due forces on model research for structures. Softin, D.S., et al. [1913, p. 124-125] Method for determining for due forces on structures. Softin, D.S., et al. [1913, p. 124-125] Method for determining for due forces on model research for structures.
gated with wastewater. Palazzo, A.J., et al., [1981, 1991, CR 81-08 Seven-year performance of CRREL slow-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2592, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44], MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1901, 4493]. CR 81-14 Effect of soil temperature on nitrification kinetics. Parket, L.V., et al., [1982, 2793]. SR 82-01 Overview of models used in land treatment of wastewater likander, L.K., [1982, 2793]. SR 82-01 Mathematical simulation of nitrogen interactionest in soils. Seinn, H.M., et al., [1953, p.241-249]. MP 2051 U.S. tandra bisone publication list. Beson, J., et al., [1993, 2993]. Oren: bostom Hyperbolic reflections on Bendort Sea seisme recorde. Neave, K.G., et al., [1981, 1992]. GR 81-02 Soluen treaching in the Arctic. Mellor, M., [1981, p.243-832]. Soluen treaching in the Arctic. Mellor, M., [1991, p.323-832]. CR 81-17	p.131-137; MP 3412 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Chouseding files from the Weddell Sca., summer 1977. Buch, K.R., [1990, 26p.; CR 89-16 Oceanography Annountic data collection equipment for oceanographic application. Dean, A.M., 81., [1971, p.1311-1121] MP 1028 Constal marine geology of the Beaudort, Chukchi and Berrag Scas. Gatto, L.W., [1990, 357p.; SR 89-05] International Workshop on the Seasonal Sea for Zone, Montrey, Caldorini, Feb. 26-Mar.I., 1979. Anderica, BG., cd., [1990, 137p.; MP 1292 Problems of the seasonal sea ice zone. Weeks, W.F., [1990, p.1-15]. Physical occunigraphy of the seasonal sea see zone McPiece, M.G., [1990, p.9-132]. Arctic Ocean temperature, stoking and density, March-May 1979. McPiece, M.G., [1991, 20p.; SR 81-05] Mesoscale acrose-ocean stoterocton experiments. SR 88-29	Site investigations and submarine soil mechanics in polar region. Chumberlain, E.J. [1991, 1891] SR 81-36 Sen lee rabble formation in the Bering Sen and Nortee Sound, Alaska. Koracs, A., [1911, 239.] SR 81-36 Offshore mechanics and Arctic cagineering, symposium 1993, [1933, 1973] Dynamic ice structure interaction dening continuous crashing. Mattimena, M., [1933, 45p.) MP 1806 Method for determining need lends on offshore structures. Johnson, J.B., [1931, p.124-129] MP 2006 Hot, M., [1931, p.130-12]; MP 2007 Protection of offshore arctic structures by explosives. Methods, J.B., [1931, p.130-12]; MP 2008 MP 2009 Measurement of see forces on structures. Softin, D.S., et al. [1931, p.174-155] MP 2009 Measurement of see forces on structures. Softin, D.S., et al. [1931, p.174-155] MP 2009 MP 2
gated with wastewater. Palazzo, A.J., et al., [1981, 1992, CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 25p.] SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-42] Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 44p.] CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1982, 27p.] Overview of models used in land treatment of wastewater likunder, L.K., [1982, 27p.] SR 82-01 Mathematical simulation of nitrogen inferractions in soil, Sciim, H.M., et al., [1981, p.241-241] MP 3051 U.S. tunders biome publication list. Beown, J., et al., [1982, 27p.] Overse, bottom Hyperbolic reflections on Besufiert Sea seisme records, Neave, K.G., et al., [1981, 14p.] Solucia treaching in the Arctic. Mellor, M., [1981, p.343-812] Solucia treaching in the Arctic. Mellor, M., [1981, p.343-812] Solucia treaching in the Arctic. Mellor, M., [1981, p.343-812]	p.131-1373 MP 3412 On modeling the baroclinic adjustment of the Arcic Occus. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chossoftagelists from the Weddell Sex, summer 1977. Buch, K.R., [1990, 26p.] CR 80-16 Oceanography Antomatic data collection equipment for oceanographic application. Dean, A.M., R., [1978, p.1111-1121] MP 1028 Constal marine geology of the Beautor, Chulchi and Berrag Sexs. Gatta, L.W., [1990, 357p.] MP 1028 Constal marine geology of the Beautor, Chulchi and Berrag Sexs. Gatta, L.W., [1990, 357p.] MP 1028 international Workshop on the Seasonal Sex Ice Zone, Monterey, Caldorna, Feb. 26-Mar.I, 1979. Andersex, B.C., ed. [1990, 357p.] MP 1292 Physical oceanography of the seasonal sex ice zone McPher, M.G., [1990, p.91-132] MP 1294 Arcic Ocean temperature, salancy and density, March-May 1979. McPher, M.G., [1991, 20p.] SSR 81-95 Metostale arrace-ocean interaction experiments. Johns	Site investigations and submarine soil mechanics in polar region. Chumberlain, E.J. [1991, 1891] SR 20-38. Sen ice rubble formations in the Bering Ses and Nortice Sound, Alaska. Kovacc, A., [1911, 239.] SR 20-38. Sund, Alaska. Kovacc, A., [1911, 239.] SR 20-38. Offshere mechanics and Arciae engineering. symposium 1993, [1993, 8139.] Dynamic involvanture interaction dening continuous crushing. Maximizer, M., [1993, 450.] MP 1809. Method for determining are loads on offshore structures. Johnson, J.B., [1913, p.120-121.] MP 2009. Protection of offshore arche structures by explosives. Method for determining archeristics by explosives. Method for determining archeristics of surface archeristrates. Soilin, D.S., et al. [1993, p.170-125]. MP 1809. [1993, p.170-125]. MP 1809. Christermities of multi-year pressure radges. Kosacc, A. [1993, p.170-125]. MP 200-1259. Let secong on the Alaskan shelf of the Bernfort Sea. Weeks. W. F., et al., [1993, p. 201-215]. Crasterminics of maximum of challengal and comical structures. Kato, K., et al., [1913, 39.] CR 20-2. CR 20-2. Offshore metchanics and Alatae exponering symposium 1994 (1994, p.1914, 3.) of the commendation of parts of cylindrical and comical structures. Kato, K., et al., [1913, 33.]
gated with wastewster. Palazzo, A.J., et al., [1981, 1992, CR 81-08 Seven-year performance of CRREL shon-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2593, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44), MP 1753. Wastewater treatment by a prototype show rate land treatment system. Jenkins, T.F., et al., [1981, 4493] CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et pl., [1981, 2793] SR 81-33 Overview of models used in land treatment of wastewater blander, L.K., [1982, 2793] SR 82-01 Mathematical simulation of nitrogen interactions in soils, Selim, H.M., et al., [1983, p.241-249] MP 2053. U.S. tundra biome publication list. Beown, J., et al., [1983, 2793] Oversc. bottom Hyperbolic reflections on Beaufiert Sea seisone records. Neave, K.G., et al., [1981, 1493] CR 81-02. Solves treaching in the Arctic. Mellor, M., [1981, 13192] Solves treaching in the Arctic. Mellor, M., [1981, 13192] Solves treaching in the Arctic. Mellor, M., [1981, 13193] Solves treaching in the Arctic. Mellor, M., [1981, 13192] Solves treaching in the Arctic. Mellor, M., [1981, 13193] Solves treaching in the Arctic. Mellor, M., [1981, 13193] CR 81-17 Site interstigations and submarine soil mechanoses in polar regions. Chamberlain, E.J., [1981, 1893] Solves are solves and submarine soil mechanoses in polar regions. Chamberlain, E.J., [1981, 1893] Solves are solves and submarine soil mechanoses in polar regions. Chamberlain, E.J., [1981, 1893]	p.131-1373 MP 2412 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Chousedagellists from the Weddell Sea, summer 1977. Buch, K.R., [1990, 26p.3] CR 20-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., H., [1971, p.13111-112], MP 1028 Constal marine poology of the Beaudort, Chukchi and Berrag Seas. Gazio, L.W., [1960, 357p.] SR 20-05 International Workshop on the Seasonal Sea Ice Zone, Monterey, Caldornia, Feb. 26-Mar.I., [1979, Anderica, BG, cd., [1940, 157p.] MP 1292 Problems of the seasonal sea ice zone. Weeks, W. F., [1990, p. 1-15]. MP 1293 Physical occungraphy of the seasonal sea see zone McPhee, M.G., [1990, p. 91-123]. MP 1293 Artic Ocean temperature, saluncy and density, March-May 1979 McPhee, M.G., [1991, 10p.] SR 21-95 Mesoscale acroscoverus netteraction experiments. Johannessen, O.M., ed., [1994, 176p.] SR 28-29 Artice research of the United States, Vol.4. [1990, 1209.] MP 2745 Oceans	Site investigations and submarine soil mechanics in poles regions. Chumberlain, E.J. (1991, 1891) SR 88-36. Sea ice rubble formations in the Bering Sea and Northe Sound, Alatha. Kowaca, A., (1911, 236) Offshore mechanics and Arcise engineering. SUP 180. 1993, (1993, 8139) Dynamic invotracture interaction dering continuous crush ing. Matterner, M., (1993, 615) Method for determining tee londs on offshore structures Johnson, J.B., (1913, p. 124-123) Method for determining tee londs on offshore structures Johnson, J.B., (1913, p. 124-124) Method for determining tee londs on offshore structures Johnson, J.B., (1913, p. 126-123) Method for determining tee londs on offshore structures Johnson, J.B., (1913, p. 130-322) Method for determining tee londs on offshore structures Johnson, J.B., (1913, p. 130-322) Method for determining tee forces on structures. South, D.S., et al. (1913, p. 174-135) Method for the factors on structures. South, D.S., et al. (1913, p. 173-132) Method for the factors on structures. South, D.S., et al. (1913, p. 173-132) Method for the factors of structure religion (1913, p. 173-132) Method for the factors of structures for the factor of the factor of the factor for the factor for the factor of the factor for the factor of the factor of the factor for the factor of the factor of the factor of the factor for the factor of
gated with wastewater. Palazzo, A.J., et al., [1981, 1594] CR 81-08 Seven-year performance of CRREL shon-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2592] Sil 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44] MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4494] CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1982, 2793] Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2794] Sil 82-09 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2794] Mathematical simulation of nitrogen inferractions in soil, Sciim, H.M., et al., [1983, p.241-248] Mythomical simulation of nitrogen inferractions in soil, Sciim, H.M., et al., [1983, p.241-248] U.S. tunders biome publication list. Beown, J., et al., [1983, 2794] Overac hottom Hyperbolic reflections on Beaufiert Sca seisume records Neave, K.G., et al., [1981, 1493] CR 81-02 Soluca treaching in the Arctic. Mellor, M., [1981, p.343-812] Soluca treaching in the Arctic. Mellor, M., [1981, p.343-812] Soluca treaching in the Arctic. Mellor, M., [1981, p.343-812] CR 81-17 Site interstigations and submarine soil mechanics in polar regions. Chareherlain, E.J., [1981, 1393] SR 81-24 Understanding the Arctic sea floor for cagineering gamposes. (1982, 14192) Incoming on the Alaskan shelf-of-the Beaufiert Sea. Weeks,	p.131-1373 MP 3412 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomoflogelists from the Weddell Sca., summer 1977. Buch, K.R., [1990, 26p.] CR 80-16 Oceanspraphy Antonated data collection equipment for oceansgraphic application. Dean, A.M., Jr., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benedori, Chalchi and Berrag Scas. Gatta, L.W., [1990, 357p.] SR 80-05 International Worlshop on the Seasonal Sca. Let Zone, Monterey, Calderine, Feb., 26-Mar. J. 1979. Anderica, B.G., ed. [1990, 357p.] MP 1292 Problems of the seasonal sea ice zone. Weeks, W.F., [1990, p.1-35] Physical occanography of the seasonal sea ice zone McPher, M.G., [1990, p.9-132] MP 1293 Arcise Ocean temperature, submey and density, March-May 1979. McPher, M.G., [1990, p.9-132] MP 1294 Arcise Ocean temperature, submey and density, March-May 1979. McPher, M.G., [1991, 20p.] SR 81-05 Mesoscial carrier-scene internation experiments. Johnsonsen, O.M., ed., [1994, 170p.] Arcise research of the United States, Vel.4. [1990, 120p.] MP 2748 Cavening fund sea ice model. Flate, G.M., et al., [1990, p.279-242] MP 2748	Site investigations and submarine soil mechanics in polor region. Chumberlain, E.J. (1991, 1891 SE 81-38 Sen ice rabble formation, E.J. (1991, 1891 SE 81-38 Sen ice rabble formation in the Berine Sea and Nortice Sound, Alaska. Koraco, A., (1911, 2391 SE 81-38 Offshere mechanics and Arciae engineering, symposium 1993, (1993, 8139). Dynamic involvanture interaction dening continuous crashing. Mathematic, M., (1993, 45). Method for determining are leads on offshore structures Johnson, J.B., (1913, p. 128-113). Protection of offshore methor structures by explosives. Method, (1993, p. 130-32). MP 100 [1993, p. 178-157]. Method for distribution structures. Soilin, D.S., et al. (1993, p. 178-157). MP 100 (Induce petroleum production in accounted maters. Tuck cr., W.B., (1993, p. 207-215). Ice action on pains of cylendrical and comical structures Kato, K., et al. (1993, 33-7). Offshore mechanics and Alexiae exponering symposium 1994, (1994, 3) with p. 1994, p.
gated with wastewster. Palazzo, A.J., et al., [1981, 1992, CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 25p.] SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-42], MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 44p.] CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 27p.] Overview of models used in land treatment of wastewater lehander, L.K., [1992, 27p.] Mathematical simulation of nitrogen inferactiones in sock, Scient, H.M., et al., [1993, p.241-241] MP 3051 U.S., tondra biome publication list. Beown, J., et al., [1993, 25p.] Solucia biome publication list. Beown, J., et al., [1981, 25p.] CR 81-02 Solucia biome publication list. Beown, J., et al., [1981, 25p.] Solucia treaching in the Arctic. McRoe, M., [1981, p.832-39 CR 81-17 Site interstigations and submarine soil mechanics in pale regions. Chamberlain, E.J., [1981, 15p.] SR 81-24 Understanding the Arctic sea food for capitacting purposes, (1982, 141p.) SR 81-25 Les courag on the Alaskan shelf of the Beaufort Sea. Weeks, W.F., et al., [1981, 35p. 4 may] Sone probabilistic merces of its grouping on the Alaskan Shelf.	p.131-1373 MP 2412 On modeling the haroclinic adjustment of the Artic Ocean. Hibber, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Cheanoflagelists from the Weddell Sea, summer 1977. Buch, K.R., [1990, 26p.] CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benofort, Chukchi and Berrag Seas. Gatto, L.W., [1990, 357p.] SR 80-05 International Workshop on the Seasonal Sea (or Zone, Monterey, Coldornia, Feb. 26-Mac.I., 1979. Andersea, Boc. ed., [1990, 37p.] MP 1292 Problems of the seasonal sea ire zone. Weeks, W.F., [1990, p.1-15] Physical oceanography of the seasonal sea see zone McPher, M.G., [1990, p.9-1132] MP 1293 Article Ocean temperature, submay and densary, March-May 1979 McPher, M.G., [1991, p.9-1132] SR 81-95 Mesoscale an accuracion subtraction experiments. Johnnessea, O.M., ed., [1994, 176p.] SR 81-95 Accur research of the United States, Vol.4. [1990, 120p.] MP 2745 Chermis Covening fluid sea see model. Flain, G.M., et al., [1990, p.279-242] Article research of the United States, Vol.4. [1990, 120p.] Article research of the United States, Vol.4. [1990, 170p.] MP 2745	Site investigations and submarine soil mechanics in polor regions. Chumberlain, E.J. [1991, 1891] SR 81-38 Sen ice rubble formations in the Bering Sea and Nortice Sound, Alaska. Koraco, A., [1911, 2361] SR 81-39 Offshore mechanics and Arctic cagineering. symposium 1993, [1993, 8139] Dynamic involvanture interaction defining continuous crush sing. Mattiliners, M., [1983, 4553] Method for determining are loads on offshore structures Johnson, J.B., [1913, p.124-123] Method for determining are loads on offshore structures Johnson, J.B., [1913, p.124-124] Method for determining are loads on offshore structures Johnson, J.B., [1913, p.124-125] MP 1000 Protection of offshore article structures by explosives. Method 164, M., [1933, p.310-322] MP 1000 Method for determining structures. South, D.S., et al. [1931, p.778-287] Method for determines of metho-year pressure radges. Kosaco, A. [1933, p.173-135] Offshore petroleum production in sce-conterd waters. Tuck cr., W.B., [1933, Mp. 507-215] Ice scrong on the Alaskan shelf-of-the Bernfort-Sea. Weeks Kosaco, A. [1933, p. 507-215] Ice action on parts of exhibitical and comical structures Kato, K., et al. [1933, Mp. 6 map; Ice action on parts of exhibitical and comical structures (Rato, K., et al. [1934, Johns, and Anciae exposering synthesis (1934, p.107-112) Dependence of crushing specific energy on the report rus and the structure selectity. South, D.S., et al. [1934, p.107-112] Dependence of crushing specific energy on the report rus and the structure selectity. South, D.S., et al. [1934, p.107-112]
gated with wastewster. Palazzo, A.J., et al., [1981, 1592, CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2593, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-43]. MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4492]. CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793]. SR 821-31 Overview of models used in land treatment of wastewster inhander, L.K., [1982, 2793]. SR 821-31 Mothemonical simulation of nitrogen interactions in soils. Scient, H.M., et al., [1981, p.241-241]. MP 2051 U.S. tender, L.K., [1982, 2794]. SR 821-31 U.S. tenders biome publication list. Beown, J., et al., [1981, 2794]. SR 83-29 Ocens: bostom Hyperholic reflections on Benefort Sea seismer records. Newse, K.G., et al., [1981, 1494]. CR 81-17 Soil interching in the Arctic. Mellor, M., [1981, p.843, 832]. Soilora treaching in the Arctic. Mellor, M., [1981, p.843, 832]. Select treaching in the Arctic. Mellor, M., [1981, 1319, CR 81-17 Site interchange the Arctic sea floor for expirecting proposes. Charekerlain, E.J., [1981, 1393]. SR 81-24 Understanding the Arctic sea floor for expirecting proposes. (1992, 14193). July 181, 1893. CR 83-25 Ice scoring on the Alaskan shelf of the Beaufort Sea. Weeks, W.F., et al., [1984, p. 213-216]. MP 1808.	p.131-1373 On modeling the haraclinic adjustment of the Artic Ocean. Holder, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Chousedagelinis from the Weddell Sex, summer 1977. Buch, K.R., [1990, 26p.] CR 89-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., H., [1978, p.1111-1121] MP 1028 Sex. Gatta, L.W., [1990, 357p.] SR 89-05 International Workshop on the Seasonal Sex Ice Zone, Monterey, Coldornia, Feb. 26-Mar. J. 1979. Anderice, Belleville, 1979. Anderice, Belleville, 1979. Anderice, Belleville, 1979. Anderice, Mp. 1292 Problems of the seasonal sex ice zone. Weeks, W.F., [1990, p.1-152] MP 1292 Physical oceanography of the seasonal sex ice zone McParc, M.G., [1990, p.9-1132] MP 1293 Article Ocean temperature, salancy and density, March-May 1979. McParc, M.G., [1991, p.9-1132] SR 81-95 Mesocale arrace-ocean interaction experiments. Johannessen, O.M., ed., [1994, 179p.] SR 84-29 Article research of the United States, Vol.4. [1990, 130p.] MP 2745 Oceans Cavaning fund sex ice model. Flace, G.M., et al., [1990, p.239-242] MP 2708 Article research of the United States, Vol.4. [1990, 130p.] MP 2745 Offshore drifting Defeatition and engineering characteristics of permaticus.	Site investigations and submanue soil mechanics in poles regions. Chumberlain, E.J. [1991, 1891] SR 88-36 Sea ice rubble formations in the Bering Sea and Nortice Sound, Alacha. Kovaco, A. [1911, 2361] Offshore mechanics and Arcise engineering. Symposium 1993, [1993, 8139] Dynamic invotracture interaction dering continuous crush ing. Matchiner, M., [1993, 6150] Method for determining see loads on offshore structures Johnson, J.B., [1913, p. 126-123] Method for determining see loads on offshore structures Johnson, J.B., [1913, p. 126-123] Method for determining see loads on offshore structures Johnson, J.B., [1913, p. 126-123] Method for determining see loads on offshore structures Johnson, J.B., [1913, p. 126-123] Method for determining see loads on offshore structures Johnson, J.B., et al. [1913, p. p. 176-125] Method for determining structures. South, D.S., et al. [1913, p. 177-125] Methodermines of methopean pressure ridges. Rossec, A. [1913, p. 173-125] Methodermines of methopean pressure ridges. Rossec, A. [1913, p. 173-125] Ice screeng on the Alachan shelf of the Bendert Sea. Weets W.F., et al. [1913, Joy - may; Ice action on parts of colondrical and comical structures. W.B., et al. [1914, Joy - may; Ice action on parts of colondrical and comical structures. Test. Rossec, A. [1914, Joy - may; Ice action on two cylenthesis structures. Kase, K., et al. [1914, Joy - may; Ice action on two cylenthesis structures. Kase, K., et al. [1914, Joy - may; Ice action on two cylenthesis structures. Kase, K., et al. [1914, Joy - may; Ice action on two cylenthesis structures. Kase, K., et al. [1914, Joy - may; Ice action on two cylenthesis structures. Kase, K., et al. [1914, Joy - may; Ice action of tex accertion on offshore structures. Manh L.D., [1914, Joy - may; Ice action of tex accertion on offshore structures. Manh L.D., [1914, Joy - may; Ice action of tex accertion on offshore structures. Manh L.D., [1914, Joy - may; Ice action of tex accertion on offshore structures. Manh L.D., [1914, Joy - may; Ice action of tex
gated with wastewater. Palazzo, A.J., et al., [1981, 1592, CR 81-48 Seven-year performance of CRREL shon-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2592, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-42], MP 1753. Wastewater treatment by a prototype show rate land treatment system. Jenkins, T.F., et al., [1981, 4492]. CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1982, 2792]. SR 82-91 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2792]. SR 82-92 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2792]. SR 82-93 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2792]. SR 82-93 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2792]. SR 82-83 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2792]. SR 82-83 Overview of models used in land treatment of wastewater likunder, L.K., [1982, 2792]. SR 83-29 Overview of models used in land treatment of sense. 1, et al., [1981, 1592]. SR 83-29 Overview of models used in land treatment of sense. 1, et al., [1981, 1592]. SR 83-29 Overview of models used in land treatment of sense. 1, et al., [1981, 1592]. SR 83-29 Overview of models used in land treatment of sense. 1, et al., [1981, 1982]. SR 83-25 CR 81-17 Site intending in the Arctic sea flow for engineering purposes. [1982, 14192]. SR 81-24 Understanding the Arctic sea flow for engineering purposes. [1982, 14192]. SR 83-25 Los coming on the Alaskan shelf of the Beaufort Sea. Weeks, W.F., et al., [1984, p. 213-47 Son English and the Beaufort Sea. Weeks, W.F., et al., [1984, p. 213-47 Son English and the Beaufort Sea. Weeks, W.F., et al., [1984, p. 213-47	p.131-1373 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomologelists from the Weddell Sca., summer 1977. Buch, K.R., [1990, 26p.] Cessaspraphy Assumate data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benedori, Chalchi and Berrag Scas. Gatta, L.W., [1990, 357p.] MP 1028 Scas. Gatta, L.W., [1990, 357p.] Secreption of the Seasonal Sca Ice Zone, Monterey, Colderon, Feb., 26-Mar. J. 1979. Anderica, B.G., ed. [1990, 357p.] Problems of the seasonal sca ice zone. Weeks, W.F., [1990, p.1-35] Physical occanography of the seasonal sca ice zone McPher, M.G., [1990, p.9-132] Arcise Ocean temperature, solongy and density, March-May 1979 McPher, M.G., [1990, p.9-132] MP 1293 Mesoscale arrive-scene interaction experiments. Johnsonsea, O.M., ed., [1914, 176p.] Arcise research of the United States, Vol.4, [1991, 1291, MP 2748 Oceans Cavaning fund sca ice model. Flata, G.M., et al., [1990, p.279-242] Arcise research of the United States, Vol.4, [1990, 120p.] MP 2748 Offshore drilling	Site investigations and submanue soil mechanics in poles regions. Chamberlain, Ed., [1991, 1891] SR 81-30 Sea ice rubble formations in the Bering Sea and Northe Sean Add Methods. Sea Northe Sound, Alaska. Kovace, A., [1911, 2361] Offshore mechanics and Arcise engineering, symposium 1993, [1993, 8139] Dynamic invitracture interaction desing continuous crush sing. Mattellaer, M., [1993, 4553] Method for determining see looks on offshore structures Johnson, J. B., [1913, p. 120-1212] Method for determining see looks on offshore structures Johnson, J. B., [1913, p. 120-122] Method for determining see looks on offshore structures Johnson, J. B., [1913, p. 193-122] Method for determining see looks on offshore structures Johnson, J. B., [1914, p. 310-322] Method for determining structures. Hayner, F.D., et al. [1913, p. 173-123] Method for the forces on structures. Sodin, D.S., et al. [1913, p. 173-123] Method for the forces on structures. Sodin, D.S., et al. [1913, p. 173-123] Method for the forces on structures. Sodin, D.S., et al. [1913, p. 173-123] Method for the forces of the forces on structures. More for the forces on the Alaskan shelf of the Bernfort Sea. Method of the Bernfort Sea. Method W. F., et al. [1913, p. 30-1215] Method for mechanics and Arcise exposering symposium 1912 (1914, p. 105-112) Dependence of errobing specific energy on the supert resident for accurate structure schools. Sodin, D.S., et al. [1914, p. 163-112] Dependence of errobing specific energy on the supert resident for accuration of the accuration on offshore structures. Math. Res. R., et al. [1914, p. 105-112] Assessment of the accuration on offshore structures. Math. R., p. 1913, p. 1913, p. 1914, p
gated with wastewster. Palazzo, A.J., et al., [1981, 1592, CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2592, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44], MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4492, CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793, SR 82-81 Overview of models used in land treatment of wastewater Inkander, L.K., [1982, 2792, SR 82-81 Mathematical simulation of nitrogen interactions in soil, Scian, H.M., et al., [1982, 2792, SR 82-82 Methodological state of nitrogen interactions in soil, Scian, H.M., et al., [1981, p.241-243], MP 2051 U.S. tendra biome publication list. Beown, J., et al., [1981, 2792, SR 83-29 Ornic bottom Hyperholic reflections on Benefort Sea seismer records. Newse, K.G., et al., [1981, 1492, CR 81-17 Soilone treaching in the Arctic. Mellor, M., [1981, p.823, 882] Solones treaching in the Arctic. Mellor, M., [1981, p.823, 882] Understanding the Arctic sea floor for engineering purposes, (1982, 14192, SR 83-25) Le scoring on the Alaskan shelf of the Benefort Sea. Weeks, W.F., et al., [1981, 3-223] Sone probabilistic aspects of ice gougang on the Alaskan Shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p. 213-214] Solone probabilistic aspects of ice gougang on the Alaskan Shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p. 213-225] Solone probabilistic aspects of ice gougang on the Alaskan Shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p. 213-225] Solone probabilistic aspects of ice gougang on the Alaskan Shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p. 213-225] Solone probabilistic aspects of ice gougang on the Alaskan Shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p. 213-225] Solone probabilistic aspects of ice gougang on the State Sea. Merch, W.F., et al., [1984, p. 213-225]	p.131-1373 On modeling the haraclinic adjustment of the Artic Ocean. Holder, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Chousedagelinis from the Weddell Sea, summer 1977. Buch, K.R., [1990, 26p.] CR 89-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., H., [1978, p.1111-1121] MP 1028 Seas. Gatta, L.W., [1990, 357p.] SR 89-05 International Workshop on the Seasonal Sea for Zone, Monterey, Coldornia, Feb. 26-Mar. J. 1979. Anderica, Botter, Coldornia, Feb. 26-Mar. J. 1979. Anderica, Botter, Coldornia, Feb. 26-Mar. J. 1979. Anderica, Botter, Coldornia, Feb. 26-Mar. J. 1979. Anderica, Mp 1292 Physical oceanography of the seasonal sea see zone McPher, M.G., [1990, p.9-1123] MP 1293 Article Ocean temperature, salancy and density, March-May 1979. McPher, M.G., [1991, p.9-1124] SR 81-95 Mesocale arrace-ocean interaction experiments. Johannessen, O.M., Cd., [1994, 170p.] SR 81-95 Article research of the United States, Vol.4. [1990, 130p.] Article research of the United States, Vol.4. [1990, 130p.] MP 2745 Oceans Cavaning fund sea see model. Flato, G.M., et al., [1990, p.239-242] Article research of the United States, Vol.4. [1990, 130p.] MP 2745 Offshowe drifting Defunction and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1976, p. 31-104] Defunction and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1976, p. 31-104] Defunction and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1976, p. 31-104] Defunction and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1976, p. 31-104] Defunction and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1976, p. 31-104] Defunction and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1976, p. 31-104] Defunction and engineering characteristics of permations beneath the	Site investigations and submarine soil mechanics in polar region. Chumberlain, E.J. [1981, 1891] SR 20-38. Sen ice rubble formations in the Bering Ses and Nortice Sound, Alaska. Koraco, A., [1981, 2361] SR 20-38. Sund, Alaska. Koraco, A., [1981, 2362] SR 20-38. Sund, Alaska. Koraco, A., [1981, 2362] SR 20-38. Sund, Alaska. Koraco, A., [1981, 2362] SR 20-38. Sund, Alaska. Koraco, A., [1982, 2462] SR 20-38. Supposition 1993, [1993, 11362] SR 20-38. Supposition 1993, [1993, 11362] SR 20-38. Supposition involves the determining are leads on offshore structures. Johnson, J.B., [1983, p.126-122] SR 20-38. Supposition Johnson, J.B., [1983, p.126-122] SR 20-38. Supposition of offshore arche structures by explosives. Med 1964, p. [1993, p.136-122] SR 20-38. Supposition of offshore archerostics. Supposition production in acceptance and supposition production in acceptanced waters. Tuck or, W. p. [1993, p. 20-215] SR 20-38. Supposition production in acceptanced waters. Tuck or, W. p. [1993, p. 20-215] SR 20-38. Supposition production in acceptanced waters. Tuck or, W. p. [1993, p. 20-215] SR 20-38. Supposition production in acceptanced waters. Tuck or, W. p. [1993, p. 20-215] SR 20-38. Supposition production in acceptanced waters. Tuck or, W. p. [1993, p. 20-215] SR 20-38. Supposition production of the Bernford Sea World W. p. [1993, p. 20-215] SR 20-38. Supposition of the action on two exploration and common structures. Kind, K., et al., [1993, p. 20-215] SR 20-38. Supposition of the structure schools of supposition production supposition production supposition production supposition production supposition production production production production production production production production production producti
gated with wastewster. Palazzo, A.J., et al., [1981, 1592, CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2593, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-43] MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4492, CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793, SR 82-01 Overview of models used in land treatment of wastewster inhander, L.K., [1982, 2793, SR 82-01] Mothemonical simulation of nitrogen unteractions in soils. Scient, H.M., et al., [1982, p.241-241], MP 2051 U.S. tundra bisone publication list. Beown, J., et al., [1982, 2793, SR 83-29] Oente bottom Hyperholic reflections on Benefort Sea seisone records. Newse, K.G., et al., [1981, 1493, CR 81-02] Solven treaching in the Arctic. Mellor, M., [1981, p.843, 832] Solven treaching in the Arctic. Mellor, M., [1981, p.843, 832] Understanding the Arctic sea floor for engineering proposes. (1992, 141p2, SR 83-25) Ice seoring on the Alaskan shelf of the Benefort Sea. Weeks, W.F., et al., [1983, p.213-254] Solven prohabilitie supects dice gougns on the Alaskan Shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p.213-254] Solven promutest distribution on the Alaskan shelf of the Benefort Sea. Weeks, W.F., et al., [1984, p.213-254] Solven proposities englished features using DC methods. Scii. Waspang registry peched features using DC methods. Scii. Waspang registry peched features using DC methods. Scii.	p.131-1373 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomodispellists from the Weddell Sea, summer 1977, Buch, K.R., [1990, 26p.3] CR 89-16 Oceanography Annountic data collection equipment for oceanographic application. Dean, A.M., Jr., [1971, p.1311-1121] MP 1028 Constal marine geology of the Benedort, Chukchi and Berrag Seas. Gatta, L.W., [1990, 357p.3] SR 89-05 International Workshop on the Seasonal Sea Ice Zone, Montery, Caldorini, Erk. 26-Mar.I., 1979. Address, BG., cd., [1990, 137p.3] MP 1292 Problems of the seasonal sea ice zone. Weeks, W.F., [1990, p.1-15] Physical oceanography of the seasonal sea see zone McPace, M.G., [1990, p.9-1-12] Arctic Ocean temperature, stoking and density, March-May 1979. McPheer, M.G., [1990, p.9-1-12] Mesoscale across-oceanos interaction experiments. Johnnessea, O.M., cd., [1944, 176p.3] SR 81-05 Oceans Castaling fund sea see model. Place, G.M., et al., [1990, p.278-263] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the United States, Vol.4, [1990, 120p.3] Arctic research of the Uni	Site investigations and submanue soil mechanics in poles regions. Chamberlain, E.J. (1991, 1891) SR 81-30 Sea ice rubble formations in the Bering Sea and Northe Sound, Alacha. Kovaco, A. (1911, 1204) Offshore mechanics and Arcise engineering. Springions 1993, (1993, 8139) Dynamic investmence unteraction dering continuous crush ing. Matchiner, M., (1993, 615) Method for determining see londs on offshore structures being, Matchiner, M., (1993, 615) Method for determining see londs on offshore structures being, Matchiner, J.B., (1993, p. 1984-121) Method for determining see londs on offshore structures being, M., (1993, p. 1984-121) Method for determining see londs on offshore structures by explosives. Meller, M., (1993, p. 198-152) Ice forces on model statementures. Hapter, F.D., et al. (1993, p. 178-155) M.P. 1600, p. 278-2737 M.P. 1600, p. 178-1753 M.P. 1600, p. 178-1754 M.P. 1600, p
gated with wastewster. Palazzo, A.J., et al., [1981, 1992. CR 81-08 Seven-year performance of CRREL shon-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2593. SR 81-12 Soil microbiology. Bouatta, E., et al., [1981, p.38-43]. MP 1753 Wastewater treatment by a prototype show rate land treatment system. Jenkins, T.F., et al., [1981, 4493. CR 81-14 Effect of soil temperature on nitrification kinetics. Parket, L.V., et pl., [1981, 2793. SR 81-33] Overview of models used in land treatment of wastewater bikander, L.K., [1982, 2793. SR 88-33] Overview of models used in land treatment of wastewater bikander, L.K., [1982, 2793. SR 88-32] Mathematical simulation of nitrogen interactions in soils, Selim, H.M., et al., [1983, p.241-249]. MP 2053. U.S. tundra bisone publication list. Beown, J., et al., [1983, 2793]. SR 83-29 Oversc hottom Hyperbolic reflections on Beaufiert Sea seisone records. Neave, K.G., et al., [1981, 1493. CR 81-12 Solves treaching in the Arctic. Mellor, M., [1981, 13192. Solves treaching in the Arctic. Mellor, M., [1981, 1319. CR 81-17 Site intreatings the Arctic sea food for eagineering purposes, (1982, 14193. SR 81-24 Understanding the Arctic sea food for eagineering purposes, (1982, 14193. SR 81-24 Let somma on the Alaskan shelf of the Beaufort Sea. Week, W.F., et al., [1983, p.213-21] Solves persuafrost distribution on the Alaskan Shelf of the Beaufort Sea. Weeks, W.F., et al., [1983, p.213-21] Solves persuafrost distribution on the Alaskan Shelf of the Beaufort Sea. Weeks, W.F., et al., [1983, p.213-21] Solves persuafrost distribution on the Alaskan Shelf of the Beaufort Sea. Weeks, W.F., et al., [1983, p.213-21] Mapping resistive seabed features using [PC methods. Sed-mann, P.V., et al., [1983, p.136-12]. MP 1918 Mapping registive seabed features using [PC methods. Sed-mann, P.V., et al., [1983, p.136-12]. MP 1918.	p.131-1373 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomologelists from the Weddell Sca., summer 1977, Buch, K.R., [1990, 26p.3] CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1311-1121] Constal marine geology of the Benedort, Chukchi and Berrag Seas. Gatta, L.W., [1990, 357p.3] SR 80-05 International Workshop on the Seasonal Sea Lee Zone, Monterey, Coldoran, Feb. 26-Mar.I., 1979. Andreica, B.G., ed. [1990, 157p.3] MP 1292 Problems of the seasonal sea ice zone. Works, W.F., [1992, p.1-15] Physical oceanography of the seasonal sea see zone McPher, M.G., [1990, p.9-1-12] Arene Ocean temperature, submey and densory, March-May 1979 McPher, M.G., [1990, p.9-1-12] Menocale across-ocean stotraction experiments. Johannessen, O.M., ed., [1984, 170p.3] Menocale across-ocean stotraction experiments. Johannessen, O.M., ed., [1984, 170p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p.3] Arene research of the United States, Vol.4, [1990, 120p	Site investigations and submanue soil mechanics in polar region. Chumberlain, E.J. (1991, 1891) Sen ice rubble formation in the Bering Sen and Nortee Sound, Alaska. Kovaco, A., (1911, 239) Sen ice rubble formation in the Bering Sen and Nortee Sound, Alaska. Kovaco, A., (1911, 239) Sen ice rubble formation and Arcisic caginetring. Symposium 1993, (1993, 8139) Offshere mechanics and Arcisic caginetring. Symposium 1993, (1993, 8139) Dynamic irrotracture interaction dening continuous crub ing. Maximizer, M., (1993, 450) Method for determining are loads on offshore structures. Johnson, J.B., (1993, p. 126-123) Protection of offshore methor structures by explosives. Method. Soc. M., (1993, p. 130-123) MP 100 Heasurement of ser forces on structures. Soulin, D.S., et al. (1993, p. 173-152) Offshore petroleum production in sec-control waters. Tuch cr., W.R., (1993, p. 201-215) Ice secong on the Alaskan shelf of the Bernfort Sen. Method. W.F., et al., (1993, b) or explosive of grant on the performance of the Bernford Sen. Method. W.F., et al., (1993, b) or explosive methodical and control structure Kata, K., et al., (1993, b) or explosive methodical structures. Kine, K., et al., (1994, p. 103-124) Ice action on two explosional structures. Maximum of the structure schools of structures. Soulin, D.S., et al., (1994, p. 103-124) Assessment of are accretion on offshore structures. Maximum and the structure schools on solitones and structures. Maximum and the structure schools on solitones and structures. Maximum and the structure schools on solitones and structures. Maximum and the structure schools on solitones and structures. Maximum and the structure schools on solitones and structures. Maximum and the structure schools on solitones and structures are schools on solitones and structures. Maximum and the structure schools on solitones and structures under structures. Soliton, D. (1994, 1994, 1994) Assessment of are accretion on solitones structures. Soliton, D. (1994, 1994) Assessment of are accretion on solitones struct
gated with wastewater. Palazzo, A.J., et al., [1981, 1594] CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2592] Sil microbiology. Bosatta, E., et al., [1981, p.38-44] MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, p.38-44] Effect of sail temperature on nitrification lineties. Parker, L.V., et al., [1981, 2792] Overview of models used in land treatment of wastewater lukunder, L.K., [1992, 2792] Mathematical simulation of nitrogen interactioness in sock, Scion, H.M., et al., [1992, p.241-241] MP 2051 U.S. tondra biome publication list. Brown, J., et al., [1993, 2792] Const. biotom Hyperbolic reflections on Benefiert Sea seismoc records. Neave, K.G., et al., [1991, 1693] CR 81-02 Solucia treaching in the Arctic. McGoe, M., [1991, p.343-382] MP 1864 Solucia treaching in the Arctic. McGoe, M., [1991, p.343-382] Site intestigations and submarine soil mechanics in pulse regions. Chamberlain, E.J., [1981, 1592] CR 81-25 Understanding the Arctic sea floor for expirencing purposes, (1982, 1419). See probabilistic aspects of ice gonging on the Alaskan Sac2 of the Benefiet Sea. Weeks, W.F., et al., [1993, 399. amp 2506] Solves persunfront distribution on the Alaskan Sac2 of the Benefiet Sea. Weeks, W.F., et al., [1994, p.75-82] MP 1892 Solves persunfront distribution on the Alaskan shelf. Sea. mann, P.V., et al., [1994, p.75-82] MP 1892 Numerical simulation of sea see undisced gonges on the thebres of the polar occasis. Weeks, W.F., et al., [1995, p.196-145] MP 1991 Numerical simulation of sea see undisced gonges on the thebres of the polar occasis. Weeks, W.F., et al., [1995, p.196-145] MP 1991	p.131-1373 On modeling the baroclinic adjustment of the Arcii Cornal Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomodispellists from the Weddell Sea, summer 1977. Buch, K.R., [1990, 26p.] Crassiphy Assumate data collection equipment for oceanographic application. Dran, A.M., Jr., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benedori, Chalchi and Berrag Seas. Gatta, L.W., [1990, 357p.] Second marine geology of the Benedori, Chalchi and Berrag Seas. Gatta, L.W., [1990, 357p.] MP 1028 Constal marine geology of the Benedori, Chalchi and Berrag Seas. Gatta, L.W., [1990, 357p.] MP 1292 Seas. Gatta, L.W., [1990, 357p.] MP 1292 International Workshop on the Seasonal Sea Ice Zone, Monterey, Calderina, Feb., 26-Mar. [1979. Anderica, B.C., ed., [1990, 357p.] Physical occumography of the seasonal sea ice zone McPace, M.G., [1990, p.9-132] MP 1293 Physical occumography of the seasonal sea ice zone McPace, M.G., [1990, p.9-132] MP 1294 Arciic Ocean temperature, salancy and density, March-May 1979 McPace, M.G., [1990, p.9-132] MP 1294 Mesocale arrace-ocean interaction experiments. Johannessea, O.M., ed., [1994, [191], 20p.] Mesocale arrace-ocean interaction experiments. Johannessea, O.M., ed., [1994, [191], 20p.] MP 2745 Oceans Castening fund sea ice model. Flato, G.M., et al., [1990, p.239-242] Arciic research of the United States, Vol.4, [1990, 150p.] MP 2745 Offshore drifting Defenction and engineering characteristics of permations beneath the Bendort Sea. Sellmann, P.V., et al., [1976, p.931-405] Defenction and engineering characteristics of permations beneath the Bendort Sea. Sellmann, P.V., et al., [1976, p.931-405] Defenction and engineering characteristics of permations beneath the Bendort Sea. Sellmann, P.V., et al., [1976, p.931-405]	Site investigations and submanue soil mechanics in poles region. Chumberlain, Ed., [1991, 1991, 1993, SR 88-38 Sen ice radble formations in the Bering Sen and Northe Sound, Alaska. Koraca, A., [1911, 2361. SR 81-38 Offshore mechanics and Arcise engineering, symposium 1993, [1993, 8139]. Dynamic involvanture interaction defining continuous crush ing. Materiaers, M., [1983, 4139]. Method for determining are looks on offshore structures Johnson, J.B., [1913, p.124-123]. MP 200 Protection of offshore article structures by explosives. Mellow, M., [1993, p.310-323]. MP 1600 for, M., [1993, p.310-323]. MP 1600 forecess on model macine structures. Hayner, F.D., et al. [1993, p.775-237]. MP 1600 formation of offshore article structures. Softm, D.S., et al. [1993, p.173-135]. MP 1600 for periodeum production in seconstret uniters. Full (1993, p.173-135). MP 1600 force petroleum production in seconstret uniters. Full (1993, p.173-135). MP 1600 force petroleum production in seconstret uniters. Full (1993, p.173-135). MP 1600 force petroleum production in seconstret uniters. Full (1993, p.173-135). MP 1600 force petroleum production in seconstret uniters. Full (1993, p.173-135). MP 1600 force petroleum production in seconstret uniters. Full (1993, p.173-135). MP 1600 force action on pains of cylindrical and comical structures. Kine, K., et al. [1993, p. p. marg. [1994, p.
gated with wastewster. Palazzo, A.J., et al., [1981, 1992, CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2593, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-44), MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4493, CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793, SR 82-01 Overview of models used in land treatment of uniteraster islander, L.K., [1982, 2793, SR 82-01 Mathematical simulation of nitrogen interactions in soils. Scient, H.M., et al., [1982, p.241-243], MP 2051 U.S. tomate biome publication list. Bown, J., et al., [1981, 2993, SR 83-29 Oenic bottom Hyperholic reflections on Bendort Sea seisme records. News, K.G., et al., [1981, 1493], GR 81-17 Soluen treaching in the Arctic. Mellor, M., [1981, p.823-832] Soluen treaching in the Arctic. Mellor, M., [1981, p.823-832] Understanding the Arctic sea floor for engineering purposes, (1982, 1419), SR 83-25 Les essuing on the Alaskan shelf of the Bendort Sea. Weeks, W.F., et al., [1981, 349, MP 1801 Soluen probabilistic aspects of ice gougang on the Alaskan Shelf of the Bendort Sea. Weeks, W.F., et al., [1984, p.73-82] Soluen, P.V., et al., [1984, p.73-82] Soluen, P.V., et al., [1985, p.136-147] Mp 1918 Numerical simulation of Sea see induced gouges on the shelves of the polar occusion. Weeks, W.F., et al., [1985, p.256-1894, p.75-82] Numerical simulation of Sea see induced gouges on the shelves of the polar occusion. Weeks, W.F., et al., [1985, p.256-1894, p.75-82]	p.131-1373 On modeling the baroclinic adjustment of the Artic Ocean. Holder, W.D., III. [1990, p.247-259] MP 2739 Ocean environments ChousedageEists from the Weddell Sex, summer 1977. Buch, K.R., [1990, 26p.] CR 89-16 Oceanography Annuatic data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1811-1121] MP 1028 Constal marine poology of the Beaudort, Chukchi and Berrag Sex. Gatin, L.W., [1990, 357p.] SR 89-95 International Workshop on the Seasonal Sex Ice Zone, Musternational Oceanography of the seasonal sex Ice Zone McPiter, MG, [1990, p.91-132] MP 1293 Physical oceanography of the seasonal sex Ice Zone McPiter, MG, [1991, 20p.] SR 81-95 McPater Ocean temperature, salmey and density, March-May 1979 McPiter, MG, [1991, 20p.] SR 81-95 Menoscale acrosco-ocean interaction corporments. Johannessen, O.M., ed. [1994, 176p.] SR 88-29 Arene research of the United States, Vol.4, [1990, 120p.] MP 2708 Oceans Casualing fund sex Ice model. Place, G.M., et al., [1994, 1799, 209-1242] Arene research of the United States, Vol.4, [1990, 120p.] MP 2708 Offshore delling Delenction and expirecting characteristics of permations beneath the Resident Sex, Alaska Sellmann, P.V., et al., [1976, 251-66] Delenction and expirecting characteristics of permations beneath the Resident Sex, Sellmann, P.V., et al., [1976, 251-66]	Site investigations and submanue soil mechanics in poles region. Chamberlain, E.J. (1991, 1891) SR 88-36. Sea ice rubble formation in the Bering Sea and Northe Sound, Alacha. Koraca, A. (1911, 1204) Offshore mechanics and Arcise engineering. Symposium 1993, (1993, 8139) Dynamic invotracture unteraction dering continuous crush ing. Matchiner, M., (1993, 615) Method for determining see londs on offshore structures Johnson, J.B., (1913, p. 126-123) Method for determining see londs on offshore structures Johnson, J.B., (1913, p. 126-123) Method for determining see londs on offshore structures Johnson, J.B., (1913, p. 126-123) Method for determining see londs on offshore structures Johnson, J.B., (1913, p. 130-322) Method for determining see londs on offshore structures Johnson, J.B., et al. (1913, p. 171-135) Ice feeces on model stacme structures. Hapter, F.D., et al. (1913, p. 171-135) Method for determining structures. South, D.S., et al. (1913, p. 171-135) Ice scoring on the Alachan shelf of the Bezolori Sea. Weeks W.F. et al. (1913, j. 197-135) Ice scoring on the Alachan shelf of the Bezolori Sea. Weeks W.F. et al. (1913, j. 197-135) Ice action on spars of clandrocal and comucal structures. Nature, i. (1914, j. 197-124) New Test al. (1914, j. 197-125) Ice action on spars of clandrocal and comucal structures. Nature, p. (1914, j. 197-124) Ice action on two clandrocal structures. Nature, K., et al. (1914, j. 196-112) Dependence of crushing specific energy on the superior mod the structure structure. Mash-men, L., (1914, j. 197-124) Assessment of see acceptation on offshore structure. Mash-men, L.D., (1914, j. 197-124) Interpolation of crush-et distance engineering. Soil, 1934, p. 31-314; Interpolation of crush-et distance engineering. Soil, p. 30-31-314; Interpolation of crush-et distance engineering. Soil, p. 30
gated with wastewater. Palazzo, A.J., et al., [1981, 1991, CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 25p.; SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-41]. MP 1753 Wastewater treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 449.] CR 81-14 Effect of soil temperature on nitrification linetures. Parker, L.V., et al., [1981, 27p.] Overview of models used in land treatment of material relaxable, L.K., [1992, 27p.] Overview of models used in land treatment of material relaxable, L.K., [1992, 27p.] Overview of models used in land treatment of material relaxable, L.K., [1992, 27p.] Overview of models used in land treatment of material seasons. Section, H.M., et al., [1993, p.241-243]. MP 3851 U.S. tombra bisome publication list. Beown, J., et al., [1981, 27p.] Overview bisome publication list. Beown, J., et al., [1981, 27p.] CR 81-02 Soluce hottom Hyperbolic reflections on Brandert Sea seismoc records. Neave, K.G., et al., [1991, 149.] Soluce treaching in the Arctic. Medice, M., [1991, p.843-29 Soluce treaching in the Arctic. Medice, M., [1991, p.843-29 Soluce investigations and submarine soil mechanous in polar regions. Chamberlain, E.J., [1981, 18p.] Site investigations and submarine soil mechanous in polar regions. Chamberlain, E.J., [1981, 18p.] Site investigations and submarine soil mechanous in polar regions. Chamberlain, E.J., [1981, 18p.] Site investigations and submarine soil mechanous in Polar Relaxion Shell of the Beaufort Sea. Weeks, W.F., et al., [1984, p.713-2] Los courage on the Alaskan shell of the Beaufort Sea. Weeks, W.F., et al., [1985, p.216-195, p.126-195,	p.131-1373 On modeling the baroclinic adjustment of the Arcie Ocean. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomologelists from the Weddell Sea, summer 1977. Buch, K.R., [1990, 26p.] CR 80-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., [1978, p.1111-1121] Constal marine geology of the Benedori, Chalchi and Berrag Seas. Gata, L.W., [1980, 357p.] SR 80-05 International Workshop on the Seasonal Sea Let Zone, Monterey, Colderon, Feb., 26-Mar.I., 1979. Anderica, B.G., ed., [1980, 137p.] MP 1292 Problems of the seasonal sea ice zone. Weeks, W.F., [1980, p.1-35] Physical occanography of the seasonal sea are zone McPher, M.G., [1980, p.9-132] MP 1293 Arene Ocean temperature, soloney and density, March-May 1979. McPher, M.G., [1980, p.9-132] MP 1294 Mesocale autorescent solutionation experiments. Johannessea, O.M., ed., [1984, 176p.] SR 84-29 Active research of the United States, Vol.4. [1990, 120p.] MP 2748 Oceans Cavaning fund sea are model. Flato, G.M., et al., [1990, p.279-242] Arene research of the United States, Vol.4. [1990, 120p.] MP 2748 Oceans Cavaning fund sea are model. Flato, G.M., et al., [1990, p.279-242] Arene research of the United States, Vol.4. [1990, 120p.] MP 2748 Oceans Cavaning fund sea are model. Flato, G.M., et al., [1990, p.279-242] Arene research of the United States, Vol.4. [1990, 120p.] MP 2748 Oceans Cavaning fund sea are model. Flato, G.M., et al., [1990, p.279-242] Arene research of the United States, Vol.4. [1990, 120p.] MP 2748 Oceans Cavaning fund sea are model. Flato, G.M., et al., [1990, p.279-242] Arene preparable and engineering characteristics of permatent beneath the Beaudort Sea. Sellmann, P.V., et al., [1976, p.231-440] Definition and engineering characteristics of permatent beneath the Beaudort Sea. Sellmann, P.V., et al., [1977, p.431-440] Definition and engineering characteristics of permatent beneath the Beaudort Sea. Sellmann, P.V., et al., [1977, p.431-440]	Site investigations and submanue soil mechanics in poles region. Chumberlain, E.J. [1991, 1891] SR 81-38 Sen ice rabble formations in the Bering Sen and Northe Sound, Alaska. Koraca, A., [1911, 2391] SR 81-39 Offshore mechanics and Arciae cagineering, symposium 1993, [1993, 8139]. Dynamic involvanture interaction defining continuous crush sing. Mattimers, M., [1983, 459.] Dynamic involvanture interaction defining continuous crush sing. Mattimers, M., [1983, 459.] Method See determining are looks on offshore structures Johnson, J.B., [1913, p.124-123]. Method See determining are looks on offshore structures Johnson, J.B., [1913, p.124-123]. MP 1000 Protection of offshore article structures by explosives. Methods, M., [1933, p.310-323]. MP 1000 Protection of offshore article structures. Soullin, D.S., et al. [1931, p.174-135]. MP 1000 Characterization of math-year pressure radges. Kosaca, A. [1932, p.173-135]. Offshore petroleum production in sco-constructures. Kosac, R. (1932, p.173-135). MP 1000 Characterization of math-year pressure radges. Kosaca, A. (1932, p.173-135). MP 2000 Protection of parts of cylindrical and comical structures. Kosac, R. (1933, p.173-135). Ice action on parts of cylindrical and comical structures. Kosac, R., et al. [1933, p.173-135]. Chiboter methanics and Arciae exposering structures. Kosac, R., et al. [1934, p.173-135]. Dependence of crushing specific energy on the inject ration of the structures velocity. Soullin, D.S., et al., [1934, p.173-135]. Attention of the accuration on offshore structures. Mass L.D., [1934, p.173-137]. Attention of the accuration on offshore structures. Mass L.D., [1934, p.173-137]. Attention of structures velocity. Soullin, D.S., et al., [1934, p.173-137]. Attention of the accuration of crushed structures statume on distance in parts on statuments in accurating structures. Soullin, D.S., et al., [1934, p.173-137]. Attention of the accuration of crushed structures statume on distance in parts are accuration of the accuration of the accurati
gated with wastewster. Palazzo, A.J., et al., [1981, 1992. CR 81-48 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 259.] Sil microbiology. Bosatta, E., et al., [1981, p.38-45] Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 449.] Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 279.] Overview of models used in land treatment of uniterater blander, L.K., [1982, 279.] Mathematical simulation of nitrogen interactions in soil, Scient, H.M., et al., [1982, 279.] Mathematical simulation of nitrogen interactions in soil, Scient, H.M., et al., [1981, p.241-243] MP 2851 U.S. tendra biome publication list. Beoms, J., et al., [1981, 299.] Subsea treaching in the Arctic. Medice, M., [1981, p.823-29] Ornic bottom Hyperholic reflections on Braufort Sea seismer records. Newse, K.G., et al., [1981, 149.] Soluen treaching in the Arctic. Medice, M., [1981, p.823-382] Soluen treaching in the Arctic. Medice, M., [1981, p.823-382] Soluen treaching in the Arctic. Medice, M., [1981, 119.] Set intestigations and submarine soil mechanics in pulsa regions. Charelerian, E.J., [1981, 139.] Solven treaching the Arctic sea floor for engineering purposes, (1982, 1419.) Solven probabilistic aspects of ice goughny on the Alaskan Shell of the Brandert Sea. Weeks, W.F., et al., [1984, p.713-2] Some probabilistic aspects of ice goughny on the Alaskan Shell of the Brandert Sea. Weeks, W.F., et al., [1984, p.713-2] Solven, P.V., et al., [1984, p.75-82] MP 1808 Solven, P.V., et al., [1985, p.136-115] Mp 1908 Mp 2009 Mp 2009 Prilameners summations of sea see induced gouges on the shelves of the polar occurs. Weeks, W.F., et al., [1985, p.25-165] MP 2106 Prilameners summations of the formation and miching of sea see gouges. Weeks, W.F., et al., [1985, p.25-165] MP 2108 Prilameners summations of the formation and miching of sea see gouges. Weeks, W.F., et al., [1985, p.25-265]	p.131-1373 On modeling the baroclinic adjustment of the Arcic Ocean. Haber, W.D., III, [1990, p.247-259] MP 2739 Ocean environments Chomolingelists from the Weddell Sca., summer 1977. Buch, K.R., [1990, 26p.] Crassification from the Weddell Sca., summer 1977. Buch, K.R., [1990, 26p.] Crassification opigment for oceanographic application. Dean, A.M., R., [1978, p.1111-1121] MP 1028 Constal marine geology of the Benefort, Chulchi and Berrag Scas. Gatta, L.W., [1990, 357p.] SR 2005 International Workshop on the Seasonal Sca Lee Zone, Monterey, Calderina, Feb. 26-Mail, 1979. Anderica, B.C., ed. [1990, 357p.] MP 1292 Publicate of the seasonal scaler zone. Weeks, W.F., [1990, p.1-35] Physical oceanography of the seasonal scaler zone of McPare, M.G., [1990, p.9-132] Arcic Ocean temperature, salancy and density, March-May 1979. McPare, M.G., [1991, 20p.] MP 288-81-99 Arcic research of the United States, Vol.4, [1990, 1299] Arcic research of the United States, Vol.4, [1990, 1299] MP 2745 Obstation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1994, p.39-246] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1996, 259-340] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1996, 259-340] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1996, 253-40] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1996, 253-40] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1996, 253-40] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1997, 253-40] Defenciation and engineering characteristics of permations beneath the Resident Sea. Sellmann, P.V., et al., [1997, 1992, 253-40] Defenciation and engineering characteristics of perma	Site investigations and submanue soil mechanics in poles region. Chumberlain, E.J. (1991, 1891) Site for cubble formations in the Bering Sea and Northe Sound, Alacha. Koraci. A. (1991, 2001) Offshore mechanics and Arcise engineering. Symposium 1993, (1993, 8139) Dynamic involvanture unteraction dering continuous crush ing. Matthews, M., (1993, 450,) Method See determining see looks on offshore structures. Johnson, J.B., (1993, p. 124-123) Method See determining see looks on offshore structures. Johnson, J.B., (1993, p. 130-322) Method See determining see looks on offshore structures. Johnson, J.B., (1993, p. 130-322) Method See determining see looks on offshore structures. Johnson, J.B., (1993, p. 130-322) Method See determining see looks on offshore structures. Johnson, J.B., et al. (1993, p. 171-153) MP 1600 MP 1600 MP 1601 MP 1601 Charactermics of methogran pressure endors. South, D.S., et al. (1993, p. 171-153) MP 1601 Charactermics of methogran pressure endors. Mense, A., (1993, p. 171-153) MP 1602 Chindre operiodism production in necoconcred waters. Tool cr., W.B., (1993, p. 907-215) Ice secong on the Alacham shelf of the Benderl Sea. Weeks W.F. et al. (1993, 199 a. may) Ice action on pures of exhibitional and comical structures. Karo, K., et al. (1993, 199 a. 1994 (1994, 1904) Ice action on pures of exhibitional and comical structures. Kaso, K., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures. Mask Sea. R., et al. (1994, 1904) Ice action on two ephodicular structures.
gated with wastewster. Palazzo, A.J., et al., [1981, 1992, CR 81-08 Seven-year performance of CRREL show-rate land treatment prototypes. Jenkins, T.F., et al., [1981, 2593, SR 81-12 Soil microbiology. Bosatta, E., et al., [1981, p.38-43] MP 1753 Wastewster treatment by a prototype slow rate land treatment system. Jenkins, T.F., et al., [1981, 4492, CR 81-14 Effect of soil temperature on nitrification kinetics. Parker, L.V., et al., [1981, 2793, SR 82-01 Mothemotical simulation of nitrogen unteractions in soils. Scient, H.M., et al., [1982, p.241-241] My 2852-01 Mothemotical simulation of nitrogen unteractions in soils. Scient, H.M., et al., [1982, p.241-243] My 2851 U.S. tendra bisone publication list. Beown, J., et al., [1982, 2793] Soiloca bostom Hyperholic reflections on Benefort Sea serione records. Newse, K.G., et al., [1981, 1493] Soiloca treaching in the Arctic. Medice, M., [1981, p.843, 882] Soiloca treaching in the Arctic. Medice, M., [1981, p.843, 882] Soiloca treaching in the Arctic. Medice, M., [1981, p.843, 882] Understanding the Arctic sea floor for engineering proposes. Chamberlain, E.J., [1981, 1393] Soiloca treaching the Arctic sea floor for engineering proposes. (1982, 14192, P. 9 may) CR 81-12 Soil intestinguisms and submarine soil mechanics in polar reposits. Chamberlain, E.J., [1981, 1393] Soil Resource of the Alaskan shell of the Benefort Sea. Weeks, W.F., et al., [1984, p.213-216] Soil Resource of the Benefort Sea. Weeks, W.F., et al., [1984, p.213-216] Napung reinstre peaked features using DC mechods. Sea. mann., P.V., et al., [1984, p.75-82] Napung reinstre peaked features using DC mechods. Sea. mann., P.V., et al., [1985, p. 136-135] Napung reinstre peaked features using DC mechods. Sea. mann., P.V., et al., [1985, p. 136-135] Napung reinstre peaked features using DC mechods. Sea. mann., P.V., et al., [1985, p. 259-265] Napung reinstre peaked features using DC mechods. Sea. Mecho, W.F., et al., [1985, p. 259-265] Napung reinstre peaked features using DC mecho	p.131-1373 On modeling the baroclinic adjustment of the Artic Ocean. Haber, W.D., III. [1990, p.247-259] MP 2739 Ocean environments Chouseling files from the Weddell Sea, summer 1977. Buch, K.R., [1990, 26p.3] CR 89-16 Oceanography Automatic data collection equipment for oceanographic application. Dean, A.M., Jr., [1971, p.18111-112]; MP 1028 Constal marine prology of the Beasdort, Chukchi and Berrag Seas. Gatin, L.W., [1960, 357p.3] SR 89-05 International Workshop on the Seasonal Sea Ice Zone, Montery, Caldornia, Feb. 26-Mar. I. 1979. Anderica, BG, cd., [1940, 137p.3] MP 1292 Problems of the seasonal sea ice zone. Works, W. F., [1960, cd., [1940, 137p.3]] MP 1292 Physical oceanography of the seasonal sea see zone McPher, M. G., [1940, p.91-132] MP 1293 Arcic Ocean temperature, subsequand density, March-May 1979. McPher, M. G., [1941, 176p.3] SR 81-05 Mesoscale acrosco-ocean interaction experiments. Johannessen, O. M., ed., [1944, 176p.3] SR 88-29 Arcic research of the United States, Vol.4. [1940, 120p.3] Arcic research of the United States, Vol.4. [1940, 120p.3] Arcic research of the United States, Vol.4. [1940, 120p.3] Arcic research of the United States, Vol.4. [1940, 120p.3] Arcic research of the United States, Vol.4. [1940, 120p.3] Arcic research of the United States, Vol.4. [1940, 120p.3] Arcic research of the United States, Vol.4. [1940, 120p.3] Defensation and engineering characteristics of permateous beneath the Resident Sea. Sellmann, P.V., et al., [1940, 120p.3] Defensation and engineering characteristics of permateous beneath the Resident Sea. Sellmann, P.V., et al., [1941, 1941, 1941] Defensation and engineering characteristics of permateous beneath the Resident Sea. Sellmann, P.V., et al., [1941, 1942, 1943, 1944] Defensation and engineering characteristics of permateous beneath the Resident Sea. Sellmann, P.V., et al., [1941, 1942, 1943, 1944]. Defensation and engineering characteristics of permateous beneath the Resident Sea. Sellmann, P.V., et al., [1941, 1942]. P. 432-1405	Site investigations and submanue soil mechanics in poles regions. Chamberlain, E.J. (1991, 1891) Site for rubble formations in the Bering Sea and Northe Sound, Alacha. Kovaca, A. (1911, 236) Site BlM. (1913, 1819) Offshore mechanics and Arcise engineering, symposium 1993, (1993, 1819) Dynamic investmence miteraction dering continuous crush ing. Matchines, M., (1993, 163) Method for determining see looks on offshore structures being, Matchines, J. (1991, p. 124-122) Method for determining see looks on offshore structures Johnson, J. R., (1991, p. 126-122) Method for determining see looks on offshore structures Johnson, J. R., (1991, p. 193-122) Method for determining see looks on offshore structures Johnson, J. R., (1991, p. 193-122) Method for determining the structures by explosives. Method, M., (1993, p. 136-123) Method for determining the structures. Haynes, F.D., et al. (1993, p. 136-125) Method for dee feeces on structures. Softin, D.S., et al. (1993, p. 136-125) Method for dee feeces on structures. Softin, D.S., et al. (1993, p. 136-125) Method for dee feeces on structures. Softin, D.S., et al. (1993, p. 136-135) Lee scoring on the Alaskan shelf of the Bernfort Sea. Weeks W.F., et al. (1993, 187) Offshore mechanics and Aleise exposering symposium 1993 (1994, p. 1961-112) Dependence of erishing specific energy on the aspect rus and the structure schoots. Softin, D.S., et al. (1994, p. 1961-112) Dependence of erishing specific energy on the aspect rus and the structure schoots. Softin, D.S., et al. (1994, p. 1961-112) Dependence of erishing specific energy on the aspect rus and the structure schoots. Softin, D.S., et al. (1994, p. 1961-112) Dependence of erishing specific energy on the aspect rus and the structure schoots. Softin, D.S., et al. (1994, p. 1961-112) Dependence of erishing specific energy on the aspect rus and the structure schoots. Softin, D.S., et al. (1994, p. 1961-112) Dependence of erishing structures. Makhores L., (1994, p. 1961-112) Dependence of erishing structures under sharme condit

Sheet for forces on a conical structure: an experimental study. Sodhi, D.S., et al., (1915, p.643-455; MP 1986	Crude oil spills on solureric permufesot in interior Almika. Johnson, L.A., et al. (1900, 67p.) CR 90-29	Relative abundance of distants in Weddell Sets puck ice. Clarke, D.B., et al., (1963, p.181-182) MP 1786
Esperience with a biguist ice stress season. Con. G.F.N.,	Posting of oil under seasce. Koraca, A., et al., [198], p.912-	Morphology and ecology of distorts in sea ice from the Wed-
1965, p.252-255; MP 1937 Measurement of iding on offshore structures. Munk, L.D.,	922 ₃ 34P 1459 Surface disturbance and pestection during economic develop-	dell Sea. Clarke, D.B., et al. (1914, 41p.) CR 8445 Sea ice data busys in the Weddell Sea. Ackley, S.F., et al.
(1965, p.267-292) MP 2010	ment of the North. Brown, J., et al. [1981, 889.] 30P 1467	[1984, 1863] CR 84-11 Sea ice penetration in the Arctic Ocean. Works, W.F.,
Topical databases: Cold Regions Technology on line. Lis- ton, N., et al. (1965, p.12-15) MP 2027	Long-term active layer effects of crade oil spilled in interior	(1984, p.37-45; SEP 1993
Resistant measurements of uplifting ice forces. Zahlanday, L.J., 1965, p.153-159; MP 2092	Alinka, Collins, C.M., (1963, p. 175-179) MP 1656 Simulation of oil slicks in rivers and lakes. Shen, H.T., et al.,	Heat and environce advection over antarctic sea fee. An- dress, E.L., (1985, p.734-746) MP 1000
leateumenenien for an upiding see force model. Zubenenty,	(1910, 29 ₇₋₃ CR 90-01 Optical phenomens	Physical and structural characteristics of Weddell Sea pack
LJ_1965, p.1430-1435; MP 2091 See for and the Fairway Rock icefore. Koraca, A., et al.	Measurements of refractive index spectra over store. An-	Sensor pressure ridge microbial communities. Ackley. S.F.,
1905, p.25-32; MP 2145 lee cover research—present state and finare needs. Kerr,	dress, E.L., (1966, p.241-260) MP 2212 Atmospheric stability from scintillation measurements. As-	[1918], p.172-174] MP 2490 Show cover effects on anterctic sea ice thickness. Achley,
A.D., et al. (1964, p.)64-399; MP 2004	drend, E.L., (1968), p.2241-22447 MP 2306	S.F. et al. (1990, p.16-21) MP 2736
Crushing of ice sheet against rigid cylindrical structures. Southi, D.S., et al. (1916, p.1-12) MP 2018	Optical properties Photoclastic unstrumentation—penicipies and techniques.	Pad foundations Construction on permatered at Longycarbyen on Spitchergen.
Offshore Mechanics and Arctic Engineering Symposium, 5th,	Roberts, A., et al. (1979, 1579.) SR 79-13 Caralog of sande/obscurant characterization instruments.	Telegraphy
1966, (1966, 4 sole.) MP 2031 Some effects of friction on ice forces against vertical struc-	O'Brieri, H.W., et al. (1994, p.77-12) MP 1865	Oxygen isotope profiles through ice sheets. Johnson, S.J., et
tures. Kata, K., et al. (1986, p.521-533) MP 2036 Impact ice force and pressure: An experimental study with	Thermal emissivity of disthermanous materials. Month, R.H., et al., §1965, p.872-878; MP 1963	al. (1972, p.429-434) MP 997 US global ice over research program West Antarchies and
ures ice. Softii, D.S., et al. (1966, p.569-576)	Preliminary development of a Sher opine sensor for TNT Zhang, Y., et al., §1968, 16p.; SR 88-66	beyond. Grootes, P.M., et al. 11969, 12p.; MP 2709
Flexural and buckling failure of floating ice sheets against	Organic sells	Particle size distribution Measurement and identification of perotols collected near
structures. Sodia, D.S., (1914, p.319-359; MP 2134 Model study of ice forces on a single pile. Zabianthy, L.J.,	Acres ecosystem the contai tunics at Burrow, Almia. Beown, J., ed., (1990, 571p.) MP 1356	Barron, Almha. Kustar, M., (1978, 69.) CR 78-30 Numerical simulation of atmospheric ice accretion. Achiey.
(1964, p.77-87) 36P 2308	Constal tundes at Barrow, Brown, J., et al., (1989, p.1-29) MP 1354	SF_c: at, (1979, p.44-52) MP 1235
International Offshore Mechanics and Arene Engineering Symposium, 1967 (1967, 4 vols.) MP 2109	Organizations	Some and Sog preside size measurements. P. et. R.H., 1252, p.47-58; MP 1902
for beam moving against a stoping structure. Softe, D.S.,	Indocumention systems planning study Atlaits, R.T., ct al., [1967, 459.] SR 87-23	Fairing soon characteristics and exametion. herger, R.H.,
Advances in ice mechanics-1967, (1967, 492)	Comparison of EPA and USATHAMA detection capability	Soon characterization at SNOW-ONE-R. Berger, R.H., et
MP 2307 Advances in service mechanics in the USA Soffit D.S., et	estimations. Grant, C.L., et al., [1944, p.465-419; MP 3455	zi, §1963, p.155-1953 SIP 1067 Characterization of soom for graduation of its effect on elec-
al, g1967, p.37-49; MP 2306	Arctic research in the United States, Vol.3, §1989, 72p.; MP 2653	tromagnetic wave propagation. Berger, R.H., (196),
Mechanical properties of multi-year service. Rachter-Metge, J.A., et al., §1967, p.121-153; MP 3438	Agenc reserved of the United Scient, Vol.3, (1999, 71p.)	Frank ice formation. Ettema, R., et al. (1984, 44p.)
Kallah ice stress mensurement program. Cos. GFN.,	MF 2530 United States argue research plus homist revision, 1999	CR 84-18 Effect of sure on streeters in these Son of grander materials.
Mechanical properties of multi-year presence ridge tee.	[99] Boons, J., ed., (1989, 72p.) MP 2544 Orientation	Pal. Show, H.H., (1985, 15p.) CR 85-02
Richter-Meinge, J.A., (1947, p. 166-119). MP 2299 Working group on ice forces. Jed state-oblike-net report.	Vector analysis of sice persographic data. Ferrick, M.G., et	Effect of size on sizenes in shear Sim of grander materials, Pt.2. Shen, H.H., (1965, 20p.) CR 85-83
Sanderson, T.J.O., ed. (1967, 2219) SR 87-17	≥, (1989, p.129-141; MP 2794 OseMations	Summer of everyosing in water-measured saon. Collect.
Figural and bucking failure of Source are obserts against structures. Solits, D.S., §1947, p.53-73. MP 2315	Occasic boundary-layer features and oncellation at death sta-	Frank see memorements in CRREL's Some facility Day,
Ascie construction working group report. Micrin, E.L. et	piets. McPace, M.G., (1994, p.379-934; MP 1309 Otypen integes	SF, et al. (1906, p 427-436) 36P 2127 Airhere particle measurements Berger, R.H., (1909).
3 .1947 a 111.17L MP 2424		
st, (1957, p.311-)14; MP 2436 Conference on Offshore Mechanics and Archic Engineering.	Oxygenmetope profiles therepicies theers. Inhanes, S.J., et al. 1977 a. 199.281.	p.31 ₂ SCP 2644
Genference on Offshore Merhanics and Arcine Engineering, 24, 1948, Vol.4, §1958, 345p.; MP 2317	of §1972, p.439-434; Osygen instages in the batal zone of Macantalia Gaere	p.31; MP 2044 Particles Extractal components and concentrations of micros-
Conference on Offshore Mechanics and Armir Engineering, 2d, 1994, Vol.4, (1994, 145); MP 2317 Verification tests of the surface integral method for calculating structural ice louds. Johnson, J.B., et al., (1994, p. 445).	MP 997	p.31; NP 3644 Particles Exercised components and concentrations of microspheries in some and pack are from the Wolfell Sen-
Conference on Offshore Mechanics and Armic Engineering. 2th, 1992, 1992, 1892; Verification texts of the surface integral method for calculating structural for loads. Johnson, J.B., et al., (1982, 9.483-494; MP 2353 Joe surea measurements around offshore structures. Johnson	sl. (1972, p.429-434) MP 997 Oxygen instopes in the band zone of Micantilla Gluere Lunson, D.E., et al. (1978, p.472-485) MP 1177 Park he Meso-scale strain measurements on the Besidoset sea park	p.3.1; MP 2004 Particles Elemental components and concentrations of microspherics in store and pock for from the Weddell Sea. Kumar, M., et al. (1963, p.126-131; MP 1777 Foresco-scattering corrected extension by assopherical par-
Conference on Offshore Mechanics and Artice Engineering, 2d, 1994, Vol.4, §1995, 1459; MP 2317-Verification tests of the surface integral method for calculating structuralize louds. Johnson, J.E., et al., §1995, §445-456; See stress measurements insured offshore structures. MP 2353-lee stress measurements insured offshore structures. J.E., §1995, §35-54; MP 2411.	sl. (1972, p.429-434) MP 997 Oxygen instopes in the band zone of Mannotch Gheer Lunson, D.E., et al. (1978, p.472-445) MP 1177 Park for Vero-scale strain measurements on the Besidout see pack see (AIDJEX 1971) Hiller, W.D., III, et al. (1974, p.119-134) MP 1435	p.31; NP 2004 Particles Elemental components and concentrations of microspherides in store and god, for from the Weld Sen. Kuran, M., et al. (1995, p.122–131). MP 1777 Formaco-neutring corrected extraction by assispherical particles. Boltem, C.F., et al. (1995, p.102)–1925). MP 1998
Conference on Offshore Mechanics and Artice Engineering, 2th, 1983, Vol.4, §1993, 1459; 30P 2317 Verification texts of the surface integral method for calculating structuralize loads. Johnnon, J.B., et al., §1993, p. 455-456; 30P 2453 [456]. Surface measurements around offshore structures. Johnnon, J.B., §1993, p. 55-56; 30P 2463 [4593, p. 459-46]. Elements of firsting-drives control systems. Perham, R.E., §1993, 54p, § appendix; 30P 2453	sk. 1972, p.439-434; MP 997 Oxygen instages in the basal zone of Macannia Gazer Lunius, D.E., et al. 1972, p.672-465; MP 1177 Park for Vero-scale strain measurements on the Bessidout sea pack see (AIDJEX 1971). Hiller, W.D., III, et al. 1974.	p.3.1g MP 3044 Particles Elemental components and concentrations of micros- pherides in store and pock for from the Weddell Sea. Kunna, M., et al. [1963, p.126-131] MP 1777 Foresco-sentering corrected estimation by assopherical par- mides. Boleen, C.F., et al. [1965, p.1823-1825) MP 1998 Authorize particle measurements. Berger, R.31, [1966.
Conference on Offshore Mechanics and Artice Engineering, 2d, 1994, Vol. (1994, 145); MP 2317 Verification tests of the surface integral method for calculating structural see Isola. Johnson, J.R., et al. (1993, 345-456; MP 2353 Ice series incrementates around offshore structure. Johnson, J.R., (1994, p.55-54); MP 2611 Elements of footing-debtes control systems. Perham, R.E., (1993, 54); a appendix y. MP 2613 Middah are stress measurement program. Con., G.F.N., (1993, p.11-15). MP 2618	sl. (1972, p.429-414) MP 997 Oxygen instopes in the basal zone of Mannoria Gheer Lunson, D.E., et al. (1978, p.472-445) MP 1117 Pack for Meso-scale strain measurements on the Besidout sea pack see (AIDJEX 1971) Holler, W.D., III, et al. (1974, p.119-134) MP 1435 Seatonical variations in Arche sea see ridging and deformation rates. Holler, W.D., III, (1975, p.31-156) MP 886 Movement of countal sea see near Fradhor Ray. Weeks,	p.31; NP 2004 Particles Elemental components and concentrations of microspherides in store and pol. for from the Webbell Sen. Kuma, M., et al. (1995, p.122-131); NP 1777 Formed-scattering corrected estimation by nonopherical particles. Boltem, C.F., et al. (1995, p.1023-1323); NP 2004 Arthurse particle measurements. Berger, R.31., (1994, p.31); MP 2004 PATTERNED GROUND
Conference on Offshore Mechanics and Artic Engineering, 2th, 1983, Vol.4, §1993, 1459; 30P 2317 Verification texts of the surface motipal method for calculating structuralize louds. Johnnon, J.B., et al., §1993, p. 455-456; 30P 2353 for stress measurements around offshore structures. Johnson, J.B., §1993, p. 55-56; 30P 2493 MP 2413 Elements of forstong-drives control systems. Perfam, R.E., §1993, §19, § appends; 30P 2493 Middah are stress measurement program. Con., G.F.N., MP 2413 Rebuilding infrastructure for pleasure bosting. Wortley,	sl. (1972, p.439-434) MP 997 Oxygen instages in the basal zone of Macannia Guerr Lusson, D.E., et al. (1972, p.672-465) MP 1177 Park for Mc10-scale strain measurements on the Bessdowt sea pack are (AIDJEX 1971) Halier, W.D., III., et al. (1974, p.110-134) MP 1035 Seatonical samations in Archives are religing and deformance rates. Halier, W.D., III., (1975, p.31-716) Movement of control sea are near Frantise Bay. Werks, W.F., et al., (1977, p.535-540) My Leaching and the drift of pack are through restricted glass.	p.31; NP 3044 Particles Elemental componious and concentrations of microspherides in soon and pack for from the Woldell Sen. Kunan, M., et al. [1993, p.120-131] NP 1777 Formed-scattering corrected extinction by assopherical particles. Boltem, C.F., et al. [1995, p.1023-1325] NP 2008 Arrhorne particle measurements. Berger, R.31, [1906, p.31]
Conference on Offshore Mechanics and Arme Engineering. 2th, 1993, Vol. 8, 1993, 1859; 3 MP 2317. Verification texts of the surface integral method for calculating structural for loads. Johnson, J.B., et al., 1983, 9, 484-456; MP 2353. See serten measurements around offshore structures. Johnson, J.B., 1993, p.55-59; MP 2618. Elements of footon-folders control systems. Perham, R.E., 1993, Sup. 2 appends; MP 2618. MP 2618. MP 2618. See a stress measurement program. Con. G.F.N., 1993, p.11-15. MP 2618. Rebuilding infrastructure for pleasure bosons. Mortier, CA., et al., 1999, p.193-2013. MP 2618. Conference on offshore mechanics and Archive congruence.	SL (1972, p.429-434) Oxygen instages in the band zone of Manuschia Ginere Lunson, D.E., et al. (1978, p.672-465) Park for Meso-scale strain measurements on the Besidourt sea pack see (AIDJEX 1971) Hiller, W.D., III., et al. (1974, p.119-135) Superiorial summons in Ascens sea see ridging and deformation rates. Haber, W.D., III., (1975, p.11-15) Movement of countal sea see near Profiber Ray. Weeks, W.F., et al., (1977, p.53)-540; Lee anching and the duti-of pack see through recomberation. South, D.S., (1977, 183).	p.31; NP 3044 Particles Elemental components and concentrations of microspheristics in storm and pack for from the Weddell Sea. Kwinz, M., et al. (1982, p.122–131); MP 1777 Formacd-scattering corrected extinction by nonopherical particles. Boltem, C.F., et al. (1985, p.1923–1323); MP 1998 Airhorne particle measurements. Berger, R.H., (1986, p.31); MP 2000 Patterned ground in Alaska. Pene, T.L., et al. (1994, 87); MP 1100 Patterned ground.
Conference on Offshore Mechanics and Artic Engineering. 2d, 1993, Vol.4 (1993, 145); MP 217. Verification tests of the surface integral method for calculating structuralize louds. Johnson, J.B., et al. (1993, p.485-496; MP 205). Ice series measurements bound offshore structures. Johnson, J.B., (1993, p.55-59; MP 206). MP 2011. Benness of footony-driens control systems. Perham, R.E., (1993, p.11-15). MP 2013. Middled are stress measurement program. Con., G.F.N., (1993, p.11-15). MP 2013. Rehalding infrastructure for pleasure boung. Co., et al. (1999, p.119-201). MP 2016. Conference on offshore mechanics and Archie engineering. Sci., 1999, p.199, 2169.	sl. 1972, p.439-434; MP 997 Oxygen instages in the banal zone of Macannika Gazer- Lunson, D.E., et al., [1972, p.672-445]. MP 1177 Path for Meso-scale strain measurements on the Besidowt sea pack are (AIDJEX 1971). Hilder, W.D., III, et al., [1974, p.119-138]. Seatestical variations in Arche sea are religing and deformation. rates. Hilder, W.D., III, [1975, p.11-156]. MP 850 Movement of constal sea are near Fradhor Ray. Weeks, W.F. et al., [1977, p.333-549. MP et arching and the death of pack are through restricted class- cath. South, D.S., [1977, 11]. Modeling gradure as a various-optimize confirmant. Hilder, W.D., III, [1977, p.46-55]. MP 1844.	p.3.13 Particles Elemental components and concentrations of microspherics in store and pock for from the Woldell Sea. Kuran, M., et al. [1983, p.128-1313 MP 1777 Formed-sendering corrected estimation by assispherical particles. Bokers, C.F., et al. [1985, p.1823-1325) MP 1998 Authoric particle measurements. Berger, R.31, [1986, p.31] PATTERNED GROUND Patterned ground malasks. Fewt, T.L., et al. [1984, 87g, MP 1100 Proteored ground Morphology of the North Slope. Walker, H.J., [1971, p.48-52] Morphology of the North Slope. Walker, H.J., [1971, p.48-52]
Conference on Offshore Mechanics and Arme Engineering. 2th, 1993, Vol. 8, 1993, 1859; 2 MP 2317. Verification texts of the surface integral method for calculating structural for loads. Johnson, J.B., et al., 1983, 9, 485-496; MP 2353. MP 2353. See stress measurements around offshore structures. Johnson, J.B., 1993, p. 55-59; MP 2618. Benerits of footing-delens control systems. Perham, R.E., 1993, Sap. 2 appends; MP 2618. Sep. 2 appends; MP 2619. MP 2619. Sep. 2 appends; MP 2619. MP 2619. Rehabiling infrastructure for pleasure bosting. Case, et al., 1999, p. 193-201. MP 2619. Conference on offshore mechanics and Archic congruencing. Sch., 1999, 1999, 4749; MP 2619. Gordernee on offshore mechanics and archic congruencing, 2th, 1999, 1999, 1999, 379-376.	sl. [1972, p.439-434] MP 997 Oxygen instages in the basal zone of Macannia Gaeret Lusson, D.E., et al. [1972, p.672-445] MP 1177 Path for Meso-scale strain measurements on the Besidowt sea pach are (AIDJEX 1971) Hilder, W.D., III, et al. [1974, p.119-134] Statistical sumations in Archivers in religing and deformation, races. Hilder, W.D., III, [1975, p.311-354] MP 800 Mosement of constal sea are near Franchise Bay. Weeks, W.F. et al. [1977, p.533-546] Me stelling and the draft of pack are through restricted chan- aris. South, D.S., [1977, 13]; Medding grid are in a viscous-plante communit. Hiller, W.D., III, [1977, p.86-55] MD 101, [1977, p.86-55] MP 1164 Sea are studies in the Weldell Sea region about USCGG Emison Koland. Arkley, S.F., [1977, p.177-177]	p.33; NP 3044 Particles Elemental components and concentrations of microspheristics in storm and pick for from the Wedded Sen. Kwins, M., et al. (1983, p.120-1313). MP 1777 Forward-scattering corrected extraction by assospherical particles. Boltem, C.F., et al. (1985, p.1923-1323). Arrhorne particle measurements. Berger, R.34., (1986, p.31). PATTERNED GROUND Patterned ground on Alaska. Pewe, T.L., et al., (1984, E.p.; MP 1000 Patterned ground Morphology of the North Slope. Walker, H.J., (1971, p.44-52). Therefore been.
Conference on Offshore Mechanics and Artic Engineering. 2d, 1993, Vol.4 (1993, 1459). MP 217. Verification tests of the surface integral method for Colorating intercuralize loads. Johnson, J.B., et al. (1993, 9.485-496). MP 245. See sures measurements assume offshore structures. Johnson, J.B., (1993, p.55-59). MP 2611. Bennests of fronting-driens control systems. Perham, R.E., (1993, 549). 9 appends: MP 263. MR 263. MR 263. MR 263. MR 264. Page 263. MR 264. MR 264. Conference on offshore measurement program. Con., G.F.N., (1993, p.111-15). MR 2646. Conference on offshore mechanics and Artic conjuncting. Sch., 1999, 1999, 4169. MR 264. MR 264. LPM (1999, 1999, 1999). MR 264. LPM (1998,	SI, 1972, p.439-434; MP 997 Oxygen instages in the basal zone of Macannia Gazer Lunson, D.E., et al., [1972, p.672-465]. Pack for Meso-scale strain measurements on the Besidowt sea gach ner (AIDDEX 1971). Habler, W.D., III, et al., [1974, p.119-134]. MP 1035 Summed summission marches was see religing and deformation races. Habler, W.D., III, [1975, p.311-75]. Me sement of contral sea see near Practice Ray. Weeks, W.F., et al., [1977, p.533-545]. Me F., et al., [1977, p.533-546]. Mecking gard see as a viscous-plante community. Habler, W.D., III, [1977, p.46-55]. MP 1046 Sea see studies as the Weddel Sea region about USCGC Rutten found. Achier, S.F., [1977, p.171-175]. MP 1048	p.33; NP 3044 Particles Elemental components and concentrations of microspherides in storm and pack for from the Webbell Sen. Kuran, M., et al. (1985, p.122-131); MP 1777 Formaco-tentiering corrected estitution by assospherical particles. Boltem, C.F., et al. (1985, p.102)-13235 MP 2008 Arrhence particle measurements. Berger, R.31., (1984, p.31); MP 2004 PATTERNED GROUND Futterned ground stability. Proc. T.L., et al. (1984, 2.7); MP 2004 Patterned ground. Merphology of the North Stope. Walker, H.J., (1973, p.46-52). Parentiset bines. Processed terry-drug using a heavy build-over mounted processor.
Conference on Offshore Mechanics and Artic Engineering, 2d, 1993, Vol.4, [1993, 1459;] MP 2317. Verification texts of the surface mappal method for calculating structural ice louds. Johnson, J.B., et al., [1993, p. 635-646]. MP 2453. [1993, p. 635-646]. MP 2453. MP 2454. MP 2453. MP 2454. MP 24554. MP 24564. MP 24554. MP	sl. 1972, p.45-434; MP 997 Oxygen instages in the banal zone of Macannila Gazettanian, D.E., et al., [1972, p.672-404]; MP 1177 Path for Meso-scale strain measurements on the Besidowt sea pack see (AIDJEX 1971): Hilder, W.D., III., et al., [1972, p.11-128]; Sentencial variations in Arche sea see religing and deformation rates. Hilder, W.D., III., [1975, p.11-156]; MP 850 Movement of constal sea see near Fradhor Ray. Weeks, W.F. et al., [1977, p.333-546]; MP 1046 lee arching and the dedt of pack are through restricted channels. South, D.S., [1977, 1132. Worlding gard are as a various-plante community. Hilder, W.D., III., [1977, p.46-55]; MP 1164 Sea are studies as the Weldell Sea region about USCGC Ritton Kelma. Arching, S.F., [1977, p.172-177]. Dynamics of near-whore see: Rosaco, A., et al., [1977, p.595-550].	p. 3.13 Particles Elemental components and concentrations of microspheristics in store and pock for from the Weddell Sea. Kunar, M., et al. (1983, p.128-131) MP 1777 Foresco-sentering corrected estimation by assophirical particles. Boleen, C.F., et al. (1985, p.1823-1325) MP 1998 Authoric particle measurements. Berger, R.H., (1986, p.31) PATTERNED GROUND Famound ground Morphology of the North Slope. Walker, H.J., (1973, p.46-52) Particular for South Slope. Walker, H.J., (1973, p.46-52) Particular forces and (1977, 12) - appendix Friedment tenying using a heavy buildown mounted potentier. Eaton, R.A., et al. (1977, 12) - appendix SE 77-30 Effect of freeze-than cycles on realizate properties of fine-
Conference on Offshore Mechanics and Arme Engineering. 2h, 199a, Vol. 8, 199a, 1859; WP 2317. Verification texts of the surface integral method for calculating structural for loads. Johnson, J.B., et al., 1981, 9,485-496; MP 2353. He sertes measurements around offshore structures. Johnson, J.B., 199a, p.55-59. MP 2363. Series of footope-debre control systems. Perham, R.E., 1993, Sap. 2 appends; MP 2653. Methods are stress measurement program. Cos., G.F.N., 199a, p.11-15. MP 2653. Rebuilding infrastructure for pleasure bosoning. Mexico, C.A., et al., 1999, p.193-201; MP 2663. Conference on offshore mechanics and Arcine engineering. Sci., 1999, 1999, 476p; MP 2664. Conference on offshore mechanics and arcine engineering. Sci., 1996, 1999, 476p; MP 2664. Physical actions. McGhary, W.R., et al., (1998, p. 195-201). MP 2579. Wisconduced bergs be motion near a fronting praise main, L.M., et al., (1994, p. 285-211). MP 2569.	sk. 1972, p.439-434; MP 977 Oxygen instages in the band zone of Matanaska Gener Lunson, D.E., et al., 1972, p.672-445; Pack for Mesonacide strain measurements on the Besidourt sea pack are (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p.119-139; Seatement winnesses in Arche sea are ridging and deformation, races. Hilder, W.D., III, 1975, p.11-159. MP 850 Mosement of control sea are men Profiber Bay. Weeks, W.F., et al., 1977, p.535-549; MP 1866 for arching and the drift of pack are through restricted channels. Sodin, D.S., 1977, 1197. Medeling pack are as a viscour-plante community. Hilder, W.D., III, 1977, p.66-55; MP 1868 Sea see studies as the Weeklel Sea region about USCGG Emiton Keland. Ackley, S.F., 1977, p. 171-173; MP 1908 Dynamics of near-whore see: Rosacs, A., et al., 1977, p.56-520; MP 1300 Sea see and see algae relationships in the Weeklel Sea. Ack- ley, S.F., et al., 2573, p.76-712. MP 1300	p.33; NP 3044 Particles Elemental components and concentrations of microspheristics in storm and pack for from the Wedded Sen. Kwin, M., et al. (1983, p.128-133). MP 1777 Formacd-actioning corrected extraction by assospherical particles. Boltem, C.F., et al. (1985, p.1023-1323). Arrhorne particle measurements. Berger, R.H., (1984, p.33). PATTERNED GROUND Patterned ground at Aliaka. Powe, T.L., et al. (1984, 87p; MP 1000 Patterned ground. Morphology of the North Slope. Walker, H.J., (1973, p.46-52). MP 1000 Patterned there. Proceed there. Proceed there. Sen. R.A., et al. (1977, 12p. a superiols; SR 77-30 Effect of freeze-those cycles on realizant geogeness of fine-granted sods. Johnson, T.C., et al. (1973, 198). MP 1002
Conference on Offshore Mechanics and Artic Engineering. 2d, 1993, Vol.4, §1993, 1459; Verification tests of the surface integral method for calculating structural ice louds. Johnson, J.B., et al., §1993, p. 655-656; Ice series measurements assume offshore structures. Johnson, J.B., §1993, p. 55-559; Bennets of finding-drives control systems. Perfam, R.E., §1993, p. 55-559; App. 2011. Bennets of finding-drives control systems. Perfam, R.E., §1993, p. 55-559; Mp. 2013. Rehaliding infractructure for picasure bosting. Worlder, C.A., et al., §1959, p. 195-201; Mp. 2004. Conference on offshore mechanics and Artic conjuncting. 2d, 1909, §190, §199; Mp. 2004. Conference on offshore mechanics and article engineering. 2d, 1909, §190, §199; Dynatic analysis of a flowing see shore undergoing serious-indentition. McGharp, W.R., et al., §1909, p. 195-201. Wave-induced bergs be motion near a flowing platform. Mol. L.M., et al., §1909, p. 205-215; Mp. 2009. Mp. 2013. Mp. 2014. Mp. 2014. Mp. 2015. Mp. 2016.	sk. 1972, p.43-434; MP 977 Oxygen instages in the basal zone of Matanaska Gener Lunson, D.E., et al., 1972, p.672-465; MP 1177 Path for Meso-scale strain measurements on the Bestifourt sea pach see (AIDJEX 1971) Hiller, W.D., III., et al., 1974, p.119-178; Seatement winnesses in Arche sea see religing and deformation, races. Hiller, W.D., III., 1975, p.11-176; MP 989 Movement of control sea see near Profiles Bay. Week, W.F., et al., 1977, p.535-540; MP 1986 lee arching and the drift of park are through recurried channels. South, 1977, p.535-540; Medeling park see as a viscoso-plastic continuum. Hiller, W.D., III., 1977, p.46-57; Sea see sudders in the Weekled Sea region about USCGC Runton Kennel. Achiey, S.F., 1977, p.171-175; p.563-520; MP 1988 Sea see and see signe relationships in the Weekled Sea. Achiey, S.F., et al., 1977, p. 36-71; MP 1989 Sea see and see signe relationships in the Weekled Sea. Achiey, S.F., et al., 1978, p. 78-71; MP 1980 Measurement of measured deformation of Bestifies sea see (AIDJEX-1971). Fibler, W.D., III., et al., 1978, p. 144-	p.34; NP 3044 Particles Elemental components and concentration of microspherides in atom and pack for from the Webbell Sen. Kuran, M., et al. [1933, p.122-1313] NP 1777 Forward-scattering corrected extinction by assopherical particles. Bohem. C.F., et al. [1935, p.1021-1325] Arrhorne particle measurements. Berger, R.34, [1936, p.31] PATTERNED GROUND Patterned ground at Alaska. Print, T.L., et al. [1944, 837; MP 1800 Patterned ground. Merphology of the North Stope. Walker, H.J., [1973, p.45-52] Direction bases. Particles and the Arrival at al. [1977, 125, a superiols; SR 77-30. Hiller of freeze-than cycles on realizat geographes of fine-primed sols. Johnson, T.C., et al. [1978, 1987. MP 1802 Freeze than effect on resilicat properties of fine-toda.
Conference on Offshore Mechanics and Artic Engineering, 2th, 1993, Vol. 8, 1993, 1819; 21. Verification texts of the surface metgral method for calculating structuralize looks. Johnnon, I.B., et al., 1993, p. 835-846; for sixtus measurements around offshore structures. Johnnon, J.B., 1993, p. 55-59. MP 2013 Benerics of forsting-delene control systems. Perham, R.E., 1993, p. 11-15; MP 2013 Methods are stress measurement program. Cos., G.F.N., MP 2013 Rebuilding infrastructure for pleasure bosting. Worder, CA., et al., 1999, p. 193-201; Conference on offshore mechanics and Artic engineering. 2th, 1999, 1999, 4769; Conference on offshore mechanics and artic engineering. 2th, 1990, 1999, 4769; Dynamic analysis of a favoring see short undergoing sericular medication. McGelvier, W.R., et al., 1999, p. 195-201; MF 2570 Wave-related bergs be modern near a favoring faction. Medication. Holladry, J.S., et al., 1999, p. 199-315. Measurement of once thirkness warg electromagnetic in duction. Holladry, J.S., et al., 1999, p. 199-315. Old recovery	Sil (1972, p.439-434) Oxygen instages in the banal zone of Macannila General Lunson, D.E., et al., (1972, p.672-445) Path for Meso-scale strans measurements on the Benafourt sea pach are (AIDJEX 1971) Hilder, W.D., III., et al., (1972, p.11-15) Seatement of control measurements on the Benafourt sea pach rates. Hilder, W.D., III., (1975, p.11-15) Mesonessi of control sea see endaging and deformation rates. Hilder, W.D., III., (1975, p.11-15) Mesonessi of control sea see near Frankow Ry. W.F. et al., (1977, p.53)-5549 Mesonessi of control sea see near Frankow Ry. M.F. et al., (1977, p.53)-549 Mesonessi of season-plantic continuum. Hilder, W.D., III., (1977, p. 265-55) MP 1046 Sea see studies as the Weddell Sea region about USCGC Rutton foliand. Action, S.F., (1977, p. 172-17), MP 1046 Dynamics of near-thore see: Rosson, A., et al., (1977, p. 565-50) Sea see and see algae relationships in the Weddell Sea. Act. Ici., S.F., et al., (1977, p. 366-51) Mesonement of mesonale deformation of Beaston sea (AIDJEX-1971). Hilder, W.D., III., et al., (1978, p. 185-172). MP 1200 Mesonement of mesonale deformation of Beaston sea (AIDJEX-1971). Hilder, W.D., III., et al., (1978, p. 185-172). MP 1179	PATE NAME OF SHAPE STATES AND SHAPE STATES AND SHAPE STATES AND ST
Conference on Offshore Mechanics and Artice Engineering, 2d, 1993, Vol. (1993, 1879); Verification texts of the surface motiful method for calculating structural ice louds. Johnson, J.B., et al. (1993, p. 835-846); Ice sertes measurements assume offshore structures. Johnson, J.B., (1993, p. 55-54); Dements of fronting-delets control systems. Perfuse, R.E., (1993, 189, 2 mpcals); MP 2003 Mishink are stress measurement program. Con., G.F.N., (1993, p. 11-12); Rehalding infrastructure for pleasure bosting. Worlder, C.A., et al. (1999, p. 195-201). MP 2000 Conference on offshore mechanics and Artice engineering, 2d, 1994, (1993, 1993). Conference on offshore mechanics and artice engineering, 2d, 1994, (1994, 1993). Dynamic analysis of a finding ore sheet undergoing strings inferration. McGelsop, W.R., et al. (1999, p. 195-201). Wisconduced bergs be motion near a finding platiness. Medium. Holladay, J.S., et al. (1999, p. 195-201). MP 2000 Off necessary. Offshore oil in the Almhan Artice. Weeks, W.F., et al.	SI, 1972, p.439-434; Oxygen instages in the basal zone of Manuschia Gener Lusson, D.E., et al., 1972, p.672-445; Path for Meso-scale strain measurements on the Benefourt sea pach see (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p.119-139; Sentencial summinous in Ascine sea see ridging and deformation, races. Hilder, W.D., III, 1975, p.119-159. MP 850. Mosement of control sea see near Profiles Bay. Weeks, W.F., et al., 1977, p.533-549. MP 1866. Its necking and the drift of park are through reconnect channels. South, D.S., 1977, 119.; Modeling park see as a viscous-plantic commission. Hilber, W.D., III, 1977, p.46-55; Sea see studies in the Weekled Sea region about USCGC Rutter Kelnel. Actiop, S.F., (1977, p. 170-17); Dynamics of near-shore see: Rosaco, A., et al., 1977, p. 56-520; Sea see and see signe relationships in the Weekled Sea. Actiop, S.F., et al., 1978, p. 76-71; MP 1808. Measurement of mesociale deformation of Benefics sea see (AIDJEX-1971). Public, W.D., III, et al., 1978, p. 180-172; Effect of the occasion boundary layer on the mean defined guester applications of a sample model. McTare, M.G., 1978.	p.31; MP 3004 Particles Elemental components and concentrations of microspheristics in storm and pack for from the Webbell Sen. Kuran, M., et al. (1983, p.122-131); MP 1777 Formaco-sentering corrected estitution by assospherical particles. Boltem, C.F., et al. (1985, p.102)-13235; MP 1998 Arborne particle measurements. Berger, R.H., (1986, p.31); MP 3666 Patterned ground and Alaska. Front T.L., et al. (1984, p.31); MP 1660 Patterned ground. Merchalogy of the North Shop. Walker, H.J., (1973, p.46-52); MP 1660 Patterned ground. Merchalogy of the North Shop. Walker, H.J., (1973, p.46-52). MP 1660 Patterned ground. Merchalogy of the North Shop. Walker, H.J., (1973, p.46-52). MP 1660 Patterned force for the North Shop. Walker, H.J., (1973, p.46-52). MP 1660 Patterned force of the North Shop. Walker, H.J., (1973, p.46-52). MP 1660 Effect of freeze-than cycles on resilient properties of freeze-than effect on resilient properties of fine-particle and a Johnson, T.C., et al., (1973, 1983. Freeze than effect on resilient properties of fine sold. Johnson, T.C., et al., (1973, p.34-7276). MP 1226
Conference on Offshore Mechanics and Artic Engineering. 2th, 1993, Vol. 8, 1993, 1819; 1819; 181	SI, 1972, p. 439-434; Oxygen instages in the basal zone of Matanasia Gener Lusson, D.E., et al., 1972, p. 672-445; MP 1177 Path for Meso-scole strain increasements on the Bestifourt sea good see (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p. 119-129; Meso-scole strain increasements on the Bestifourt sea good see (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p. 119-129; Meso-scole strain matanas in Arche sea see religing and deformation, races. Hiller, W.D., III, 1975, p. 11-176; MP 1006 Most ment of constal sea not ment Profiles Bay. Weeks, W.F., et al., 1977, p. 533-540; MP 1006 Re arching and the drift of pack are through restricted channels. South, in Sec., 1977, 1973-197; Modeling and see as a succompliante continuum. Hiller, W.D., III, 1977, p. 46-57; Sea see studies as the Weldell Sea region about USCGC Rutton School. Ackley, S.F., 1977, p. 171-177; p. 563-520; Sea see and see algae relationships in the Weldell Sea. Ackley, S.F., et al., 1978, p. 26-71; MP 1008 Sea see and see algae relationships in the Weldell Sea. Ackley, S.F., et al., 1978, p. 26-71; MP 1101 Messurement of mesocale deformation of Bestifort sea see (AIDDEX-1971). Indier, W.D., III, et al., 1974, p. 141-173; Effect of the occurre boundary layer on the mean factor of real sea application of a sample model. McPiter, M.G., 1979, p. 141-170; Occurrence on the seasonal sea see long. Teets, W.F., et al., 1974, p. et al.	p. 3.13 Particles Elemental components and concentrations of microspheristics in atom and pack for from the Wedded Sen. Kunn, M., et al. (1983, p.128-1313) MP 1777 Forward-amoring corrected extraction by assospherical particles. Bohem, C.F., et al. (1995, p.123-1423) MP 1998 Arrhorne particle measurements. Berger, R.H., (1994, p.31) PATTERNED GROUND Patterned ground in Alinka. Powe, T.L., et al. (1994, 8.7); MP 1000 Patterned ground in Alinka. Powe, T.L., et al. (1994, 8.7); MP 1000 Patterned ground Morphology of the North Slope. Walter, H.J., (1973, p.46-52). MP 1000 Patterned treating using a heavy buildorer mounted polyerater. Eaton, R.A., et al. (1977, 12); a superiols; SR 77-30 Effect of freeze-than cycles on resilient properties of fine-granted toda. Johnson, T.C., et al. (1973, 199); MP 1002 Freeze than effect on resilient properties of fine-granted toda. Johnson, T.C., et al. (1975, p. 267-276) MP 1236 Patterness Fireshi, payment resilient surface deformations. Senth, N., et al. (1975, 13 lexus) Elevalth, payment resilient surface deformation. Senth, N., et al. (1975, 13 lexus) Elevalth, payment resilient surface deformations. Senth, N., et al. (1975, 13 lexus) Elevalth payment resilient surface deformations. Senth, N., et al. (1975, 13 lexus) Elevalth payment resilient surface deformations. Senth, N., et al. (1975, 13 lexus) Elevalth payment resilient surface deformations.
Conference on Offshore Mechanics and Artic Engineering. 2h, 1993, Vol. 8, 1993, 1859; 1993, 1862, 1993, 1859; 1993, 1863, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1993, 1869; 1869	sk. 1972, p. 439-434; Oxygen instores in the bond zone of Matanania Cheer Lunson, D.E., et al., 1972, p. 672-445; MP 1177 Path for Meso-scale strain measurements on the Bestfourt sea good see (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p. 119-139; Sentencial strains in Ascene sea see religing and deformation, races. Hiller, W.D., III, 1975, p. 311-150; Mosternet of constal sea not near Pradicion Bay. Werks, W.F., et al., 1977, p. 533-540; Mosternet of constal sea not near Pradicion Bay. Werks, W.F., et al., 1977, p. 533-540; Mosternet of constal sea not near Pradicion Bay. Werks, W.F., et al., 1977, p. 533-540; Mosternet of constal sea not near Pradicion Bay. Werks, W.F., et al., 1977, p. 533-540; Mosternet of constal sea not near through reconned channels. South, p. 51, 1977, 1972. Mostering and the drift of pack are through reconned channels. South, p. 51, 1977, p. 346-55; San see studies in the Weldfell Sea region about USCGG Burton Scane. Achier, S.F., 1977, p. 172-177; p. 563-520; MP 1000 Sea see and are algae relationships in the Weldfell Sea. Achier, S.F., et al., 1978, p. 76-71; Messurement of mesoscial deformation of Beautiers sea see (AIDDEX-1971). Inflien, W.P., III, et al., 1978, p. 316-172; Effect of the occurre houseless player on the mean drift of pack see application of a sample model. McPiter, M.G., 1978, p. 318-320; Oxeron on the seasonal sea net near. To ech., W.F., et al., 1979, p. 318-320; MP 1108 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange on the Seasonal Sea lee Jone, Men 1980 Increasing the dechange of the Seasonal Sea lee Jone, Men 1980 Increasing the dechange of the Seasonal Sea lee Jone, Men 1980 Incr	p. 31; MP 2004 Particles Elemental components and concentrations of microspheristics in storm and pod, for from the Webbell Sea. Kwira, M., et al. (1983, p.120-131); MP 1777 Forward-scattering corrected extraction by assospherical particles. Boltem, C.F., et al. (1985, p.1923-1323); MP 1998 Airhorne particle measurements. Berger, R.H., (1986, p.31); MP 2006 Patterned ground in Alaska. Pene, T.L., et al. (1986, E.P.; MP 2006) Patterned ground in Alaska. Pene, T.L., et al. (1986, E.P.; MP 2006) Patterned ground in Alaska. Pene, T.L., et al. (1986, E.P.; MP 2006) Patterned ground in Alaska. Pene, T.L., et al. (1986, E.P.; MP 2006) Patterned ground in Alaska. Pene, T.L., et al. (1987, E.P.; MP 100) Patterned ground in Alaska. Pene, T.L., et al. (1972, E.P.; MP 100) Patterned ground in Alaska. Pene, T.L., et al. (1972, E.P.; MP 100) Patterned ground in Alaska. Pene, T.L., et al. (1972, E.P.; MP 100) Effect of freeze-than excites on renderin properties of fine-grand soft. Johnson, T.C., et al. (1972, E.P.; MP 100) Patterness. Freith, per micro renderin unface delocationus. Sonth, N., et al. (1975, E.P.; MP 1206 Patterness. Faces, R.A., et al. (1976, Elp.; MP 1206 From action in New Jerney legioners. Series, Series, MP 1206 From action in New Jerney legioners. Series, E.L., et al.
Conference on Offshore Mechanics and Artice Engineering. 22, 1993, Vol. 8, 1993, 1859; Verification texts of the surface metapal method for calculating structural for loads. Johnson, J.B., et al., 1993, p. 635-656; MP 2053 Ice stress measurements around offshore structures. Johnson, J.B., 1993, p. 535-59. MP 2061 Enumers of forstang-drives control systems. Perfain, R.E., (1993, p. 11-15). MP 2063 Middal are stress measurement program. Cos., G.F.N., p. 1993, p. 11-15; Rehalding infrastructure for pleasure bouring. Westley, C.A., et al., 1999, p. 119-201. MP 2060 Conference on offshore structures and Artice engineering. Sch., 1999, p. 199-3, 4769; Conference on offshore structures and Artice engineering. Sch., 1990, p. 199-3, MP 2060. Conference on offshore structures and mente engineering. Sch., 1990, p. 199-3, MP 2060. Conference on offshore structures and mente engineering. Sch., 1990, p. 199-3, MP 2060. Dynastic analysis of a fination are abstrage of structures. McGelvery, W.R., et al., (1990, p. 195-295). MP 2060 Wissenblaced bergs be motion near a finating platform Medicine. Holladay, J.S., et al., (1990, p. 199-315). MP 2060 Old secondary Offshore out in the Alaskan Artice. Weeks, W.F., et al., (1994, p. 311-175). MP 2060 Old secondary Offshore out in the Alaskan Artice. Weeks, W.F., et al., (1994, p. 311-175). MP 2061 Conlinear. McGelsyllis and seepages to cold-dominated environments. McGelsyllis and seepages to cold-dominated environments. McGelsyllis and seepages to cold-dominated environments.	Si. 1972, p. 439-434; Oxygen instages in the basal zone of Manuschia Gener Lusson, D.E., et al., 1972, p. 672-445; Path for Meso-scale strain measurements on the Benefourt sea pach see (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p. 119-139; Sentencial strains on Ascene sea see religing and deformation, races. Hilbert, W.D., III, 1975, p. 119-139. MP 898. Mosement of contail sea see near Profiles Bay. Week, W.F., et al., 1977, p. 533-549; Mosement of contail sea see near Profiles Bay. Week, W.F., et al., 1977, p. 533-549; Mosement of contail sea see near Profiles Bay. Week, W.F., et al., 1977, p. 535-549; Mosement of contail sea see near Profiles Bay. Week, W.F., et al., 1977, p. 535-549; Mosement of Establish see through reconnect channels. South, D.S., 1977, 139-139; Mose see seaffers in the Weekled Sea region about USCGC Rutter Kennel. Actiop, S.F., (1977, p. 170-177); 2 549-520; Mosement of mesonshoe see. Rosaco, A., et al., 1977, p. 549-520; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 549-520; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 549-520; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 549-520; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 549-520; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 549-520; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of mesonshoes see Rosaco, A., et al., 1977, p. 349-340; Mosement of m	PATE STATE COMPARISON AND CONCENTRATION OF MICROSPACES COMPARISON IN SOME AND CONCENTRATIONS OF MICROSPACES COMPARISON OF THE STATE OF
Conference on Offshore Mechanics and Artic Engineering. 2h, 1993, Vol. 8, 1993, 1859; WP 2317. Verification texts of the surface integral method for calculating structuralities loads. Johnnon, J.B., et al., 1993, 9, 635-646; MP 2453. See series measurements assume offshore structures. Johnnon, J.B., 1993, p. 55-569. MP 2613. See, 8 appendix; MP 2613. Sep. 8 appendix; MP 2613. MP 2613. Sep. 8 appendix; MP 2613. Sep. 8 appendix; MP 2613. Sep. 8 appendix; MP 2614. Sep. 1993, p. 11-15; MP 2615. Rehalding infrantracture for pleasure bosting. Worley, C.A., et al., 1989, p. 118-201; MP 2616. Conference on offshore mechanics and Artic engineering. Sch., 1989, p. 198-201. Conference on offshore mechanics and artic engineering. Sch., 1989, p. 198-201. Dynamic analysis of a Loating see where undergoing vertical memberships of a Loating see where undergoing vertical memberships of a Loating see where undergoing vertical memberships. Memberships of a Loating see where undergoing vertical memberships. MP 2509. Wave-induced bergs bis motion near a footing station Medicals. J. M. et al., 1990, p. 205-215; Memberships of see see thirdshess wang electromagnetis in duction. Holladay, J.S., et al., 1990, p. 369-315. MP 2500. Offsore sed in the Alaskan Archic. Weeks, W.F., et al., 1994, p. 211-175; MP 2500. Offsore sed in the Alaskan Archic. Weeks, W.F., et al., 1998, p. 211-175. MP 2500. Offsore sed in the Alaskan Archic. Weeks, W.F., et al., 1998, p. 211-175. MP 2500. Offsore sed in the Alaskan Archic. Weeks, W.F., et al., 1998, p. 211-2115. MP 2500. Offsore sed in the Alaskan Archic. Weeks, W.F., et al., 1998, p. 211-2115. MP 2500. Offsore sed in the Alaskan Archic. Weeks, W.F., et al., 1998, p. 211-2115. MP 2500.	sk. 1972, p. 18-18-18. Oxygen instopes in the bond zone of Matanasia Gener Lunson, D.E., et al., 1972, p. 672-48. Pack for Meso-scale strain measurements on the Bestdout sea goal see (AIDJEX 1971). Hiller, W.D., III., et al., 1974, p. 119-128. Meso-scale strain measurements on the Bestdout sea goal see (AIDJEX 1971). Hiller, W.D., III., et al., 1974, p. 119-128. Meso-scale strain measurements on the Bestdout sea goal see (AIDJEX 1971). Hiller, W.D., III., 1975, p. 119-129. Mesonement of control sea net near Profiler Bay. Weeks, W.F., et al., 1977, p. 533-540. Me Lea arching and the draft of pack are through restricted channels. South, D., 119-77, 191-191. Modeling and the draft of pack are through restricted channels. South, D., III., 1977, p. 46-55. Sea see studies as the Weekled Sea region about USCGC Rutton School. Ackley, S.F., 1977, p. 171-177, p. 363-520. Me 1000. Sea see and are algae relationships in the Weekled Sea. Ackley, S.F., et al., 1978, p. 36-71. Me 1000. Sea see and are algae relationships in the Weekled Sea. Ackley, S.F., et al., 1978, p. 36-71. Me 1000. Me	p. 31; MP 3004 Particles Elemental components and concentrations of microspheristics in storm and pack for from the Wedded Sen. Kwin, M., et al. [1935, p.123-131]. MP 1777 Formach-confering corrected extraction by assospherical particles. Bolten, C.F., et al. [1935, p.1923-1325]. Arrhorne particle measurements. Berger, R.H., [1906, p.18]. MP 3006 PATTERNED GROUND Patterned ground stables. Pene, T.L., et al. [1907, p.18]. MP 3006 Patterned ground Mosphology of the North Slope. Walker, H.J., [1977, p.46, 51]. MP 1006 Proteined ground Mosphology of the North Slope. Walker, H.J., [1977, p.46, 52]. MP 1006 Proteined bines. Proteined there: Proteined there. Proteined there. Proteined there. Proteined to forespectual ground properties of fine-graned softs. Johnson, T.C., et al., [1977, 179, appendix SR 77-30] Iffect of forespectual cycles on realizing properties of fine-graned softs. Johnson, T.C., et al., [1978, 1994, MP 1002 Proteiness. Protein an effect on resident properties of fine total. Johnson, T.C., et al., [1979, p.127-176]. MP 1236 Patterness. Protein an English surface deformations. Senth, N., et al., [1975, 179, ST 5606 From attention when from proteins berger, R.L., et al., [1978, 6-19, ST 7500] Residency of the moder anglesit during freezing and thouse, Johnson, T.C., et al., [1978, p.56]. MP 1106
Conference on Offshore Merkames and Arme Engineering. 2h, 1993, 1962, 1993, 1859; Verification texts of the surface meteral method for calculating structural for loads. Johnson, J.B., et al., 1983, 9,455-49. NP 2353 Ice series measurements around offshore structures. Johnson, J.B., 1993, p.55-59. Elements of foreing-delens control systems. Perkam, R.E., 1993, 58p. 2 appends; Middals are stress measurement program. Con, G.F.N., MP 2613 Rebuilding infrastructure for pleasure bosting. MP 2615 Rebuilding infrastructure for pleasure bosting. Conference on offshore mechanics and Arche engineering. Sch., 1999, 1919, 474p; Conference on offshore mechanics and arche engineering. Sch., 1999, 1999, 474p; Conference on offshore mechanics and arche engineering. Sch., 1999, 1999, 474p; Conference on offshore mechanics and arche engineering. Sch., 1999, 1999, 474p; Conference on offshore mechanics and arche engineering. Sch., 1999, 1999, 474p; Conference on offshore mechanics and arche engineering. Sch., 1998, 1999, 199	Sil (1972, p.439-434) Oxygen instages in the banal zone of Manasaka Gener Lunson, D.E., et al., (1972, p.672-445) Path for Meso-scale strain measurements on the Benafourt sea pach see (AIDJEX 1971) Miller, W.D., III, et al., (1972, p.119-139) Seatement of contail sea see near religing and deformation rates. Haber, W.D., III, (1975, p.119-139) Mesoment of contail sea see near Profiles Bay. Weeks, W.F., et al., (1977, p.533-540) Mesoment of contail sea see near Profiles Bay. Weeks, W.F., et al., (1977, p.533-540) Mesoment of contail sea see near Profiles Bay. Weeks, W.F., et al., (1977, p.535-540) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.P., (1977, p. 171-173) My D., III, (1977, p.545-57) My	PATE DESCRIPTION AND ACCOUNTS A
Conference on Offshore Mechanics and Artice Engineering. 2h, 1993, Vol. 8, 1993, 1859; 1993, 1893, 1894, 1993, 1895, 1993, 1895, 1897, 2193, 9485-496; 1993, 1895, 1897, 2485-496; 1993, 1	Sil (1972, p.439-434) Oxygen instages in the banal zone of Manasaka Gener Lunson, D.E., et al., (1972, p.672-445) Path for Meso-scale strain measurements on the Benafourt sea pach see (AIDJEX 1971) Miller, W.D., III, et al., (1972, p.119-139) Seatement of contail sea see near religing and deformation rates. Haber, W.D., III, (1975, p.119-139) Mesoment of contail sea see near Profiles Bay. Weeks, W.F., et al., (1977, p.533-540) Mesoment of contail sea see near Profiles Bay. Weeks, W.F., et al., (1977, p.533-540) Mesoment of contail sea see near Profiles Bay. Weeks, W.F., et al., (1977, p.535-540) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.D., III, (1977, p.545-57) Mesoding pack see as a viscosur-plantic commission. Hilber, W.P., (1977, p. 171-173) My D., III, (1977, p.545-57) My	PATE PATERNED GROUND Patenties of the second process and concentrations of microspheristics in storm and pack for from the Wedded Sen. Kurne, M., et al. [1983, p.122-1313] MP 1977 Formach-confering corrected extraction by assospherical particles. Boleen, C.F., et al. [1983, p.1923-1325] MP 1998 Arrhorne particle measurements. Berger, R.H., [1984, p.18] Patterned ground measurements. Berger, R.H., [1984, p.18] Patterned ground Methods Penel, T.L., et al. [1984, E.P.; MP 1000 Patterned ground Methods Penel, T.L., et al. [1984, E.P.; MP 1000 Patterned ground Methods Penel, T.L., et al. [1987, p.46, E.]; Signature of the North Slope. Walker, H.J., [1977, p.46, E.]; Signature of the North Slope. Walker, H.J., [1977, p.46, E.]; Signature of the North Slope. Walker, H.J., [1977, p.46, E.]; MP 1000 Patterned ground Methods and a heavy build-near mounted polyeries are resident geogenists of fine-granded softs. Johnson, T.C., et al., [1977, 17g. appendix; Signature of the content of the content Johnson, T.C., et al., [1978, E.]; Patterness. Percentan effect on encheral properties of fine tools. Johnson, T.C., et al., [1979, p.1277, 17g. appendix MP 1236 Patterness. Percentan effect on encheral properties of fine tools. Johnson, T.C., et al., [1979, p.1277, 17g. appendix MP 1236 Patterness. From across and the series of properties of fine tools. Johnson, T.C., et al., [1978, 17g. appendix MP 1236 From across and the series angles decreaments. Series, R.L., et al., [1978, E.]; Residency of the moder angles democracy laptonsy association in Manne. South, N. et al., [1979, 27p.; En Medical Methods and them creater laptonsy association in Manne. South, N. et al., [1979, 27p.; En Methods Series and treat across and approach as a partial of approach and treat angles democracy in a partial of approach and treat angles democracy in a partial of approach and treat angles democracy in approach and the methods and the moderness and treat angles of the formation in approach and treat angles democracy in a p
Conference on Offshore Mechanics and Artice Engineering. 2h, 1993, Vol. 8, 1993, 1893; Verification texts of the surface integral method for calculating structuralize looks. Johnson, J.B., et al., 1983, 9, 635-656; MF 2353 Me section measurements around offshore structures. Johnson, J.B., 1993, p. 55-569. MF 2463, Sup. 8 appends; Millah are stress measurement program. Con. G.F.N., (1993, p. 11-15). MF 2463 Middah are stress measurement program. Con. G.F.N., (1993, p. 11-15). MF 2463 Rebuilding infrastructure for pleasure bosting. Morelly, C.A., et al., 1999, p. 182-701; MF 2464 Conference on offshore mechanics and Artice engineering. Sch., 1989, p. 198-704; Conference on offshore mechanics and artice engineering. Sch., 1989, p. 198-704. MF 2569 Conference on offshore mechanics and artice engineering. Sch., 1989, p. 198-704. MF 2569 Mresondated bergs be mechanics and article engineering. Sch., 1989, p. 198-704. MF 2569 Mresondated bergs be motion near a finding platform Mil., L.M., et al., (1998, p. 208-215). MF 2569 Measurement of sea are thurkness ware electromagnetic in during. Holladay, J.S., et al., (1996, p. 368-315). MF 2560 Off spells on permateon. Collina, C.M., et al., (1971, p. 31-67). Second progress report on oil spills and set pagens in cold-dominated examinations. McComp., B.H., et al., (1971, p. 31-67). Second progress report on oil spills on permateon Spills in Alinka. Alink, R.M., et al., (1971, p. 1871, p. 37-37). MF 2561 Second progress report on oil spills on permateon Spills in Alinka. Alinka. Alink. R.M., et al., (1971, p. 1871, p. 31-37). MF 2562 MF 2563 MF 2564 MF 2565 MF 2566	sk. 1972, p. 18-18-18. NF 997 Oxygen instores in the bond zone of Mannenia Ciner. Lunson, D.E., et al., 1972, p. 872-4853. NF 1177 Pack for Meso-scale strain measurements on the Bestfourt sea goals see (AIDJEX 1971). Hiller, W.D., III, et al., 1974, p. 119-184. Sentencial strains on Ascene sea see religing and deformation, reces. Hiller, W.D., III, (1975, p. 11-19). MF 100 Mostement of constal sea not near Profiles. Bay. Werks, W.F., et al., [1977, p. 533-540]. Me F., et al., [1977, p. 533-540]. Me John South, W.D., III, (1975, p. 1975-197). Medeling and the drift of pack are through reconced chan- eria. South, D.S., [1977, 119]. Modeling and act as a vanous-plante community. Hiller, W.D., III, [1977, p. 36-55]. MP 1018 Sea see studies in the Weldfell Sea region about USCGC Burton foliad. Ackley, S.F., [1977, p. 170-177]. p. 563-520; MP 100 Sea see and are algae relationalisys in the Weldfell Sea. Ack- ley, S.F., et al., [1978, p. 26-71]. Measurement of measurements deformation of Bestfort sea set (AIDJEX-1971). Inflier, W.D., III, et al., [1978, p. 126- 172). Effect of the occanic boundary layer on the mean drift of goal see application of a simple model. McPiter, M.G., (1978, p. 183-180). Oxer treatment Mechalop on the Seasonal Sea lee Lone, Mer 1108 Leernate boundary-faser scatters and oxidiations at dreft sea- ment. McPiter, M.G., [1984, p. 37-8, 583-7]. Derante boundary-faser scatters and oxidiations at dreft sea- ment. McPiter, M.G., [1984, p. 38-8, 583-7]. Derante boundary-faser scatters and oxidiations at dreft sea- ment. McPiter, M.G., [1984, p. 38-8, 583-7]. MP 1407 Season extraorphere internations in the Weldfell Sea same defining buops. Ackley, S.F., [1981, p. 17-18]. Condensate profiles over Article leads. Andreas, E. et al.,	PAGE Particles Elemental components and concentrations of microspheristics in storm and pack for from the Wedded Sen. Kuran, M., et al. (1985, p.122-131). MP 1777 Formaco-sentering corrected extinction by monopherical particles. Bolten, C.F., et al. (1985, p.1921-132b). Arborne particle measurements. Berger, R.H., (1986, p.19). PATTERNED GROUND Patterned ground in Alaska. Pene, T.L., et al. (1986, p.19). MP 1600 Patterned ground in Alaska. Pene, T.L., et al. (1986, p.19). MP 1600 Patterned ground. Morphology of the North Slope. Walker, H.J., (1971, p.46, S.). MP 1600 Patterned ground. Morphology of the North Slope. Walker, H.J., (1971, p.46, S.). MP 1600 Patterned ground. Morphology of the North Slope. Walker, H.J., (1971, p.46, S.). Patterned ferrechan cycles on resilient properties of fine-particle facts. Johnson, T.C., et al., (1973, 1984, MP 1602). Freeze than effect on resilient properties of fine-sola. Johnson, T.C., et al., (1974, 1984, MP 1602). Patterned. Freshch, present resilient properties of fine-sola. Johnson, T.C., et al., (1970, p. (2471).) MP 1200 Patterned. Freshch, present resilient unface deformations beneath patterness. Sinch, N., et al., (1970, 41pq. SR 7600). Front action in New Jersey Inglusiva. Berg, R.L., et al., (1971, fo.p.). Resilience of unfactors unphalt during freezes and thinning Johnson, T.C., et al., (1978, p. 302-466). MP 1000 Nondecrament withing of motorizer lingbusy summittees in Manne, South, N., et al., (1970, 21pq. SR 7600). Directory and front action centers. 3. a person, al. design. Ser., R.L., (1970, 17pq.). MP 1700 Nondecrament for cold repti, p. Denyer, P.J., et al., SR 7600. Directory and forest action centers. 3. a person, all design. Ser., R.S., (1970, 17pq.). MP 1700 Nondecrament for cold repti, p. Denyer, P.J., et al., SR 7600.
Conference on Offshore Mechanics and Arme Engineering. 2h, 1993, Vol. 8, 1993, 1893; Verification texts of the surface integral method for calculating structural for loads. Johnson, J.B., et al., 1983, 9, 635-69. MP 2053 Ice suren measurements around offshore structures. Johnson, J.B., 1993, p. 55-59. MP 2063 Engenes of footney-delves control systems. Perham, R.E., 1993, 549, 9 appendix; MP 2063 Middals are stress measurement program. Con, G.F.N., MP 2063 Rebuilding infrastructure for pleasure bosting. MP 2063 Rebuilding infrastructure for pleasure bosting. MP 2063 Conference on offshore mechanics and Arche congenerate, 8th, 1999, 6749; Conference on offshore mechanics and arche congenerate, 8th, 1999, 6749; Conference on offshore mechanics and arche congenerate, 8th, 1999, 6749; Conference on offshore mechanics and arche congenerate, 8th, 1999, 6749; Conference on offshore mechanics and arche congenerate, 8th, 1999, 6759; MP 2064 Conference on offshore mechanics and arche congenerate, 8th, 1999, 6759; MP 2064 Conference on offshore mechanics and arche congenerate, 8th, 1999,	Si. 1972, p. 439-434. Oxygen instages in the basal zone of Matanasia General Lusson, D.E., et al., 1972, p. 672-445. Path for Meso-scale strain measurements on the Bestifourt sea goals see (AIDJEX 1971). Hiller, W.D., III., et al., 1974, p. 119-139. Seatement of control was a see religing and deformation rates. Hiller, W.D., III., 1975, p. 119-159. Meso-scale strain of control sea see religing and deformation rates. Hiller, W.D., III., 1975, p. 119-159. Mesorman of control sea see near Profiles Bay. Week, W.F., et al., 1977, p. 533-549. Mesorman of control sea see near Profiles Bay. Week, W.F., et al., 1977, p. 535-549. Me p. 100, 100, 1977, 1913, 1913. Mesorman of hiller, W.D., 1977, 1913, p. CR. 77-18. Modeling pack see as a viscous-plantic commission. Hiller, W.D., III., 1977, p. 46-55; Sea see studies as the Weekled Sea region about USCGC Rutter Keinel. Actiop, S.F., 1977, p. 1713-173; 2 563-529. Me p. 100. Sea see and see algue relationships in the Weekled Sea. Actiop, S.F., et al., 1978, p. 76-71; Mesormanism of mesoscoil deformation of Bestifies sea see (AIDDEX-1971). Publics, W.D., III., et al., 1978, p. 183-805. Me p. 100. Me p. 100. Mesormanism of mesoscoil deformation of Bestifies sea see (AIDDEX-1971). Publics, W.D., III., et al., 1978, p. 183-805. Me p. 100. Mesormanism of mesoscoil deformation of Bestifies sea see (AIDDEX-1971). Publics, W.D., III., et al., 1978, p. 183-805. Me p. 100. Mesormanism of mesoscoil deformation of Bestifies sea see (AIDDEX-1971). Publics, W.D., III., et al., 1978, p. 183-805. Me p. 100. Mesormanism of mesoscoil deformation of Bestifies sea see application of a sungle model. Med Parc, M.G., 1978, p. 183-805. Me p. 100. Mesormanism of mesoscoil deformation of Bestifies sea see application of a sungle model. Med Parc, M.G., 1978, p. 183-805. Me p. 100. Mesormanism of mesoscoil deformation of Bestifies sea segmentary large on the seasonal Sea see	Particles Elemental components and concentration of microspherides in storm and god, for from the Weddell Sen. Kuran, M., et al. (1983, p.122-131). MP 1777 Formachecutering corrected estination by assistancial particles. Bolten, C.F., et al. (1985, p.102)-1022b. Arborne particle measurements. Berger, R.H., (1984, p.31). Patterned ground Melaka. Frue, T.L., et al. (1984, R.J., p. 10). Patterned ground Melaka. Frue, T.L., et al. (1984, R.J., p. 10). Patterned ground Melaka. Frue, T.L., et al. (1987, R.A., p. 10). Patterned ground Melaka. Frue, T.L., et al. (1987, R.A., p. 10). Patterned forces for North Stope. Walker, H.J., (1987, R.A., p. 10). Sentence for sentence and a leavy buildoing mounted polycritic. Enton, R.A., et al. (1987, I.2). MP 1002. Freche de fererechtus cycles on realized geogeness of fine and lebanism, J.C., et al., (1989, p. 2012/26). MP 1023. Freche from enters on realized geogeness of fine and lebanism, J.C., et al., (1989, p. 2012/26). MP 1224. Patterness. Frields, permised realized surface deformations. Senith, N., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1989, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C., et al., (1988, d.Sp., SR. 7540. Senithency of all under anghalt during freezing and thisman, J.C.,
Conference on Offshore Mechanics and Artic Engineering. 2h, 1993, Vol. 8, 1993, 1859; 1993, 1879, 217. Verification texts of the surface integral method for calculating structuralize looks. Johnson, J.B., et al., 1983, p. 855-56; MP 2053. Ice section measurements assume offshore structures. Johnson, J.B., 1993, p. 55-56; MP 2063. Elements of foreign-delves control systems. Perham, R.E., 1993, 1994, p. 1994, p. 55-56; MP 2063. Middals are stress measurement program. Con, G.F.N., 1998, p. 11-15; MP 2063. Rehalding infrastructure for pleasure bosting. Moreover, 1998, p. 11-15. Conference on offshore mechanics and Artic congeneration, 2th, 1999, p. 1999, 4769; MP 2061. Conference on offshore mechanics and micro congeneration, 2th, 1990, p. 1993, 4769; MP 2061. Conference on offshore mechanics and micro congeneration, 2th, 1990, p. 1995, 4769; MP 2061. Conference on offshore mechanics and micro congeneration and emission. McGalver, W.R., et al., 1999, p. 198-209. Wave-induced bergs be mission near a finding platform Mol. L.M., et al., 1999, p. 85-215; MP 2509. Measurement of see for thirkness way electromagnetic induction. Holladay, J.S., et al., 1990, p. 309-315; MP 2500. Oli seconcey. Oli spellis on permution: Collina, C.M., et al., 1991, p. 81-209. Oli spellis on permution: Collina, C.M., et al., 1991, p. 82-815. Second progress report on oil spilled on permution: McFallers, 1891, p. 24-28. MP 1040. Part recovery from Arene oil spille Market, D.A., et al., 1997, p. 24-28. MP 1181. Plant recovery from Arene oil spills. Market, D.A., et al., 1997, p. 24-28. MP 1182. Proble oil spills on Marks speace force. Jeshus, I.F. et al., 1997, p. 24-28.	sk. 1972, p. 15-164. NF 997 Oxygen instores in the bond zone of Matanasia Caner Lusson, D.E., et al., 1972, p. 672-465. Pack for Meso-scale strain measurements on the Bestdout sea goal see (AIDJEX 1971). Hiller, W.D., III., et al., 1974, p. 119-129. Meso-scale strain measurements on the Bestdout sea goal see (AIDJEX 1971). Hiller, W.D., III., et al., 1974, p. 119-129. Meso-scale strain measurements on the Bestdout sea goal see (AIDJEX 1971). Hiller, W.D., III., 1975, p. 119-129. Mesonen of constal sea not near Profiler Bay. Weeks, W.F., et al., 1977, p. 533-540. Me 1986. D.S., 1977, 119. Modeling and the drift of pack are through restricted channels. South, D., III., 1977, p. 36-552. Me D., III., 1977, p. 36-552. Me D., III., 1977, p. 36-552. Me Dynamics of near-shore see. Rosaca, A., et al., 1977, p. 36-350. Sea see studies in the Weldell Sea region about USCGC Rutten fiction. Achier, S.F., 1977, p. 171-177, p. 36-350. Sea see and are algae relationships in the Weldell Sea. Achier, S.F., et al., 1978, p. 36-712. Me 1300. Sea see and are algae relationships in the Weldell Sea. Achier, S.F., et al., 1978, p. 36-712. Me 1301. Me 1302. Me 1302. Me 1303. Me 1304. Me 1304. Me 1304. Me 1305. Me 1306. Me 1306	PATEURS COMPONENTS and concentrations of microspheristics in storm and pack for from the Wedded Sen. Kuran, M., et al. (1985, p.122-131). MP 1777 Formaco-scattering corrected extinction by monopherical particles. Bodeen, C.F., et al. (1985, p.1921-132b). Arrhorne particle measurements. Berger, R.H., (1986, p.19). PATTERNED GROUND Patterned ground in Alaska. Pene, T.L., et al. (1986, p.19). MP 1000 Proteoned ground Morphology of the North Slope. Walker, H.J., (1971, p.46-52). MP 1000 Proteoned ground Morphology of the North Slope. Walker, H.J., (1971, p.46-52). MP 1000 Proteoned ground Morphology of the North Slope. Walker, H.J., (1971, p.46-52). MP 1000 Proteoned ground Morphology of the North Slope. Walker, H.J., (1971, p.46-52). Proteoned freeze-than eyeles on resilient properties of fine-particle force than effect on resilient properties of fine-sola lodinom, T.C., et al., (1972, 179, appendix). Freeze than effect on resilient properties of fine-sola lodinom, T.C., et al., (1978, 1794). MP 1002 Proteoneds Front action of the storm properties of fine-sola lodinom, T.C., et al., (1978, 4794). MP 1206 Proteoneds Front action in Non-Jersey legiturity. Berg. R.L., et al., (1973, first.). Sendenties as the under anglalit during freezes and thinned (1974). Royal. Revillency of with under anglalit during freezes and thinned (1974). Royal. Revillency of with under anglalit during freezes and thinned (1974). Royal. Revillency of with under anglalit during freezes and thinned (1974). Royal. Dramage and front action criteria 2. a garrang, design. Seng. R.L., et al., (1976, 1794). Lydalit conserte for cold repti A. Dempsey, P.L. et al., (1986, 1994). Waltermanical modes is cold repti A. Dempsey, P.L. et al., (1986, 1994). Valtermanical modes is contracted book hours of spreads. Rev. B.L., et al., (1988, 1994). CR 80-10
Conference on Offshore Mechanics and Artic Engineering. 2h, 1994, 1964, [1994, 1859; 2	SE 1972, p.439-434; MF 977 Oxygen instages in the banal zone of Macannaka Gener Lunson, D.E., et al., [1972, p.672-445]. Path for Meso-scale strain measurements on the Benafourt sea pach are (AIDJEX 1971). Hibler, W.D., III, et al., [1974, p.119-138]. Seatement of control macanna reason endome and deformation. rates. Hibler, W.D., III, [1975, p.11-156]. MP 808 Movement of control sea are near Fraithor Bay. W.F. et al., [1977, p.533-534]. MP 1006 les arching and the deft of pack are through restricted channels. South, D.S., [1977, 113]. MP 1006 les arching and the deft of pack are through restricted channels. South, D.S., [1977, 113]. We D., III, [1977, p.66-55]. MP 1006 Sea are studies in the Weddell Sea region about USCGC. Rutton Related. Archer, S.F., [1977, p.17-17]. MP 1010 Dynamics of near-shore for Rosano, A., et al., [1977, p.563-520]. Sea are and are algae relationships in the Weddell Sea. Act. les, S.F., et al., [2978, p.36-71]. MP 1200 Measurement of missecule deformation of Beauties for sea (AIDJEX-1971). Indice, W.D., III, et al., [1978, p.183-172]. Effect of the occanic boundary layer on the mean denied good see application of a single model. McPare, M.G., [1989, p.363-372]. MP 1170 Effect of the occanic boundary layer on the mean denied good see application of a single model. McPare, M.G., [1989, p.363-372]. MP 1170 Discriminal Mockshop on the Seasonal Sea for Even. Mon- ieres, Caldenna, Feb. 20-Mar. I, 10-0. Andersea, B.G., et al., [1982, 317-2]. Dersite boundary-layer entires and oxillation in deft istu- nous. McPare, M.G., [1989, p.36-854]. MP 1300 Seasone atmosphere interactions in the Weddell Sex using defting boups. Addity, S.F., [1981, p.37-128]. MP 1427 Condensate profiles over Arche leads. Andreas, E.L. et al., [1981, p.437-3040]. Private lond and suntime characteristics of interiors as as e. (inc., A.J., et al., [1982, p.318-317]. MP 1427 Condensate profiles over Arche leads. Andreas, E.L. et al., [1981, p.437-3040]. Private land and suntime characteristics of in	PATERNED GROUND Processed components and concentration of microspherides in store and god for from the Weddell Sea. Kuran, M., et al. (1983, p.122-1313) MP 1777 Formachecutering corrected estitution by assopherical particles. Bolten, C.F., et al. (1985, p.102)-13235 Arborne particle measurements. Berger, R.H., (1986, p.31) Patterned ground measurements. Berger, R.H., (1987, p.31) Patterned ground measurements. Berger, R.H., (1987, p.34) Service of the North Stope. Walter, H.J., (1987, p.34) Service Estima, R.A., et al. (1987, 112), a appendix service. Estima, R.A., et al. (1987, 112), a appendix service from the Johnson, T.C., et al. (1988, 1991, 1991) Patterness. Firstly, payment realization tender determinants. Seath, N., et al., (1988, 113), d.19, a Service, p. (1988, d.19, a Service). Service from an New Jersey leighness. Berg. R.L., et al., (1988, d.19, a Service). Service from the Seath service from the Service of microspherical patterness. Bason, R.A., et al., (1980, d.19, a Service). Service from the Seath service from the Service of microspherical patterness and service of microspherical patterness. Seath, N., et al., (1988, d.19, a partially, design force of microspherical patterness and the service of microspherical patterness. Service, R.J., et al., (1988, d.19). Service of patterness and patterness of measurements. Service, R.J., et al., (1988, d.19). Service of patterness of patterness. Seath, S.P. (19
Conference on Offshore Mechanics and Artic Engineering. 2h, 1993, Vol. 8, 1993, 1859; Verification texts of the surface integral method for calculating structuralize louds. Johnson, J.B., et al., 1983, p. 855-56; MP 2053 Me sixtus measurements assume offshore structures. Johnson, J.B., 1993, p. 855-56; MP 2063 Meshads are stress measurement program. Con., G.F.N., (1993, 58p. 8 appends); MP 2063 Meshads are stress measurement program. Con., G.F.N., MP 2063 Rehalding infrastructure for pleasure bouring. Morely, C.A., et al., (1999, p. 183-201). MP 2063 Conference on offshore mechanics and Artic engineering. Sch., 1989 (1989, p. 183-201). MP 2064 Conference on offshore mechanics and mention engineering. Sch., 1989 (1989, p. 198-201). MP 2064 Conference on offshore mechanics and mention engineering. Sch., 1989 (1989, p. 198-201). MP 2064 Dynamic analysis of a finaling see sheet undergoing vertical meleculation. McGelvery, W.R., et al., (1989, p. 185-201). MP 2079 Wave-induced bergs bis motion mean a finaling station Mak. L.M., et al., (1980, p. 208-215). Measurement of see see thirksets wang electromagnetic induction. Holladay, J.S., et al., (1980, p. 308-315). MP 2080 Oil secondary Offshore sol in the Alaskan Archic. Weeth, W.F., et al., (1984, p. 211-175). MP 2080 Oil secondary Offshore sol in the Alaskan Archic. Weeth, W.F., et al., (1984, p. 211-175). SE 20-15 Second program report on oil spilled on permations. McCon., Bill., et al., (1971, p. 211-215). MP 2103 Plant recovery from Archic oil spille. Maker. D.A., et al., (1971, p. 218-215). The of crude and refered sole in North More sole. A., et al., (1971, p. 319-315). MP 1103 Plant recovery from Archic oil spille. Maker. D.A., et al., (1971, p. 218-315). MP 1104 Plant recovery from Archic sole spills sole. A., et al., (1971, p. 319-315). MP 1105 Plant recovery from Archic sole spills sole.	SE 1972, p. 439-434; Oxygen instages in the bond zone of Matanasia Cheer Lunson, D.E., et al., [1972, p. 672-445]. Path for Meso-scale strain measurements on the Bestfourt sea goal see (AIDJEX 1971). Hiller, W.D., III, et al., [1972, p. 119-139]. Meso-scale strain measurements on the Bestfourt sea goal see (AIDJEX 1971). Hiller, W.D., III, et al., [1972, p. 119-139]. Meso-scale strain measurements on the Bestfourt sea goal see (AIDJEX 1971). Hiller, W.D., III, [1975, p. 117-15]. Meson Hiller, W.D., III, [1975, p. 117-16]. MP 1906. Me necking and the death of pack are through restricted channels. South, D.S., [1977, p. 197-16]. Mesoleng pack see as a viscous-plantic commission. Hiller, W.D., III, [1977, p. 368-57]. Sea see studies as the Weldlell Sea region about USCGC Rutten Kelnel. Ackley, S.F., [1977, p. 170-17]. Mesonement of measurements are known, A., et al., [1977, p. 568-520]. Mesonement of measurements are well-death sea see (AIDJEX-1971). Polyty. P. 2071; p. 190-112. Mesonement of measurements for the measurement of particular medical defermation of Bestfort sea see (AIDJEX-1971). Indice, W.D., III, et al., [1971, p. 180-17]. Mesonement of measurement househop in the mean death of sea see (AIDJEX-1971). Indice, W.D., III, et al., [1972, p. 180-17]. Meterior out the seasonal sea see none. Sea see Anteries, B.G., [1972, p. 180-17]. Decrease boundary-laser sentires and oscillations at doct stanonement Mesonement Mesonement Mesonement and oscillations at doct stanonem. Mesonement School, p. 1980, p. 170-171. Decrease boundary-laser sentires and oscillation at doct stanonement Mesonement Meso	PATE PROBLEM COMPARISON AND CONCENTRATION OF MICROSPACES IN SHOWN AND FACE SECURITIES IN SHOWN AND FACE SECURITIES IN SHOWN AND FACE SECURITIES AND FITTE FOR MICHAEL
Conference on Offshore Mechanics and Artice Engineering. 2h, 1993, Vol. 8, 1993, 1893; We Jill Verification texts of the surface meteral method for calculating structuralize looks. Johnson, J.B., et al., 1983, p. 855-56. Me Sixton measurements assume offshore structures. Johnson, J.B., 1993, p. 855-56. Le sixton measurements assume offshore structures. Johnson, J.B., 1993, p. 8-29-205. Me J.B., 1993, p. 8-29-205. Me J.B., 1993, p. 8-29-205. Middals are stress measurement program. Cost, G.F.N., (1993, p. 11-15). MP 263 Rebuilding infrastructure for pleasure bosting. Morelly, C.A., et al., 1999, p. 183-201. Me J. 1999, p. 183-201. Me J. 1999, p. 183-201. Conference on offshore mechanics and active conjuncting. Sci., 1999, p. 199-9. Gonference on offshore mechanics and active conjuncting. Sci., 1999, p. 199-9. Gonference on offshore mechanics and active conjuncting. Sci., 1999, p. 199-9. MP 264 Dynamic analysis of a floating see shere undergoing serval-measuremen. McGhary, W.R., et al., (1999, p. 198-200). MP 265 Mresontanical bergs be motion near a floating platform Mak. L.M., et al., (1998, p. 205-215). MP 266 Measurement of see see thirkness ware electromagnetic in duction. Holladay, J.S., et al., (1990, p. 398-315). MP 269 Off spells on permuteon. Collina, C.M., et al., (1971, p. 184-7). Second progress report on oil spille on permuteon. See 198-115. Second progress report on oil spille on permuteon. See 198-115. Second progress report on oil spille on permuteon. See 198-115. Second progress report on oil spille on permuteon. See 198-115. MP 1103 Pende oil spills on Mack speace Societ. Jenkins, I.F., et al., (1971, p. 245-279). MP 1110 Pinner recovery from Arene oil spill. Walker. D.A., et al., (1971, p. 245-279). MP 1110 Pinner recovery from Arene oil spill. Pinner or crude and refined oils in booth bloop soft. A., et al., (1972, p. 370-347). MP 1110 Finner crude and refined oils in booth bloop soft. MP 1110 Finner crude and refined oils in booth bloop soft. MP 1110 Finn	sk. 1972, p. 18-18-18. NF 997 Oxygen instores in the bond zone of Matanasia Cheer Lusson, D.E., et al., 1972, p. 672-48. MF 1177 Path for Meso-scole strain measurements on the Bestfourt sea good see (AIDJEX 1971) Hiller, W.D., III, et al., 1974, p. 119-1883 Sentention summinum in Arche sea see religing and deformation races. Hiller, W.D., III, 1975, p. 11-194, MF 100 Mostment of control sea see near Pradice Ray. Weeks, W.F., et al., 1977, p. 535-540. Me F., et al., 1977, p. 535-540. Mr F., et al., 1977, p. 36-557. Medeling and see drift of pack are through reconcised chan- ords. South, D.S., 1977, 113-17. Modeling and see also a sumono-plants communin. Hiller, W.D., III, 1977, p. 36-557. MP 1018 Sea see studies in the Weldell Sea region about USCGC Rutter Schot. Achier, S.F., 1977, p. 172-177. MP 1016 Dynamics of near-shore see. Rosaco, A., et al., 1977, p. 363-350. MP 100 Sea see and are algae relationalism in the Weldell Sea. Achier, S.F., et al., 1978, p. 78-711. Menument of measured deformation of Bestfort sea see (AIDJEX-1971). Indien, W.D., III, et al., 1978, p. 128- 172. Menument of measured boundary layer on the mean defined good see application of a simple model. McPiter, M. G., 1978, p. 183-180. Mr 100 Occurrence of the security boundary layer on the mean defined good see application of a simple model. McPiter, M. G., 1978, p. 183-180. Mr 100 Control of the security boundary layer on the mean defined good see application of a simple model. McPiter, M. G., 1978, p. 183-180. Mr 100 Condensate profiles over Arche leads. Andreas, H., et al., 1979, p. 350-3571. Mr 100 Scance atmosphere interactions in the Weldell Sea samp defining broops. Achier, S.F., p. 1981, p. 177-181. Condensate profiles over Arche leads. Andreas, H., et al., 1981, p. 437-2606. Mr 1480 Promotion and structural characteristics of interiors and occiliation and defined condensate profiles over Arche leads. Andreas, H., et al., 1981, p. 21-181. On modeling the Weldell Sea pack see. Hilbert, B. D., 117 16, 1982, p. 11-	Particles Elemental components and concentration of microspheristics in storm and god, for from the Weddell Sen. Kuran, M., et al. (1983, p.120-1313) MP 1777 Formachecutering corrected estitution by assospherical particles. Boliven, C.F., et al. (1985, p.102)-13235 Arborne particle measurements. Berger, R.H., (1986, p.31) Patterned ground Melaka. Frue, T.L., et al. (1984, 87); MP 1000 Patterned ground Melaka. Frue, T.L., et al. (1984, 87); MP 1000 Patterned ground Melaka. Frue, T.L., et al. (1987, p.46, 85); Self-condition of the North Shope. Walker, H.H., (1977, p.46, 85); MP 1000 Patterned ground Melaka. Frue, T.L., et al. (1977, p.46, 87); Effect of freeze-than cycles on revoluent properties of fine-particle of all Johnson, T.C., et al. (1977, 198); MP 1002 Freeze than effect on resilient properties of fine-particle order. Johnson, T.C., et al. (1978, 43); Freeze than effect on resilient properties of fine sold. Menous, T.C., et al. (1978, 43); Freeze than effect on resilient properties of fine sold. Menous, T.C., et al. (1978, 43); Sendance of medition upon finest properties of fine sold. Menous, T.C., et al. (1978, 43); From action in New Jersey brighters. Berg. R.L., et al. (1978, 18-2); Resiliency of with under angladi during freezing and thinning Johnson, T.C., et al. (1978, 43); Resiliency of with under angladi during freezing and thinning Johnson, T.C., et al. (1978, 43); Resiliency of with under angladi during freezing and thinning Johnson, T.C., et al. (1978, 43); Resiliency of with under angladi during freezing and thinning Johnson, T.C., et al. (1978, 43); Sendance of measurem of properties of properties of properties and collection of properties of angladical collines and thinning Johnson, T.C., et al. (1978, 43); Sendance of properties of angladical collines of properties. Sendance Johnson, T.C., et
Conference on Offshore Mechanics and Arme Engineering. 2h, 1994, 1964, 1994, 1859; We Jill Verification texts of the surface integral method for calculating structural for loads. Johnson, J.B., et al., 1984, 9,485-456; MP 2353 Ice suren measurements around offshore structures. Johnson, J.B., 1994, p.55-56; MP 2363 Benerits of footing-deletes control systems. Perham, R.E., 1993, 587, 9 appendix; MP 2463 Methods are stress measurement program. Con, G.F.N., 1992, p.11-15. MP 2463 Rebuilding infrastructure for pleasure booting. MP 2464 Conference on offshore mechanics and arctic congeneration, 2td., 1999, p.193-201; Conference on offshore mechanics and arctic congeneration, 2td., 1999, p.199-304; Conference on offshore mechanics and arctic congeneration, 2td., 1999, p.199-201; Conference on offshore mechanics and arctic congeneration, 2td., 1999, p.199-201; MP 2569 Conference on offshore mechanics and arctic congeneration, 2td., 1999, p.199-201; MP 2569 My 2564, p.1999, p.199-201; MP 2569 Wiscontinuous McGharp, W.R., et al., (1999, p.199-201). MP 2579 Wiscontinuous McGharp, W.R., et al., (1999, p.199-201). MP 2589 Memorement of sea are tharkaces were electromagnetic in duction. Holladay, J.S., et al., (1999, p.199-315). MP 2560 Oli spella on the Almiana Arctic. Weeks, W.F., et al., (1994, p.371-375). MP 2560 Oli spella on permations. Collina, C.M., et al., (1971, p.164-45). MP 1061 Pant recovery town Arctic oil spills. White collina, C.M., et al., (1971, p.164-17). Pant recovery town Arctic oil spills. White in Almia. Aria, R.M., et al., (1971, p.191-17). Crode oil spills on black speace force. Jenker, T.F., et al., (1971, p.184-17). Pant recovery town Arctic oil spills. White was, D.E., et al., (1971, p.191-17). Loads oil spills on black speace force. Jenker, T.F., et al., (1971, p.184-17). Loads oil spills on black speace force. Jenker, T.F., et al., (1971, p.184-17). Loads recovery more 1999 was find Cerch, Almia. Lausan, D.E., et al., (1971, p.191-17). Loads oil spills and bl	Si. [1972, p.439-434] Oxygen instages in the band zone of Manuscha Gener Lunson, D.E., et al. [1972, p.672-445] Pack hie Meso-scale strain measurements on the Benefourt sea pach are (AIDJEX 1971) Habler, W.D., III., et al. [1972, p.119-135] Seatement of contail are new search religing and deformation rates. Habler, W.D., III., [1975, p.119-156] Mesoneme of contail are new near Pradhor Ray. Weeks, W.F. et al. [1977, p.533-546] Mesoneme of contail are new near Pradhor Ray. Weeks, W.F. et al. [1977, p.533-546] Mesoneme of contail are new near Pradhor Ray. Weeks, W.F. et al. [1977, p.533-546] Mesoneme of contail are new near Pradhor Ray. Weeks, W.F. et al. [1977, p.533-546] Mesoneme Solds. D.S., [1977, 119.] Medding pack are as a viscoursplante continuum. Habler, W.D., III., [1977, p.365-55] Me D., III., [1977, p.365-55] Me D., III., [1977, p.365-55] Me Dynamics of near-whose are Rosano, A., et al., [1977, p.563-556] Mesonement of near-whose are Rosano, A., et al., [1977, p.563-556] Mesonement of measured beforemation of Benefici sea are (AIDJEX-1971). Indice, W.D., III., et al., [1978, p. 186-172] Mesonement of measured deformation of Benefici sea are (AIDJEX-1971). Indice, W.D., III., et al., [1978, p. 186-172] Mesonement of measured benefic Meffere, M.G., [1982, p. 188-804] Contractional Mechalog on the Seasonal Sea for Long. Mesonement on the seasonal sea are near new heaters, M.G., [1982, p. 188-804] Contractional Mechalog on the Seasonal Sea for Long. Mesonement Methods, M.G., [1982, p. 198-183] Merical Books, M.F., De-Mar I, 1970. Anderson, M.G., [1981, p. 187-184] Condensate profiles over Alvine leads. Andreas, H.J., et al., [1981, p. 187-184] Condensate profiles over Alvine leads. Andreas, H.J., et al., [1981, p. 187-184] Condensate profiles over Alvine leads. Andreas, H.J., et al., [1982, p. 187-184] Condensate profiles over Alvine leads. Andreas, M.P. 1840 Condensate profiles over Alvine leads. Andreas, M.P. 1840 Condensate profiles over Alvine leads. Andreas, M.P. 1841 Conden	Particles Elemental components and concentration of microspherides in storm and god ite from the Webbell Sen. Kuran, M., et al. (1985, p.122-131). MP 1777 Formachacutering corrected estinction by assopherical particles. Bolten, C.F., et al. (1985, p.102)-1027b. Arborne particle measurements. Berger, R.H., (1986, p.10]. Arborne particle measurements. Berger, R.H., (1986, p.11]. Patterned ground and Alaska. Proc. T.L., et al. (1984, p.7). MP 2664 Patterned ground Morphology of the North Stope. Walker, H.J., (1987, p.46-52). Patterned ground Morphology of the North Stope. Walker, H.J., (1987, p.46-52). Patterned formal storm of the North Stope. Walker, H.J., (1987, p.46-52). Patterned to the North Stope. Walker, H.J., (1987, p.46-52). Patterned to the North Stope. Walker, H.J., (1987, p.46-52). Effect of formathan explice on resilient geogenesis of fine some patterned to the solid. Johnson, T.C., et al., (1987, 189). MP 1002 Freche than effect on resilient geogenesis of fine soils. Johnson, T.C., et al., (1989, p.247-176). MP 1024 From action in New Jersey leighness. Berg. R.L., et al., (1988, flag.). Forth Action in New Jersey leighness. Berg. R.L., et al., (1988, flag.). Sendements in these signed and storing forcering and thinsing Johnson, T.C., et al., (1988, flag.). Sendements in these signed another begins associated and thinsing Johnson, T.C., et al., (1988, p.80, 466). MP 1006 Sendements in the action creation in process and thinsing Johnson, T.C., et al., (1988, p.80, 466). MP 1007 Sendements in the action creation in process of process of process and thinsing Johnson, T.C., et al., (1988, p.80, 466). MP 1006 Sendements in the action creation in process. P.L. et al., (1988, p.80, 466). MP 1006 Sendements in the action creation in a particle, design step, R.L., et al., (1988, p.80, 466). MP 1006 Sendements in the action creation from heavy of process of the solid means of process o
Conference on Offshore Mechanics and Artic Engineering. 2h, 1993, Vol. 8, 1993, 1859; Verification texts of the surface integral method for calculating structuralities louds. Johnnon, J.B., et al., 1993, p. 635-646; MP 2053. Les sixtus measurements assume offshore structures. Johnnon, J.B., 1993, p. 55-569. MP 2063. See sixtus measurements assume offshore structures. Johnnon, J.B., 1993, p. 55-569. MP 2061. Entersts of forsting-delens counted systems. Perham, R.E., 1993, p. 11-157. MP 2063. Meddad see stress measurement program. Con, G.F.N., MP 2063. Rehalding inflammeture for pleasure bosting. MP 2063. Conference on offshore mechanics and Artic engineering. Rch, 1999, p. 119-201. MP 2063. Conference on offshore mechanics and artic engineering. Rch, 1999, p. 1999, d. 1699. Dynamic analysis of a Louing see short undergoing vertical medication. McGeltury, W.R., et al., (1998, p. 1985-206). MP 2069. MP 2069	sk. 1972, p. 15-16-16. MF 977 Oxygen instores in the bond zone of Matanasia Cheer Lusson, D.E., et al., 1972, p. 672-4653. MF 1177 Pack for Meso-scole strain measurements on the Bestdown sea good see (AIDJEX 1971). Hilder, W.D., III, et al., 1972, p. 119-1293. Seatened summinous in Ascine sea see religing and deformation, reces. Hilder, W.D., III, 1975, p. 11-1719. MF 1006 Movement of constal sea new near Profiles Bay. Weeks, W.F., et al., 1977, p. 515-549. Mr 1006 lee arching and the drift of pack are through restricted channels. South, D.S., 1977, 119-32. Me Till. Modeling pack see as a vincoun-plantic continuum. Hilder, W.D., III, 1977, p. 36-572. Sea see studies as the Weeldell Sea region about USCGC Ruton Kelnd. Ackley, S.F., 1977, p. 170-177, p. 363-520. Mr 1000 Sea see and see algue relationships in the Weeldell Sea. Ackley, S.F., et al., 1978, p. 36-112. Mr 1000 Sea see and see algue relationships in the Weeldell Sea. Ackley, S.F., et al., 1978, p. 36-112. Mr 1000 Sea see and see algue relationships in the Weeldell Sea. Ackley, S.F., et al., 1978, p. 36-112. Mr 1000 Sea see and see algue relationships in the Weeldell Sea. Ackley, S.F., et al., 1978, p. 36-112. Mr 1000 Sea see and see algue relationships in the Weeldell Sea. Ackley, S.F., et al., 1978, p. 36-112. Mr 1000 Sea see and see algue relationships in the mesh dead sea see (AIDDEX-1971). Indice, W.D., III, et al., 1971, p. 183-172. Mr 1000 Sea see and see algue relationships of the mesh dead sea see (AIDDEX-1971). Indice, W.D., III, et al., 1971, p. 183-180. Mr 1000 Sea see and see algue relationships in the mesh dead sea see (AIDDEX-1971). Indice, Mr 1070 Server of the overante boundary layers on the mesh dead sea	Particles Elemental components and concentration of microspherides in atom and god ite from the Webbell Sen. Kuran, M., et al. [1983, p.129-1313] MP 1777 Formado-antering corrected extinction by assopherical particles. Bohern, C.F., et al. [1985, p.1823-1829] Arborne particle measurements. Berger, R.H., [1986, p.31] PATTERNED GROUND Patterned ground Mahaba. Print, T.L., et al. [1984, p.32] Patterned ground. Merphology of the North Slope. Walker, H.J., [1971, p.40. SS] Patterned bases. Presented bases. Presented bases. Presented total North Slope. Walker, H.J., [1971, p.40. SS] Billed of feergeding using a heavy build-over mounted policerater. Exten, R.A., et al., [1977, 129. a appendix. St Tr.10. St. [1976, p.327-179] MP 1002 Freeze than effect on resilient properties of fine softs. Johnson, T.C., et al., [1978, 1994] MP 1002 Freeze than effect on resilient properties of fine softs. Johnson, T.C., et al., [1976, p.227-176] MP 1226 Pattend presented resilient surface deformations. Senth, N., et al., [1978, 1994] Resilience of straidton upon those percentains bereath presented influence of straidtons upon those percentains bereath presented influence of straidtons upon those percentains bereath presented. Exten, R.A., et al., [1976, 4194]. SR, 7940 Resiliency of all under anglish during freezing and thoses, J.C., et al., [1978, 1984, angl., design. SR, 7940 Bernange and frost action centure lagranty sustaines in Manne. Jonn. T.C., et al., [1978, 1974]. Appliant concepts for cold reprice. Design. SR, 28, 1984 Merchanted model is commode front between of presented Resp. SR, et al., [1978, 1974]. SR, 1984 Field anders of percentage association of percentage and manapage the pochole, problem. Extend. Extend. Extend. P., and problem and manapage the pochole, problem.

Pavements (cont.)	Permafrost beneath the Beaufort Sea, near Prudhoe Bay.	Tundra and analogous soils. Everett, K.R., et al. [1981,
Guide to managing the pothole problem on roads. Eaton,	Alaska. Selimann, P.V., et al, (1979, p 1481-1493)	p 139-179 ₁ MP 1405
R.A., et al, [1981, 24p] SR 81-21 Potholes, the problem and solutions Eaton, R.A., [1982,	MP 1211 Penetration tests in subsea permafrost, Prudhoe Bay, Alaska	Mechanics of cutting and boring in permafrost. Mellor, M.,
p.160-162 ₁ MP 1504	Blouin, S.E, et al, [1979, 45p.] CR 79-07	[1981, 38p.] CR 81-26 National Chinese Conference on Permafrost, 2nd, 1981.
Full-depth and granular base course design for frost areas.	Determining subsea permafrost characteristics with a cone	Brown, J., et al, [1982, 58p] SR 82-03
Eaton, R.A, et al. (1983, p 27-39) MP 1492 Effect of color and texture on the surface temperature of	penetrometer—Prudhoe Bay, Alaska. Blouin, S.E., et al. 1979, p 3-161 MP 1217	Bibliography on glaciers and permafrost, China, 1938-1979.
asphalt concrete pavements. Berg, R L., et al. (1983).	Subsea permafrost study in the Beaufort Sea, Alaska Sell-	Shen, J, ed, [1982, 44p] SR 82-20 Offshore mechanics and Arctic engineering, symposium,
p 57-61 ₃ MP 1652	mann, P.V., et al. (1979, p 207-213) MP 1591	1983. [1983, 813p] MP 1581
Comparison of two-dimensional domain and boundary inte- gral geothermal models with embankment freeze-thaw field	Bullet penetration in snow Cole, D.M., et al, [1979, 23p] SR 79-25	Proceedings of the Symposium on Applied Glaciology, 2nd,
data. Hromadka, T.V., II, et al., [1983, p.509-513]	Test of snow fortifications Farrell, D.R., (1979, 15p)	1982. (1983, 314p.) MP 2054
MP 1659	SR 79-33	Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, p 543-
Revised procedure for pavement design under seasonal frost conditions. Berg, R., et al, [1983, 129p] SR 83-27	Permafrost beneath the Beaufort Sea. near Prudhoe Bay, Alaska. Sellmann, P.V., et al, (1980, p 35-48)	547 ₁ MP 1660
Hydraulic properties of selected soils Ingersoil, J., et al.	MP 1346	Constraints and approaches in high latitude natural resource
-1985, p.26-35 ₁ MP 1925	Dynamic ice-structure interaction analysis for narrow vertical structures. Eranti, E., et al., [1981, p 472-479]	sampling and research. Slaughter, C.W., et al. (1984, p 41-46) MP 2013
Frost heave of full-depth asphalt concrete pavements. Zom- erman, I., et al, (1985, p 66-76) MP 1927	MP 1456	Vegetation recovery in the Cape Thompson region, Alaska.
erman, I., et al., (1985, p 66-76) MP 1927 Seasonal variations in pavement performance. Johnson.	Deceleration of projectiles in snow. Albert, D.G., et al,	Everett, K.R., et al, [1985, 75p] CR 85-11
T.C., [1985, c21p] MP 2076	(1982, 29p) CR 82-20 Workshop on Ice Penetration Technology, Hanover, NH,	Vertically stable benchmarks: a synthesis of existing informa- tion Gatto, L.W., [1985, p.179-188] MP 2069
Chemical solutions to the chemical problem Minsk, L.D.,	June 12-13, 1984. [1984, 345p] SR 84-33	ice-coring augers for shallow depth sampling. Rand, J.H., et
(1985, p 238-244) MP 2224 Survey of airport pavement distress in cold regions. Vinson,	Penetration of shaped charges into ice. Mellor, M. (1984,	al, (1985, 22p) CR 85-21
T.S., et al, [1986, p 41-50] MP 2002	p.137-148 ₁ MP 1995	Remote sensing of ice and snow (review). Jezek, K.C., [1987, p.51] MP 2429
Construction engineering community: materials and diagnos-	lce penetration tests Garcia, N.B., et al. (1984, p.209- 240) MP 1996	Corps of Engineers research in the Arctic. Smallidge, P.D.,
tics [1986, 54p] SR 86-01 Effects of freeze thaw cycles on granular soils for pavements.	Mechanics of ice cover breakthrough. Kerr, A D, 1984,	et al, [1987, p.81-87] MP 2411
Cole, D.M., et al, [1986, 70p] CR 86-04	p 245-262) MP 1997	Seismic and acoustic wave propagation, working group report.
Deformation of pavements during freeze thaw cycles. John-	Revised guidelines for blasting floating ice Mellor, M., [1986, 37p] SR 86-10	Albert, D.G., et al. (1987, p.253-255) MP 2419 Fox permafrost tunnel: a late Quaternary geologic record in
son, T.C, et al, [1986, 138p] CR 86-13	Second Workshop on ice Penetration Technology, 1986.	central Alaska. Hamilton, T.D., et al, (1988, p.948-969)
Resilient moduli of soil specimens in the frozen and thawed states. Johnson, T.C., et al. (1986, 62p) CR 86-12	[1986, 659p] SR 86-30	MP 2355
Freeze-thaw test to determine the frost susceptibility of soils.	Portable hot water ice drill Tucker, W.B., et al., [1986, p 549-564] MP 2202	Pressure buildup in permafrost pile supports induced by freezeback. Ayorinde, O.A., {1989, p.236-251}
Chamberlain, E.J., [1987, 90p] SR 87-1	Portable hot-water ice drill. Tucker, W.B., et al, (1987,	MP 2467
Pavement using detector—final report. Goldstein, N., et al. [1987, 26p + append.] MP 2263	p.57-64) MP 2236	Use of off-road vehicles and mitigation of effects in Alaska
[1987, 26p + append.] MP 2263 Freeze thaw tests of road and airfield subgrade soils Cole,	Saline ice penetration: a joint CRREL-NSWC test program Cole, D.M., et al, [1987, 34p] SR 87-14	permafrost environments: a review. Slaughter, C.W., et al., [1990, p 63-72] MP 2682
D.M., et al, [1987, 36p] CR 87-02	Penetration of floating ice sheets with cylindrical indentors	Undersaturation in thawed permafrost at the beginning of
Airport pavement distress in cold regions Vinson, T.S., et	Sodhi, D.S., [1989, p.377-382] MP 2485	freezeback. Ayonnde, O.A., [1990, p.317-321]
al, [1987, p.981-1012] MP 2234 Summary of proper cold weather pavement repair methods.	Penetrometers Penetration tests in subsea permafrost, Prudhoe Bay, Alaska.	MP 2582 Permafrost bases
Eaton, R A, (1987, p.1013-1027) MP 2235	Blouin, S.E., et al., [1979, 45p] CR 79-07	Dielectric properties of thawed active layers. Arcone, S.A.,
Rating system for unsurfaced roads to be used in maintenance	Determining subsea permafrost characteristics with a cone	ct al, [1982, p 618-626] MP 1547
management. Eaton, R.A., et al, [1987, p (2)51-(2)62] MP 2313	penetrometer—Prudhoe Bay, Alaska. Blouin, S.E., et al. (1979, p.3-16) MP 1217	Permafrost beneath rivers
New freezing test for determining frost susceptibility.	Compacted-snow runways design and construction guide-	Piles in permafrost for bridge foundations Crory, F. E., et al., (1967, 41p.) MP 1411
Chamberlain, E.J., [1988, p.1045-1050] MP 2368	lines for Antarctica. Russell-Head, D.S, et al, (1989,	Runoff from a small subarctic watershed, Alaska. Chacho,
Hard-surface runways in Antarctica. Mellor, M., (1988, \$7p) SR 88-13	68p ₁ SR 89-10 Performance	E.F., et al, (1983, p.115-120) MP 1654
		Bank recession of the Tanana River, Alaska Gatto, L.W.,
Pavement design for seasonal frost conditions (1988, 12p.) Berg, R.L., MP 2547	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al. (1986, 20p) SR 86-07	(1984, 59p) MP 1746
Pavement design for seasonal frost conditions Berg, R.L., (1988, 12p.) MP 2547 Response of runway pavement to freeze thaw cycles Allen.	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al, t1986, 20p ; SR 86-07 Thawing soil strength measurements for predicting vehicle	(1984, 59p) MP 1746 Permafrost beneath roads
Pavement design for seasonal frost conditions to 1988, 12p.; MP 2547 Response of runway pavement to freeze thaw cycles Allen, W.L., et al, (1989, 31p.; SR 89-02	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al. [1986, 20p] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, SA, [1989, 18p] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522
Pavement design for seasonal frost conditions HP 2547 [1988, 12p.] Response of runway pavement to freeze thaw cycles Allen, W.L., et al, [1989, 31p.] Performance of pavement at Central Wisconsin Airport. Stark, J., et al, [1989, p 92-103] MP 2463	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, SA, [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Relass icebreaker. Tatinclaux, JC., et al., [1989, p]/1-	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road.
Pavement design for seasonal frost conditions [1988, 12p.] MP 2347 Response of runway pavement to freeze thaw cycles Allen, W.L., et al, [1989, 31p.] SR 89-02 Performance of pavement at Central Wisconsin Airport. Stark, J., et al., [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain Allen, W.L.,	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-class icebraker. Tatinclaux, J.C., et al., [1989, p. 1/1-1/18] MP 2751	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] Construction on permafrost at Longycarbyen on Spitsbergen.
Pavement design for seasonal frost conditions (1988, 12p.) MP 2547 Response of runway pavement to freeze thaw cycles Allen, W.L., et al, (1989, 31p.) SR 89-02 Performance of pavement at Central Wisconsin Airport. Stark, J., et al, (1989, p. 92-103) MP 2463 Deep frost effects on a longitudinal edge drain (1989, p. 343-352) MP 2469	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] SR 86-07 Thaving soil strength measurements for predicting vehicle performance Shoop, SA., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-class icebreaker. Tatinclaux, J.C., et al., [1989, p. 1/1-1/18] PERIGLACIAL PROCESSES	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1322 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-62] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Allen, W.L., et al, [1989, 31p.] Performance of pavement at Central Wisconsin Airport. Stark, J., et al, [1989, p. 92-103] Deep frost effects on a longitudinal edge drain [1989, p.343-352] Comparison of insulated and noninsulated pavements Kestler, M., et al, [1989, p.367-378] MP 2469	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-class icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., (1978, p.615-621) MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) MP 1108 Haul Road performance and associated investigations in Alas-
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Allen, W.L., et al, (1989, 31p.) Stark, J., et al, (1989, p. 92-103) Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements (1989, p. 367-378) Radar profiling of Newton Airfield in Jackman, Maine	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.) Thawing soil strength measurements for predicting whicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R. class icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., [1980, p.53-100] MP 1351
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Allen, W.L., et al., [1989, 31p.] Performance of pavement at Central Wisconsin Airport. Stark, J., et al., [1989, p.92-103] MP 2463 Deep frost effects on a longitudinal edge drain [1989, p.343-352] Companison of insulated and noninsulated pavements Kestler, M., et al., [1989, p. 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p.] SR 89-04	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-class icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., (1978, p.615-621) MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete payements. Berg, R.L., et al., (1983),
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Allen, W.L., et al, (1989, 31p.) Stark, J., et al, (1989, p. 92-103) Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements (1989, p. 367-378) Radar profiling of Newton Airfield in Jackman, Maine	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] Logical processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] Periglacial landforms and processes, Kenai Mts., Alaska	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., (1983, p.57-61) MP 1652
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Response of runway pavement at Central SR 89-02 Performance of pavement at Central Wisconsin Airport. Stark, J., et al. [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain [1989, p.343-352] RP 2463 Companison of insulated and noninsulated pavements Kestler, M., et al. [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p] Airport pavement distress in cold regions SR 89-04 Airport pavement distress in cold regions [1989, 142p] State of the art of pavement response monitoring systems for	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Riclass icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes. Kenai Mts. Alaska Bailey, P.K., [1985, 60p.] SR 85-03	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p. 884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., (1983, p.57-61) Interaction of gravel, surface drainage and culverts with per-
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Allen, W.L., et al., (1989, 31p.) SR 89-02 Performance of pavement at Central Wisconsin Airport. Stark, J., et al., (1989, p. 92-103) MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Comparison of insulated and noninsulated pavements stiet, M., et al., (1989, p. 93-7378) MP 2469 Comparison of insulated and noninsulated pavements fuller, M., et al., (1989, p. 9p.) Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, 9p.) Airport pavement distress in cold regions Vinson, T.S., et al., (1989, 142p.) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p.) SR 89-23	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Rogers, T., et al., [1986, 20p.] Rogers, T., et al., [1986, 20p.] Rogers, T., et al., [1986, 1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.) CR 81-27 Periglacial landforms and processes, Kenai Mis., Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., [1980, p.53-100] MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Response of runway pavement at Central SR 89-02 Performance of pavement at Central Wisconsin Airport. Stark, J., et al. [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain [1989, p.343-352] RP 2463 Companison of insulated and noninsulated pavements Kestler, M., et al. [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p] Airport pavement distress in cold regions SR 89-04 Airport pavement distress in cold regions [1989, 142p] State of the art of pavement response monitoring systems for	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.) Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Riclass incebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.) CR 81-27 Periglacial landforms and processes. Kenai Mts., Alaska Bailey, P.K., [1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., [1976, p.484-486] MP 889	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 1652 Interaction of pravel, surface drainage and culverts with permafrost beneath structures Construction and performance of the Hess creek earth fill
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Allen, W.L., et al., (1989, 31p.) Performance of pavement at Central Wisconsin Airport. Stark, J., et al., (1989, p. 92-103) MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Comparison of insulated and noninsulated pavements Kestler, M., et al., (1989, p. 95-3787) Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, 9p.) Airport pavement distress in cold regions Vinson, T.S., et al., (1989, 142p.) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p.) SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R. L., (1989, p.10-19) MP 2564 Determination of frost penetration by soil resistivity measure-	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Rogers, T., et al., [1986, 20p.] Rogers, T., et al., [1986, 20p.] Rogers, T., et al., [1986, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p1/1-1/18] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., (1981, 16p.) CR 81-27 Periglacial landforms and processes, Kenai Mits, Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., [1976, p484-486.] MP 889 20-yr cyclein Greenland ice core records. Hibler, W.D., III.	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., [1980, p.53-100] MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures
Pavement design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Allen, W.L., ct al., [1989, 31p.] Performance of pavement at Central Wisconsin Airport. Stark, J., ct al., [1989, p.92-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Comparison of insulated and noninsulated pavements Kestler, M., et al., [1989, p.97-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, 9p) Airport pavement distress in cold regions al., (1989, 142p) State of the art of pavement response monitoring systems for roads and arrifields, (1989, 401p.) State of the art of pavement response monitoring systems for roads and arrifields, (1989, 401p.) Monitoring pavement performance in seasonal frost areas. Berg, R.L., (1989, p.10-19) MP 2564 Determination of frost penetration by soil resistivity measurements Atkins, R.T., (1989, p.87-100) MP 2565	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.) Rogers, T., et al., [1986, 20p.) Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Riclass incebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes. Deposits in the glacial environment. Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes. Kenai Mts., Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., Ill., et al., [1979, p.481-483] Forecasting ice formation and breakup on Lake Champlain	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] MP 859 Kotzebue hospital—a case study Croty, F.E., [1978,
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wisconsin Airport. Stark, J., et al. [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain MP 2463 Comparison of insulated and noninsulated pavements Kestler, M., et al. [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p] SR 89-04 Airport pavement distress in cold regions Vinson, T.S., et al. [1989, 142p] State of the art of pavement response monitoring systems for roads and airfields [1989, 401p] SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R. L., [1989, p, 10-19] MP 2564 Determination of frost penetration by soil resistivity measurements Akins, R.T., [1989, p 87-100] MP 2565 Data acquisition: first the FERF then the world Knuth.	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.) Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Riclass icebreaker. Tatinclaux, J.C., et al., [1989, p.171-1718] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., (1981, 16p.) CR 81-27 Periglacial landforms and processes, Kenai Mts., Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., (1976, p.484-486), MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p.481-483) MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.) CR 79-26	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., (1978, p.615-621) MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., (1983, p.57-61) MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 1652 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., (1973, p.23-34) MP 859 Kotzebue hospital—a case study Croy, F.E., (1978, p.342-359) MP 1084
Payment design for seasonal frost conditions [1988, 12p.] Response of runway payement to freeze thaw cycles Response Respo	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenai Mits, Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., 111, et al., [1979, p.481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firm.	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] MP 859 Kotzebue hospital—a case study Croty, F.E., [1978,
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wisconsin Airport. Stark, J., et al. [1989, 910] Performance of pavement at Central Wisconsin Airport. Stark, J., et al. [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Romparison of insulated and noninsulated pavements Kestler, M., et al. [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p] SR 89-04 Airport pavement distress in cold regions Vinson, T.S., et al. [1989, 142p] State of the art of pavement response monitoring systems for roads and airfields [1989, 401p] SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R. L., [1989, p.10-19] Determination of frost penetration by soil resistivity measure- ments Akins, R.T., [1989, p.87-100] MP 2565 Data acquisition: first the FERF then the world K.V., [1989, p.136-138] Resilient modulus determination for frost Chamberlain, E.J., et al., [1989, p. 320-333] MP 2569	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.) Rogers, T., et al., [1986, 20p.) Rogers, T., et al., [1986, 1989, 18p.) MP 2749 Comparative model tests in ice of a Canadian Coast Guard Reclass incebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.) MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.) CR 81-27 Periglacial landforms and processes. Kenai Mts., Alaska Bailey, P.K., [1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., Ill., et al., [1979, p.481-483] Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firn Bates, R.E., et al., [1979, 21p.] MP 1551	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] MP 859 Kotzebue hospital—a case study Crory, F.E., (1978, p.342-359) MP 1084 Details behind a typical Alaskan pile foundation Tobiasson, W. et al., (1978, p.891-897) Soviet construction under difficult climatic conditions As-
Payement design for seasonal frost conditions (1988, 12p.) Response of runway payement to freeze thaw cycles Response Resp	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenia Mits, Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., [1976, p.484-486) MP 889 20-yr cycle in Greenland ince core records. Hibler, W.D., III., et al., [1979, p.481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Canadian Bates, R.E., et al., [1979, 21p.] Nittsel fluctuations in antarctic snow and firm Parker, B.C., et al., [1982, p.243-248] Modeling fluctuations of arctic sea ice Hibler, W.D., III., et al., [1982, p.1514-1523] MP 1579	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] MP 859 Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] Soviet construction under difficult chmatic conditions Assur, A., [1980, p 47-53] MP 1345
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wisconsin Airport. Stark, J., et al., [1989, 912-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) MP 2463 Comparison of insulated and noninsulated pavements Kestler, M., et al., [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, pp) SR 89-04 Airport pavement distress in cold regions Vinson, T.S., et al., (1989, 1899, pp) SR 89-23 Monitoring pavement response monitoring systems for roads and airfields (1989, 401p) SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R.L., (1989, p. 10-19) MP 2565 Data acquisition: first the FERF then the world K.V., (1989, p. 136-138) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2567 Case study of potential causes of frost heave. Henry, K.S. SR 90-09	Radial tire and traction aid performance on ice and in snow Rogers, T., et al., [1986, 20p.) Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-class icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes. Kenai Mts. Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Perfodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., [1979, p.481-483] Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firm al., [1982, p.432-248] Modeling fluctuations of arctic sea ice discovered the sea of the process. MP 1551 Modeling fluctuations of arctic sea ice discovered the sea of the process. MP 1579 Permafrost	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., (1978, p.615-621) MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., (1983, p.57-61) Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 1652 Interaction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., (1973, p.23-34) MP 359 Kotzebue hospital—a case study Crory, F.E., (1978, p.342-359) MP 1084 Details behind a typical Alaskan pile foundation Tobiasson, W. et al., (1978, p.891-897) MP 1094 Soviet construction under difficult climatic conditions Assur, A., (1980, p.47-53) MP 1345 U.S. Soviet seminar on building under cold climates and on
Payement design for seasonal frost conditions (1988, 12p.) Response of runway payement to freeze thaw cycles Response Resp	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.1/1-1/18] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenia Mits, Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., [1976, p.484-486) MP 889 20-yr cycle in Greenland ince core records. Hibler, W.D., III., et al., [1979, p.481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Canadian Bates, R.E., et al., [1979, 21p.] Nittsel fluctuations in antarctic snow and firm Parker, B.C., et al., [1982, p.243-248] Modeling fluctuations of arctic sea ice Hibler, W.D., III., et al., [1982, p.1514-1523] MP 1579	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p 57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p 23-34], MP 1659 Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p 891-897] Soviet construction under difficult chimatic conditions Assur, A., [1980, p 47-53] MP 1045 U.S. Soviet seminar on building under cold climates and on permafrost (1980, 365p) Design of foundations in areas of significant frost penetration.
Pavement design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wiscomin Ailen, SR 89-02 Performance of pavement at Central Wiscomin Airport. Stark, J., et al. [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements Kestler, M., et al. [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p) SR 89-04 Airport pavement distress in cold regions (189-10) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p) SR 89-10 State of the art of pavement response monitoring systems for roads and airfields (1989, 401p) SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R L., [1989, p.10-19] Determination of frost penetration by soil resistivity measurements Aktins, R T., [1939, p.87-100) MP 2565 Data acquisition: first the FERF then the world K.V., [1989, p.136-138] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al. (1989, p. 320-333) MP 2569 Case study of potential causes of frost heave. (1990, 35p) Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V C., [1990, 47p.] SR 90-09	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadan Coast Guard Relax icebreaker. Tatinclaux, J.C., et al., [1989, p.171-1718] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., (1981, 16p.) Periglacial landforms and processes, Kenai Mts. Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., (1976, p. 484-486), MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p. 481-483) Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p.) CR 79-26 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., (1982, p.1514-1523) Modeling fluctuations of arctic sea ice. Hibler, W.D., III., et al., (1982, p.1514-1523) MP 1123 Workshop on permafrost-related research and TAPS, (1975, 37p.) Numerical studies for an airborne VLF resistivity survey	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., (1978, p.615-621) MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., (1983, p.57-61) Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 1652 Interaction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., (1973, p.23-34) MP 359 Kotzebue hospital—a case study Crory, F.E., (1978, p.342-359) MP 1084 Details behind a typical Alaskan pile foundation W. et al., (1978, p.891-897) MP 1094 Soviet construction under difficult climatic conditions Assur, A., (1980, p.47-53) SR 30-40 Design of foundations in areas of significant frost penetration. Linell, K.A., et al., (1980, p.118-184) MP 1358
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Response	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p.] Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenai Mis. Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., [1976, p 484-486] MP 889 20-yr cycle in Greenland toe core records. Hibler, W.D., Ill., et al., [1979, p 481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antiarctic snow and firm Parker, B.C., et al., [1982, p 243-248] MP 1551 Modeling fluctuations of arctic sea ice Hibler, W.D., Ill., et al., [1982, p 243-248] MP 1579 Permafrost Workshop on permafrost-related research and TAPS, [1975, 37p.] MW 1127 Numerical studies for an aurborne VLF resistivity survey Arcone, S.A., [1977, 10p.]	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., (1984, 35p) MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p 23-34] Details behind a typical Alaskan pile foundation WP 859 Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation WP 108 Dovet construction under difficult climatic conditions Asur, A., [1980, p 47-53] U.S. Soviet seminar on building under cold climates and on permafrost [1980, 365p] Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction ocdes and the
Pavement design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Allen, W.L., et al., [1989, 31p.) Performance of pavement at Central Wisconsin Airport. Stark, J., et al., [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements Kestler, M., et al., [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p.) SR 89-04 Airport pavement distress in cold regions (1989, 142p.) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p.) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p.) SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R. L., (1989, p.10-19) Determination of frost penetration by soil resistivity measurements Atkins, R. T., (1989, p.87-100) MP 2565 Data acquisition: first the FERF then the world K.V., (1989, p.136-138) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Case study of potential causes of frost heave. (1990, 35p.) Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., (1990, 47p.) SR 90-09 Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., (1990, 47p.) SR 90-12 Penetration Depth of water-filled crevasses of glaciers Weertman, J., (1973, p.139-145) Leebreaking concepts Mellor, M., (1980, 18p.)	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadan Coast Guard Relax icebreaker. Tatinclaux, J.C., et al., [1989, p.171-1718] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., (1981, 16p.) Periglacial landforms and processes, Kenai Mts. Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., (1976, p. 484-486), MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p. 481-483) Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p.) CR 79-26 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., (1982, p.1514-1523) Modeling fluctuations of arctic sea ice. Hibler, W.D., III., et al., (1982, p.1514-1523) MP 1123 Workshop on permafrost-related research and TAPS, (1975, 37p.) Numerical studies for an airborne VLF resistivity survey	Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1980, p.53-100] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p 23-34, MP 859 Kotzebue hospital—a case study Crory, F. E., [1978, p.342-359] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p 891-897] MP 1084 U.S. Soviet seminar on building under cold climates and on permafrost (1980, 365p) SR 80-40 Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Comarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-14
Pavement design for seasonal frost conditions (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wisconsin Airport Stark, J., et al., [1989, 910] Refformance of pavement at Central Wisconsin Airport Stark, J., et al., [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companson of insulated and noninsulated pavements Kestler, M., et al., [1989, p 93-67-378] MP 24671 Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, 9p) Airport pavement distress in cold regions SR 89-04 Airport pavement distress in cold regions Vinson, T.S., et al., (1989, 142p) State of the art of pavement response monitoring systems for roads and airfields [1989, 401p] SR 89-23 Monitoning pavement performance in seasonal frost areas. Berg, R. L., (1989, p.10-19) Determination of frost penetration by soil resistivity measure- ments Atkins, R.T., (1989, p.87-100) MP 2565 Data acquisition: first the FERF then the world Knuth, K.V., [1989, p.136-138] MP 2565 Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p.30-333) MP 2569 Case study of potential causes of frost heave. (1990, 35p) Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., (1990, 47p) SR 90-12 Penetration Depth of water-filled crevasses of glaciers Weertman, J., (1973, p.139-145) KR 80-02	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.171-1718] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenian Mts. Alaska. Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., Ill., et al., [1979, p.481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firm Parker, B.C., et al., [1982, p.243-248] MP 1551 Modeling fluctuations of arctic sea ice. Hibler, W.D., Ill., et al., [1982, p.243-248] MP 1559 Permafrost Workshop on permafrost-related research and TAPS, [1975, 37p.] Numerical studies for an aurborne VLF resistivity survey Arcone, S.A., [1977, 10p.] Dynamics and energetics of parallel motion tools for cutting and boring Mellor, M., [1977, 85p.] CR 77-05 Transverse rotation machines for cutting and boring in perma-	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.57-61] Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34, p.342-359] Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] MP 1345 U.SSoviet seminar on building under cold climates and on permafrost (1980, 365p) Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Comnarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 32-14 Conduction phase change beneath insulated heated or cooled
Pavement design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Allen, W.L., et al., [1989, 31p.) Performance of pavement at Central Wisconsin Airport. Stark, J., et al., [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements Kestler, M., et al., [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p.) SR 89-04 Airport pavement distress in cold regions (1989, 142p.) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p.) State of the art of pavement response monitoring systems for roads and airfields (1989, 401p.) SR 89-23 Monitoring pavement performance in seasonal frost areas. Berg, R. L., (1989, p.10-19) Determination of frost penetration by soil resistivity measurements Atkins, R. T., (1989, p.87-100) MP 2565 Data acquisition: first the FERF then the world K.V., (1989, p.136-138) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Case study of potential causes of frost heave. (1990, 35p.) Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., (1990, 47p.) SR 90-09 Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., (1990, 47p.) SR 90-12 Penetration Depth of water-filled crevasses of glaciers Weertman, J., (1973, p.139-145) Leebreaking concepts Mellor, M., (1980, 18p.)	Radial tire and traction aid performance on ice and in snow Rogers, T., et al, [1986, 20p] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p] MP 2749 Comparative model tests in ice of a Canadian Coast Guard R-class recbreaker. Tatinclaux, J.C., et al, [1989, p1/1-178] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al, [1969, 87p] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., (1981, 16p) SR 85-03 Periglacial landforms and processes. Kenai Mts. Alaska Bailey, P.K., (1985, 60p) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al, (1976, p484-486) MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al, [1979, p481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p] CR 79-26 Nitrate fluctuations in antarctic snow and firm Parker, B.C., et al, [1982, p432-248] MP 1579 Permafrost Workshop on permafrost-related research and TAPS, (1975, 37p) MP 1122 Numerical studies for an airborne VLF resistivity survey Arcone, S.A., [1977, 10p] CR 77-07 Transverse rotation machines for cutting and boring in permafrost Wollor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Wollor, M., (1977, 35p) CR 77-19	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J. et al., (1984, 35p) MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p 23-34, MP 859] Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] MP 1084 Details behind a typical Alaskan pile foundation Tobiasson, MP 1109 Soviet construction under difficult chimatic conditions Assur, A., [1980, p 47-53] MP 1345 U.SSoviet seminar on building under cold climates and on permafrost [1980, 365p) SR 80-40 Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p) CR 82-14 Conduction phase change beneath insulated heated or cooled structures Lunardini, V.J., [1982, 40p) CR 82-22
Payment design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response Respons Response Respons Response Respons Respons Respons Respons Respons Respons Resp	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p.171-1718] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenian Mits, Alaska, Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., [1979, p.481-483] Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firm Parker, B.C., et al., [1982, p.243-248] Modeling fluctuations of arctic sea ice. Hibler, W.D. III., et al., [1982, p.1514-1523] Permafrost Workshop on permafrost-related research and TAPS, [1975, 37p.] Numerical studies for an airborne VLF resistivity survey Arcone, S.A., [1977, 10p.] Dynamics and energetics of parallel motion tools for cutting and boring. Mellor, M., (1977, 35p.) CR 77-05 Dynamics and energetics of parallel motion tools for cutting and boring mellor, M., (1977, 35p.) CR 77-19 Geobotanical alias of the Prudhoe Bay region, Alaska	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1983, p.57-61] Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34, p.342-359] Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] MP 1109 Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] MP 1345 U.SSoviet seminar on building under cold climates and on permafrost [1980, 365p] Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USS Roonstruction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, 750-755] MP 1662
Payement design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Allen, W.L., et al., [1989, 31p.) Performance of pavement at Central Wiscomsin Airport. Stark, J., et al., [1989, p.92-103) MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements Kestler, M., et al., [1989, p.92-103] MP 2471 Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, 9p.) Airport pavement distress in cold regions al., [1989, 142p.) State of the art of pavement response monitoring systems for roads and airfields, [1989, 401p.] State of the art of pavement response monitoring systems for roads and airfields, [1989, 401p.] Monitoring pavement performance in seasonal frost areas. Berg, R.L., (1989, p.10-19) Determination of frost penetration by soil resistivity measurements. Atkins, R.T., (1989, p.87-100) MP 2565 Data acquisition: first the FERF then the world K.V., (1989, p.136-138) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p.320-333) MP 2569 Case study of potential causes of frost heave. (1990, 35p.) Use of soft grade asphalts in airfields and highway pavements in cold feegions. Janoo, V.C., (1990, 47p.) SR 90-09 Penetration Depth of water-filled crevasses of glaciers (1991, 139-145) Lecbreaking concepts Mellor, M., (1980, 18p.) SR 80-02 Shopper's guide to ice penetration Mellor, M., (1984, p.1-35) Sea ice penetration in the Arctic Ocean Wecks, W.F., (1984, p.37-65)	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.) Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadan Coast Guard Relax icebreaker. Tatinclaux, J.C., et al., [1989, p1/1-178]. PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., (1981, 16p.) Periglacial landforms and processes, Kenai Mts. Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., (1976, p. 484-486). MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p. 481-483). MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p.) CR 79-26 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., (1982, p. 432-248). MP 1551 Modeling fluctuations of arctic sea ice. Hibler, W.D., III., et al., (1982, p. 1514-1523). MP 1579 Permafrost Workshop on permafrost-related research and TAPS, (1975, 37p.) Numerical studies for an airborne VLF resistivity survey Arcone, S.A., (1977, 10p.) CR 77-05 Dynamics and energetics of parallel motion tools for cutting and boring Mellor, M., (1977, 35p.). CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 35p.). CR 77-19 Geobotanical atlas of the Prudhoe Bay region, Alaska Walker, D.A., et al., (1980, 69p.).	Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., [1980, p.53-100] MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1980, p.53-100] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J. et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] MP 859 Kotzebue hospital—a case study Crory, FE., [1978, p.342-359] Details behind a typical Alaskan pile foundation W. et al., [1978, p.891-897] Soviet construction under difficult climatic conditions Assur, A., [1980, p.47-53] U.SSoviet seminar on building under cold climates and on permafrost [1980, 365p] Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-14 Conduction phase change beneath insulated heated or cooled structures. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40
Payment design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response Respons Response Respons Response Respons Respons Respons Respons Respons Respons Resp	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Richard Schoop, S.A., [1989, 18p.] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.] CR 81-27 Periglacial landforms and processes, Kenai Mts. Alaska Bailey, P.K., [1985, 60p.] Periodic variations 20-yr oscillation in eastern North American temperature records. Mock., S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., Ill., et al., [1979, p.481-483] MP 1245 Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firm Bates, R.E., et al., [1979, 21p.] My 1245 Modeling fluctuations of arctic sea ice. Hibler, W.D., Ill., et al., [1982, p.243-248] MP 1551 Modeling fluctuations of arctic sea ice. Hibler, W.D., Ill., et al., [1982, p.243-248] MP 1579 Permafrost Workshop on permafrost-related research and TAPS, [1975, 37p.] Numerical studies for an airborne VLF resistivity survey Arcone, S.A., [1977, 10p.] Dynamics and energetics of parallel motion tools for cutting and boring. Mellor, M., [1977, 35p.] CR 77-05 Dynamics and energetics of parallel motion tools for cutting and boring. Impermafrost. Mellor, M., [1977, 36p.] CR 77-07 Transverse rotation machines for cutting and boring in permafrost. Mellor, M., [1977, 36p.] CR 80-14 Environmental engineering, Yukon River-Prudhoe Bay Haul. Road. Brown, J., ed., (1980, 187p.) CR 80-18	Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longyearbyen on Spitsbergen. Tobiasson, W., (1978, p.884-890) Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1980, p.53-100] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., (1973, p 23-34) MP 859 Kotzebue hospital—a case study Croty, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation W. et al., (1978, p 891-897) Soviet construction under difficult climatic conditions Assur, A., (1980, p 47-53) U.S. Soviet seminar on building under cold climates and on permafrost (1980, 365p) SR 80-40 Design of foundations in areas of significant frost penetration. Linell, K.A., et al., (1980, p.118-184) MP 1358 Comarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., (1982, 20p) CR 82-12 Chawing beneath insulated structures on permafrost. Lunardini, V.J., (1982, 40p) CR 82-12 Thawing beneath insulated structures on permafrost. Lunardini, V.J., (1982, 40p) Foundations on permafrost, US and USSR design and practice. Fish, A.M., (1983, p 3-24)
Payment design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway payement to freeze thaw cycles Response of runway payement to freeze thaw cycles Response of runway payement to freeze thaw cycles Allen, W.L., ct al., [1989, 31p.) Performance of payement at Central Wiscomsin Airport. Stark, J., ct al., [1989, p. 92-103) MP 2463 Deep frost effects on a longitudinal edge drain (1989, p. 343-352) Companison of insulated and noninsulated payements Kestler, M., et al., [1989, p. 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., [1989, 9p.) SR 89-04 Airport payement distress in cold regions al., [1989, 142p.) State of the art of payement response monitoring systems for roads and airfields, [1989, 401p.] SR 89-23 Monitoring payement performance in seasonal frost areas. Berg, R.L., [1989, p. 10-19] Determination of frost penetration by soil resistivity measurements Atkins, R.T., [1989, p. 87-100] MP 2565 Data acquisition: first the FERF then the world K.V., [1989, p. 136-138] K.V., [1989, p. 136-138] Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., [1989, p. 320-333], MP 2569 Case study of potential causes of frost heave. [1990, 35p.] Use of soft grade asphalts in airfields and highway payements in cold regions. Janoo, V C., [1990, 47p.] SR 90-09 Shopper's guide to ice penetration Mellor, M., [1984, p. 10-135] Sea ice penetration in the Arctic Ocean Weeks, W.F., [1984, p. 309-318] Surfacing submarines through ice Assur, A., [1984, p. 309-318] Variability of Arctic sea ice drafts Tucker, W.B., et al,	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model tests in ice of a Canadian Coast Guard Relaxive model in the processes. Periodic Active Medican Relaxive model in the processes. Deposits in the glacial environment. Lawson, D.E., (1981, 16p.) Periglacial landforms and processes, Kenai Mts, Alaska Bailey, P.K., (1985, 60p.) SR 85-03 Periodic variations. 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., (1976, p. 484-486). MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III. et al., (1979, p. 481-483). MP 1245 Porceasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p.). CR 79-26 Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., (1982, p. 243-248). Modeling fluctuations of arctic sea ice. Hibler, W.D., III., et al., (1982, p. 1514-1523). MP 1250 Permafrost Workshop on permafrost-related research and TAPS, (1975, 37p.). Numerical studies for an airborne VLF resistivity survey Arcone, S.A., (1977, 10p.). CR 77-05 Dynamics and energetics of parallel motion tools for cutting and boring melmand boring Mellor, M., (1977, 36p.). CR 77-07 Transverse rotation machines for cutting and boring in permafrost. Mellor, M., (1977, 36p.). CR 77-07 Transverse rotation machines for cutting and boring in permafrost. Mellor, M., (1977, 36p.). CR 70-05 The processes. MP 1350	Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p] MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., [1980, p.53-100] MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1980, p.53-100] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J. et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] MP 859 Kotzebue hospital—a case study Crory, FE., [1978, p.342-359] Details behind a typical Alaskan pile foundation W. et al., [1978, p.891-897] Soviet construction under difficult climatic conditions Assur, A., [1980, p.47-53] U.SSoviet seminar on building under cold climates and on permafrost [1980, 365p] Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-14 Conduction phase change beneath insulated heated or cooled structures. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40
Pavement design for seasonal frost conditions [1988, 12p.] Response of runway pavement to freeze thaw cycles Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wisconsin Airport. Stark, J., et al. [1989, 912] Performance of pavement at Central Wisconsin Airport. Stark, J., et al. [1989, p 92-103] MP 2463 Deep frost effects on a longitudinal edge drain [1989, p.343-352] Rompanson of insulated and noninsulated pavements Kestler, M., et al. [1989, p 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R. [1989, 9p] SR 89-04 Airport pavement distress in cold regions SR 89-04 Airport pavement distress in cold regions SR 89-03 Monitoring patiented [1989, 401p] State of the art of pavement response monitoring systems for roads and airfields [1989, 401p] SR 89-23 Monitoring patiented performance in seasonal frost areas Berg, R. L. [1989, p.10-19] Determination of frost penetration by soil resistivity measurements Atkins, R. T., [1989, p.87-100] MP 2565 Data acquisition: first the FERF then the world K.V., [1989, p.136-138] Resilient modulus determination for frost Chamberlain, E.J., et al. [1989, p.320-333] Case study of potential causes of frost heave. [1990, 35p] Use of soft grade asphalts in airfields and highway pavements in cold regions. Janoo, V.C., [1990, 47p] SR 80-02 Shopper's guide to ice penetration Depth of water-filled crevasses of glaciers MP 1044 Lecbreaking concepts Mellor, M., [1980, 18p] Sea ice penetration in the Arctic Ocean MP 1993 Surfacing submarines through ice Assur, A., [1984, p.1-35] Userlaing submarines through ice Assur, A., [1984, p.309-318] Variability of Arctic sea ice drafts Tucker, W. B.	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Richard Science of the Coast Guard Richard	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] MP 1084 Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] MP 1109 Soviet construction under difficult climatic conditions Assur, A., (1980, p.47-53) MP 1345 U.SSoviet seminar on building under cold climates and on permafrost (1980, 365p) SR 80-40 Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Lunardini, V.J., [1982, 40p) CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p) CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p.] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, p.750-755] MP 1662 Posign implications of subsoil thawing Johnson, T.C., et al., (1984, p.45-103) Design and performance of water-retaining embankments in
Payment design for seasonal frost conditions (1988, 12p.) Response of runway payement to freeze thaw cycles Response Resp	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al, [1986, 20p] SR 86-07 Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p] MP 2749 Comparative model tests in ice of a Canadana Coast Guard R-class recbreaker. Tatinclaux, J.C., et al., [1989, p1/1-1/18] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p, MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., (1981, 16p) Periglacial landforms and processes. Kenai Mts. Alaska Bailey, P.K., (1985, 60p) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., (1976, p484-486) MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p481-483) Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p) CR 79-26 Nitrate fluctuations in antarctic snow and firm Parker, B.C., et al., (1982, p432-248) MP 1579 MP 1579 Permafrost Workshop on permafrost-related research and TAPS, (1975, 37p) Numerical studies for an airborne VLF resistivity survey Arcone, S.A., (1977, 10p) Dynamics and energetics of parallel motion tools for cutting and boring Mellor, M., (1977, 35p) Transverse rotation machines for cutting and boring in permafrost Mollor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 36p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 36p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 10p) Geobotanical atlas of the Prudhoe Bay region, Alaska Walker, D.A., et al., (1980, 69p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 195p) CR 78-019 Environmental engineering, Yukon River-Prudhoe Bay Haul Roa	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34, p.342-359] Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] MP 109 Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] MP 1345 U.S. Soviet seminar on building under cold climates and on permafrost (1980, 365p) Design of foundations in areas of significant frost penteration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, p.3-24] Conduction phase change beneath insulated heated or cooled structures Lunardini, V.J., [1983, p.3-24] Conduction phase change beneath insulated heated or cooled structures Lunardini, V.J., [1982, 40p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, p.3-24] Design implications of subsoil thawing Johnson, T.C., et al., (1984, p.45-103) Design and performance of water-retaining embankments in permafrost. Sayles, F.H., [1984, p.31-42] M
Payment design for seasonal frost conditions (1988, 12p.) Response of runway payement to freeze thaw cycles Response Respons Respon	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] Comparative model tests in ice of a Canadian Coast Guard Reclass icebreaker. Tatinclaux, J.C., et al., [1989, p171-1718] MP 2751 PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p.] MP 1180 Periglacial processes Deposits in the glacial environment. Lawson, D.E., [1981, 16p.] Cr. 81-27 Periglacial landforms and processes, Kenian Mts. Alaska. Bailey, P.K., [1985, 60p.] SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records. Mock, S.J., et al., [1976, p.484-486] MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., [1979, p.481-483] Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., [1979, 21p.] Nitrate fluctuations in antarctic snow and firm. Parker, B.C., et al., [1982, p.243-248] MP 1551 MGeling fluctuations of arctic sea ice. Hibler, W.D., III., et al., [1982, p.243-248] MP 1559 Permafrost Workshop on permafrost-related research and TAPS, [1975, 37p.] Numerical studies for an airborne VLF resistivity survey. Arcone, S.A., [1977, 10p.] Dynamics and energetics of parallel motion tools for cutting and boring Mellor, M., [1977, 35p.] GR 77-05 Dynamics and energetics of parallel motion tools for cutting and boring in permafrost. Mellor, M., [1977, 36p.] Geobotanical atlas of the Prudhoe Bay region, Alaska Walker, D.A., et al., [1980, 69p.] Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 187p.) CR 80-21 Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., [1980, 67p.] CR 80-21 Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., [1980, 67p.] CR 80-21	(1984, 59p) MP 1746 Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.57-61] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34] Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] MP 1084 Details behind a typical Alaskan pile foundation Tobiasson, W. et al., [1978, p.891-897] MP 1109 Soviet construction under difficult climatic conditions Assur, A., (1980, p.47-53) MP 1345 U.SSoviet seminar on building under cold climates and on permafrost (1980, 365p) SR 80-40 Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Lunardini, V.J., [1982, 40p) CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p) CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1982, 40p.] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, p.750-755] MP 1662 Posign implications of subsoil thawing Johnson, T.C., et al., (1984, p.45-103) Design and performance of water-retaining embankments in
Payement design for seasonal frost conditions (1988, 12p.) Response of runway payement to freeze thaw cycles Response Res	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al, [1986, 20p] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p] MP 2749 Comparative model tests in ice of a Canadan Coast Guard Relax icebreaker. Tatinclaux, J.C., et al., [1989, p1/1-178] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., (1981, 16p) Periglacial landforms and processes, Kenai Mts. Alaska Bailey, P.K., (1985, 60p) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., (1976, p484-486) MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p481-483) Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p) CR 79-26 Nitrate fluctuations in antarctic snow and firm Parker, B.C., et al., (1982, p432-248) MP 1579 MP 1579 Permafrost Workshop on permafrost-related research and TAPS, (1975, 37p) Numerical studies for an airborne VLF resistivity survey Arcone, S.A., (1977, 10p) Dynamics and energetics of parallel motion tools for cutting and boring mellor, M., (1977, 85p) Transverse rotation machines for cutting and boring in permafrost Mollor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 36p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 36p) CR 77-07 Transverse rotation machines for cutting and Brown, J., (1980, 87p) CR 80-19 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., (1980, 67p) CR 80-19 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., (1980, 67p) CR 76-07 CR 80-19 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., (1980, 67p) CR 76-	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.53-100] MP 1552 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J. et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34, p.342-359] MP 1084 Extensive the hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation W. et al., [1978, p.891-897] Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] U.SSoviet seminar on building under cold climates and on permafrost [1980, 365p] Design of foundations in areas of significant frost penteration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, p.3-24] Conduction phase change beneath insulated heated or cooled structures Lunardini, V.J., [1983, p.3-24] Design and performance of water-retaining embarkments in permafrost. Sayles, F.H., [1984, p.31-42] MP 1662 Foundations in permafrost and seasonal frost Proceedings. (1985, 62p) Crep of a strip footing on ice-rich permafrost. Sayles, F.H.,
Pavement design for seasonal frost conditions (1988, 12p.) (1988, 12p.) Response of runway pavement to freeze thaw cycles Response of runway pavement at Central Wisconsin Ailport. Stark, J., et al., [1989, 31p.) Performance of pavement at Central Wisconsin Airport. Stark, J., et al., [1989, p. 92-103) MP 2463 Deep frost effects on a longitudinal edge drain (1989, p.343-352) Companison of insulated and noninsulated pavements Kestler, M., et al., [1989, p. 367-378] Radar profiling of Newton Airfield in Jackman, Maine Martinson, C.R., (1989, 9p.) SR 89-04 Airport pavement distress in cold regions (1899, 142p.) State of the art of pavement response monitoring systems for roads and airfields, (1989, 401p.) State of the art of pavement response monitoring systems for roads and airfields, (1989, 401p.) SR 89-03 Monitoring pavement performance in seasonal frost areas. Berg, R. L., (1989, p.10-19) Determination of frost penetration by soil resistivity measurements Atkins, R. T., (1989, p. 87-100) MP 2565 Data acquisition: first the FERF then the world K.V., (1989, p. 136-138) Resilient modulus determination for frost conditions. Chamberlain, E.J., et al., (1989, p. 320-333) MP 2569 Case study of potential causes of frost heave. (1990, 35p.) Use of soft grade asphalts in airifields and highway pavements in cold regions. Janoo, V., (1990, 47p.) SR 90-09 Use of soft grade asphalts in airifields and highway pavements in cold regions. Janoo, V., (1990, 47p.) SR 90-12 Penetration Depth of water-filled crevasses of glaciers Weertman, J., (1973, p. 139-145) MP 1941 Icebreaking concepts Mellor, M., (1980, 18p.) Sea ice penetration in the Arctic Ocean Weeks, W.F., (1984, p. 339-318) Surfacing submarines through ice Assur, A., (1984, p. 1993 Surfacing submarines through ice Assur, A., (1984, p. 309-318) Penetration tests Brazil tensile strength tests on sea ice a data report Kovacs, A., et al., (1977, 39p.) SR 79-03 SR 79-04	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al., [1986, 20p.] Thawing soil strength measurements for predicting vehicle performance. Shoop, S.A., [1989, 18p.] MP 2749 Comparative model tests in ice of a Canadian Coast Guard Richard Science of the Coast Guard Richard Science of a Canadian Coast Guard Richard Science of the Coast Guard Richard Richard Science of the Coast Guard Richard Science of the Coast Guard Richard Ric	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p 615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., [1980, p.53-100] MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L., et al., [1980, p.53-100] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p 23-34, MP 1084 Details behind a typical Alaskan pile foundation WP 859 Kotzebue hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation W, et al., [1978, p 891-897] MP 109 Soviet construction under difficult climatic conditions Asur, A., [1980, p 47-53] U.SSoviet seminar on building under cold climates and on permafrost (1980, 365p) Design of foundations in areas of significant frost penetration. Linell, K.A., et al., [1980, p.118-184] Comparative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-14 Conduction phase change beneath insulated heated or cooled structures Lunardini, VJ, (1982, 40p) CR 82-12 Thawing beneath insulated structures on permafrost. Lunardini, VJ, (1982, 40p) CR 82-12 Conduction on permafrost, US and USSR design and practice. Fish, A.M., [1983, p 3-24] MP 1662 Poundations on permafrost US and USSR design and practice. Fish, A.M., [1983, p 3-24] MP 1690 Design and performance of water-retaining embankments in permafrost Sayles, F.H., (1984, p 31-42) MP 1730 Cree of a struptoring on ice-rich permafrost. Sayles, F.H., (1985, p 29-51) MP 1731
Payement design for seasonal frost conditions (1988, 12p.) Response of runway payement to freeze thaw cycles Response Res	Radial tire and traction aid performance on ice and in snow. Rogers, T., et al, [1986, 20p] Thawing soil strength measurements for predicting vehicle performance Shoop, S.A., [1989, 18p] MP 2749 Comparative model tests in ice of a Canadan Coast Guard Relax icebreaker. Tatinclaux, J.C., et al., [1989, p1/1-178] PERIGLACIAL PROCESSES Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p] MP 1180 Periglacial processes Deposits in the glacial environment Lawson, D.E., (1981, 16p) Periglacial landforms and processes, Kenai Mts. Alaska Bailey, P.K., (1985, 60p) SR 85-03 Periodic variations 20-yr oscillation in eastern North American temperature records Mock, S.J., et al., (1976, p484-486) MP 889 20-yr cycle in Greenland ice core records. Hibler, W.D., III., et al., (1979, p481-483) Forecasting ice formation and breakup on Lake Champlain Bates, R.E., et al., (1979, 21p) CR 79-26 Nitrate fluctuations in antarctic snow and firm Parker, B.C., et al., (1982, p432-248) MP 1579 MP 1579 Permafrost Workshop on permafrost-related research and TAPS, (1975, 37p) Numerical studies for an airborne VLF resistivity survey Arcone, S.A., (1977, 10p) Dynamics and energetics of parallel motion tools for cutting and boring mellor, M., (1977, 85p) Transverse rotation machines for cutting and boring in permafrost Mollor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 35p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 36p) CR 77-07 Transverse rotation machines for cutting and boring in permafrost Mellor, M., (1977, 36p) CR 77-07 Transverse rotation machines for cutting and Brown, J., (1980, 87p) CR 80-19 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., (1980, 67p) CR 80-19 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., (1980, 67p) CR 76-07 CR 80-19 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., (1980, 67p) CR 76-	(1984, 59p) Permafrost beneath roads Approach roads, Greenland 1955 program. [1959, 100p) MP 1522 Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al., [1978, p.615-621] MP 1102 Construction on permafrost at Longycarbyen on Spitsbergen. Tobiasson, W., [1978, p.884-890] MP 1108 Haul Road performance and associated investigations in Alaska. Berg, R.L., (1980, p.53-100) MP 1351 Effect of color and texture on the surface temperature of asphalt concrete pavements. Berg, R.L. et al., [1983, p.53-100] MP 1552 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J. et al., [1984, 35p] MP 1652 Interaction of gravel, surface drainage and culverts with permafrost. Brown, J., et al., [1984, 35p] MP 2215 Permafrost beneath structures Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O.W., [1973, p.23-34, p.342-359] MP 1084 Extensive the hospital—a case study Crory, F.E., [1978, p.342-359] Details behind a typical Alaskan pile foundation W. et al., [1978, p.891-897] Soviet construction under difficult chimatic conditions Assur, A., [1980, p.47-53] U.SSoviet seminar on building under cold climates and on permafrost [1980, 365p] Design of foundations in areas of significant frost penteration. Linell, K.A., et al., [1980, p.118-184] MP 1358 Commarative analysis of the USSR construction codes and the US Army technical manual for design of foundations on permafrost. Fish, A.M., [1982, 20p] CR 82-22 Thawing beneath insulated structures on permafrost. Lunardini, V.J., [1983, p.3-24] Conduction phase change beneath insulated heated or cooled structures Lunardini, V.J., [1983, p.3-24] Design and performance of water-retaining embarkments in permafrost. Sayles, F.H., [1984, p.31-42] MP 1662 Foundations in permafrost and seasonal frost Proceedings. (1985, 62p) Crep of a strip footing on ice-rich permafrost. Sayles, F.H.,

Heat transfer characteristics of thermosyphons with inclined evaporator sections. Haynes, F.D., et al, [1986, p.285-	Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data. Neave, K.G., et	Laboratory measurements of soil electric properties between 0.1 and 5 GHz. Delaney, A J., et al. [1982, 12p.] CR 82-10
292) MP 2034 Engineering surveys along the Trans-Alaska Pipeline. God-	al, [1984, p.237-258] MP 1839 Subsea permafrost distribution on the Alaskan shelf Sell-	CR 82-10 Tundra soils on the Arctic Slope of Alaska. Everett, K.R.,
frey, R.N., et al, [1986, 85p.] SR 86-28 Embankment dams on permafrost Sayles, F H., [1987,	mann, P.V., et al, (1984, p.75-82) MP 1852 Bank erosion, vegetation and permafrost, Tanana River near	et al, (1982, p 264-280) MP 1552
109p. ₁ SR 87-11	Fairbanks Gatto, L.W , [1984, 53p] SR 84-21	Improving electric grounding in frozen materials. Delaney, A.J., et al, [1982, 12p] SR 82-13
Heat transfer performance of commercial thermosyphons with inclined evaporator sections Haynes, F.D., et al., 1988, p.275-280; MP 2320	Permafrost, snow cover and vegetation in the USSR Bigl, SR, [1984, 128p] SR 84-36	Deformation and failure of frozen soils and ice due to stresses. Fish, A.M., (1982, p. 419-428) MP 1553
Airfields in Arctic Alaska. Crory, F.E., [1988, p.49-55]	Periglacial landforms and processes, Kenai Mts., Alaska Bailey, P.K., [1985, 60p] SR 85-03	Freezing of soil with surface convection Lunardini, V.J., [1982, p.205-212] MP 1595
Permafrost control	Seismic surveys of shallow subsea permafrost. Neave, K.G., et al., [1985, p.61-65] MP 1954	Understanding the Arctic sea floor for engineering purposes, [1982, 141p.] SR 83-25
Light-colored surfaces reduce thaw penetration in permafrost Berg, R.L., et al. (19/7, p 86-99) MP 954	U.S permafrost delegation visit to China, July 1984 Brown, J., [1985, 137p] SR 85-09	Computer models for two-dimensional steady-state heat conduction. Albert, M.R., et al. [1983, 90p] CR 83-10
Some experiences with tunnel entrances in permafrost Linell, K.A., et al., [1978, p.813-819] MP 1107	Frost jacking forces on H and pipe piles embedded in Fair- banks silt. Johnson, J.B., et al., [1985, p. 125-133]	Guidebook to permafrost and its features, northern Alaska Brown, J., ed, [1983, 230p] MP 1640
Permafrost degradation Construction on permafrost at Longyearbyen on Spitsbergen	MP 1930 Terrain analysis from space shuttle photographs of Tibet	Offshore mechanics and Arctic engineering symposium,
Tobiasson, W., (1978, p 884-890) MP 1108 Permafrost depth	Kreig, R.A., et al. (1986, p 400-409) M1/ 2097 Arctic and subarctic construction: general provisions.	Field dielectric measurements of frozen silt using VHF pulses.
Electrical ground impedance measurements in Alaskan per- mafrost regions Hockstra, P. [1975, 60p]	Lobacz, EF, (1986, 75p) SR 86-17 D.C resistivity along the coast at Prudhoe Bay, Alaska. Sell-	Arcone, S.A., et al, [1984, p.29-37] MP 1774 Conductive backfill for improving electrical grounding in
MP 104/ Permafrost beneath the Beaufort Sea, near Prudhoe Bay,	mann, P.V., et al. (1988, p.988-993) MP 2366	frozen soils. Sellmann, P.V., et al, (1984, 19p.) SR 84-17
Alaska Sellmann, PV, et al, [1979, p 1481-1493] MP 1211	PERMAFROST HEAT BALANCE Effects of permafrost on engineering. Stearns, S.R., 1966,	Workshop on Permafrost Geophysics, Golden, Colorado, 23- 24 October 1984. Brown, J., ed, (1985, 113p.)
Distribution and features of bottom sediments in Alaskan coastal waters. Sellmann, P.V., [1980, 50p]	77p ₁ M I-A2 Permafrost heat balance	SR 85-05 Dielectric studies of permafrost Arcone, SA., et al., [1985.
SR 80-15	Cylindrical phase change approximation with effective thermal diffusivity. Lunardini, V.J., (1981, p.147-154)	p 3-5; MP 1951 Galvanic methods for mapping resistive seabed features
Use of piling in frozen ground Crory, F.E., [1980, 21 p.] MP 1407	MP 1438 Permafrost heat transfer	Sellmann, P.V., et al, (1985, p.91-92) MP 1955 Strain rate effect on the tensile strength of frozen silt. Zhu,
CO2 effect on permafrost terrain Brown, J, et al. [1982, 30p.] MP 1546	Evaluation of methods for calculating soil thermal conductivi- ty. Farouki, O. [1972, 90p.] CR 82-08	Y., ct al, (1985, p.153-157) MP 1898
Seismic velocities and subsea permafrost in the Beaufort Sea, Alaska. Neave, K.G., et al. (1983, p.894-898)	Thermal properties of soils. Farouki, O.T., (1981, 136p) M 81-01	International Offshore Mechanics and Arctic Engineering Symposium, 1987. (1987, 4 vols.) MP 2189
MP 1665 Subsea permafrost distribution on the Alaskan shelf Sell-	Conduction phase change beneath insulated heated or cooled	Preparation of geophysical borehole site with ground ice, Fairbanks, AK Delaney, A J., [1987, 15p.]
mann, PV, ct al, (1984, p 75-82) MP 1852 PERMAFROST DISTRIBUTION	Computer models for two-dimensional steady-state heat con-	SR 87-07 Mechanical and physical properties of soils in cold regions
Effects of permafrost on engineering. Stearns, S.R., 1966, 77p. M I-A2	duction. Albert, M.R., et al. (1983, 90p.) CR 83-10 Permafrost hydrology	Chamberlain, E.J., (1987, p 155-161) MP 2415 Permafrost preservation
Permafrost distribution Permafrost and vegetation maps from ERTS imagery And-	Morphology of the North Slope Walker, H.J., [1973, p 49- 52] MP 1004	Piles in permafrost for bridge foundations Crory, F.E., et al., [1967, 41p.] MP 1411
erson, D.M., et al, [1973, 75p] MP 1003 ERTS mapping of Aretic and subarctic environments. And-	Geophysical methods for hydrological investigations in per- mafrost regions. Hoekstra, P., [1976, p 75-90]	PERMAPROST PRESERVATION
erson, D.M., et al., [1974, 128p.] MP 1047 Delineation and engineering characteristics of permafrost	MP 932 Colloquium on Water in Planetary Regoliths, Hanover, N.H.	Foundations of structures in cold regions Sanger, F.J., M III-C4
beneath the Beaufort Sea Sellmann, P V, et al., r1977, p 385-395, MP 1074	Oct 5-7, 1976. [1977, 161p] MP 911 Mars soil-water analyzer: instrument description and status	Permafrost preservation Construction and performance of the Hess creek earth fill
Evaluation of electrical equipment for measuring permafrost distribution. Sellmann, P.V. et al. (1977, p 39-42)	Anderson, D.M., et al., (1977, p.149-158) MP 912 Fresh water supply for an Alaskan village McFadden, T., et	dam, Livengood, Alaska Simoni, O W., (1973, p 23-34) MP 859
MP 925 Climatic and dendroclimatic indices in the discontinuous per-	al, (1978, 18p) SR 78-07 Proceedings of the second planetary water and polar pro-	Thermoinsulating media within embankments on perennially frozen soil. Berg, R.L., [1976, 161p.] SR 76-03
mafrost zone of the Central Alaskan Uplands Haugen, R.K., et al, (1978, p 392-398) MP 1099	cesses colloquium, 1978. [1978, 209p] MP 1193	Ecological and environmental consequences of off-road traf- fic in northern regions Brown, J., [1976, p.40-53]
Shallow electromagnetic geophysical investigations of perma-	Case study: fresh water supply for Point Hope, Alaska McFadden, T, et al, 1979, p 1029-1040, MP 1222	MP 1383 Road construction and maintenance problems in central Alas-
frost. Arcone, S.A., et al., [1978, p 501-507] MP 1101 Physical and thermal disturbance and protection of name	Design of foundations in areas of significant frost penetration Lincil, K.A., et al. (1980, p 118-184) MP 1358	ka Clark, EF, et al. (1976, 36p) SR 76-08 Physical and thermal disturbance and protection of perma-
Physical and thermal disturbance and protection of perma- frost. Brown, J., et al. (1979, 42p.) SR 79-05	Hydrology and climatology of a drainage basin near Fair- banks, Alaska Haugen, RK, et al. (1982, 34p)	frost. Brown, J., et al. [1979, 42p] SR 79-05 Workshop on Environmental Protection of Permafrost Ter-
Determining subsea permafrost characteristics with a cone penetrometer—Prudhoe Bay, Alaska Blouin, S. E., et al, 1979, p.3-16; MP 1217	CR 82-26 Ice-cored mounds at Sukakpak Mountain, Brooks Range	rain. Brown, J., et al. (1980, p.30-36) MP 1314 Snow pads for pipeline construction in Alaska Johnson,
Electromagnetic surveys of permafrost Arcone, SA, et al,	Brown, J., et al. (1983, p. 91-96) MP 1653 Ground ice in perennially frozen sediments, northern Alaska	PR, et al, (1980, 28p) CR 80-17
(1979, 24p) CR 79-23 Distribution and properties of subsea permafrost of the Beau-	Lawson, D.E., [1983, p 695-700] MP 1661 Water migration due to a temperature gradient in frozen soil	Construction of foundations in permafrost Linell, K.A., et al, [1980, 310p] SR 80-34
fort Sea Sellmann, PV, et al. (1979, p.93-115) MP 1287	Oliphant, J L., et al. (1983, p.951-956) MP 1666 Permafrost Benson, C., et al. (1986, p.99-106)	Sublimation and its control in the CRREL permafrost tunnel. Johansen, N 1, 1981, 12p ₁ SR 81-08
Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al. (1979, p.135-14)	MP 2156 Permafrost indicators	Surface disturbance and protection during economic development of the North. Brown, J., et al., [1981, 88p]
Features of permafrost beneath the Beaufort Sca Sellmann.	Airborne E-phase resistivity surveys of permafrost Sell- mann, P.V., et al. (1974, p 67-71) MP 1046	Response of permafrost to disturbance Lawson, D.E.
P.V., et al. (1980, p.103-110) MP 1344 Distribution and features of bottom sediments in Alaskan	Geophysical methods for hydrological investigations in per- mafrost regions Hockstra, P., 1976, p 75-90	(1986, p 1-7) MP 2165 Permafrost samplers
coastal waters Sellmann, PV, [1980, 50p] SR 80-15	MP 932 Selected examples of radiohm resistivity surveys for geotech-	Subsurface explorations in permafrost areas Cass, J.R., Jr., [1959, p 31-41] MP 885
Design of foundations in areas of significant frost penetration Linell, K A, et al. [1980, p.118-184] MP 1358	nical exploration Hoekstra, P. et al. [1977, 16p] SR 77-01	Drilling and coring of frozen ground in northern Alaska, Spring 1979 Lawson, D.E., et al. (1980, 14p)
Characteristics of permafrost beneath the Beaufort Sea Sell- mann, PV, et al. [1981, p 125-157] MP 1428	Permafrost physics	SR 80-12 PERMAFROST STRUCTURE
Delineation and engineering of subsea permafrost, Beaufort Sea. Sellmann, P.V., et al. (1981, p 137-156)	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea. Seilmann, P.V., et al., [1977,	Effects of permafrost on engineering Stearns, S.R., 1966,
MP 1600 Drainage facilities of airfields and helipotts in cold regions	p 385-395; MP 1074 Dynamic C. F. 1073 - 282 313 in fine-grained permafrost	Characteristics of the cold regions Gerdel, R W, [1969,
Lobacz, E.F., et al. [1981, 56p] SR 81-22 Surf e disturbance and protection during economic develop-	Blouin, S.E., (1977, p.282-313) MP 963 Shallow electromagnetic geophysical investigations of perma-	51p ₁ M I-A Permafrost structure
ment of the North Brown, J, et al. (1981, 88p.) MP 1467	frost. Arcone, S.A. et al. [1978, p 501-507] MP 1101	Morphology of the North Slope. Walker, H J, (1973, p 49- 52) MP 1004
Ice-cored mounds at Sukakpak Mountain, Brooks Range Brown, J., et al. [1983, p.91-96] MP 1653	Remote sensing of massive ice in permafrost along pipelines in Alaska Kovaes, A, et al. [1979, p 268-279]	Electrical resistivity profile of permafrost Hockstra, P. [1974, p.28-34] Hockstra, P. MP 1045
Relationships between estimated mean annual air and perma- frost temperatures in North-Central Alaska Haugen,	MP 1175 Geophysics in the study of permafrost Scott, W.J., et al.	Computer modeling of terrain modifications in the arctic and subarctic Outcalt, S.1, et al., [1977, p 24-32]
RK, et al. (1983, p. 462-467) MP 1658 Seismic velocities and subsea permafrost in the Beaufort Sea.	[1979, p 93-115] MP 1266 Electromagnetic survey in permafrost Sellmann, P V, et al.	MP 971 Remote sensing of massive ice in permafrost along pipelines
Alaska Neave, K.G., et al. (1983, p.894-898) MP 1665	[1979, 7p] SR 79-14 Heat transfer in cold climates. Lunardini, VJ. [1981.	in Alaska Kovacs. A , et al. [1979. p 268-279] MP 1175
Potential responses of permafrost to climatic warming Goodwin, CW, et al. [1984, p.92-105] MP 1710	731p j MP 1435 VHF electrical properties of frozen ground near Point Barrow.	Electromagnetic survey in permafrost Sollmann, P.V., et al., [1979, 7p.] SR 79-14
Frost jacking forces on H and pipe piles embedded in I airbanks silt Johnson, J B. (1984, 42p + appends)	Alaska Arcone, S.A., et al., [1981, 18p] CR 81-13 Measurements of ground resistivity Arcone, S.A., [1982,	Drilling and coring of frozen ground in northern Alaska,
MP 2271	p 92-110; MP-1513	Spring 1979 Lawson, D.E., et al. (1980, 14p.) SR 80-12

Permafrost temperature	Phase change around insulated buried pipes: quasi-steady	Static and dynamic ice loads on the Yamachiche Bend lightpi-
Unfrozen water contents of six antarctic soil materials And-	method. Lunardini, V.J., (1981, p.201-207)	er, 1984-86. Frederking, R, et al, [1986, p 115-126]
erson, D M., et al, (1989, p 353-366) MP 2470	MP 1496 Heat conduction with phase changes. Lunardini, V.J.,	MP 2389 Ice force measurements on a bridge pier in a small river.
Permafrost thermal properties Approach roads, Greenland 1955 program. (1959, 100p)	(1981, 14p) CR 81-25	Sodhi, D.S., et al., [1989, p 1419-1427] MP 2764
MP 1522	Freezing of soil with surface convection Lunardini, V.J.	Pile driving
Subsea permafrost study in the Beaufort Sea, Alaska. Sell- mann, P.V., et al, (1979, p.207-213) MP 1591	(1982, p 205-212) MP 1595 Solution of two-dimensional freezing and thawing problems	Piles in permafrost for bridge foundations Crory, F.E., et al. (1967, 41p) MP 1411
Crude oil spills on subarctic permafrost in interior Alaska.	O'Neill, K., (1983, p.653-658) MP 1584	Study of piles installed in polar snow Kovacs, A., 11976,
Johnson, L.A., et al, [1980, 128p] MP 1310	Approximate phase change solutions for insulated buried cylinders Lunardini, V J., [1983, p.25-32] MP 1593	132p ₁ CR 76-23 Stake driving tools a preliminary survey. Kovacs, A., et al,
Phase change around a circular pipe. Lunardini, V.J., 1980, 18p.; CR 80-27	Boundary integral equation solution for phase change prob-	(1977, 43p) SR 77-13
Piling in frozen ground Crory, F E., (1982, p 112-124)	lems O'Neill, K., [1983, p.1825-1850] MP 2093	Use of piling in frozen ground. Crory, F.E., (1980, 21 p) MP 1407
MP 1722 Modifications of permafrost, East Oumalik, Alaska. Law-	Two-dimensional heat conduction phase change. Albert, M.R, et al, [1983, p 85-110] MP 2161	Pile extraction
son, D.E., (1982, 33p) CR 82-36	Fixed mesh finite element solution for cartesian two-dimen-	Ice engineering. O'Steen, D.A., (1980, p.41-47)
Freezing and thawing: heat balance integral approximations. Lunardini, V.J., e1983, p.30-37; MP 1597	sional phase change. O'Neill, K, [1983, p 436-441] MP 1702	MP 1602 Frost jacking forces on H and pipe piles embedded in Fair-
Lunardini, V.J., (1983, p.30-37) MP 1597 Approximate solution to conduction freezing with density	Modeling two-dimensional freezing Albert, M.R., [1984,	banks silt Johnson, J.B., (1984, 42p. + appends.)
variation. Lunardim, V.J., [1983, p 43-45] MP 1598	45p) CR 84-10	MP 2271 Frost heave forces on piling Esch. D C., et al. (1985, 2p.)
Relationships between estimated mean annual air and perma- frost temperatures in North-Central Alaska. Haugen,	Computation of porous media natural convection flow and phase change. O'Neill, K., et al, [1984, p 213-229]	MP 1732
R.K., et al, (1983, p 462-467) MP 1658	MP 1895	Uplifting forces exerted by adfrozen ice on marine piles Christensen, FT, et al., (1985, p.529-542) MP 1905
Ground ice in perennially frozen sediments, northern Alaska Lawson, D.E., (1983, p 695-700) MP 1661	Freezing of soil with phase change occurring over a finite temperature zone Lunardini, V.J., (1985, p 38-46)	Christensen, FT, et al, [1985, p.529-542] MP 1905 Frost jacking forces on H and pipe piles embedded in Fair-
Erosion of perennially frozen streambanks Lawson, D.E.	MP 1854	banks silt. Johnson, J.B., et al, (1985, p.125-133) MP 1930
(1983, 22p.) CR 83-29	Transient two-dimensional phase change. Albert, MR., et al, [1985, p.229-243] MP 2162	Real-time measurements of uplifting ice forces Zabilansky,
Potential responses of permafrost to climatic warming Goodwin, C.W, et al. (1984, p 92-105) MP 1710	Heat conduction phase change problems Albert, M.R., et al.	L.J., (1985, p.253-259) MP 2092
Status of numerical models for heat and mass transfer in frost-	[1986, p.591-607] MP 2159	Frost heave forces on H and pipe foundation piles Buska, JS, et al, (1988, p 1039-1044) MP 2367
susceptible soils. Berg, R L., [1984, p 67-71] MP 1851	Tracking freezing front movement using boundary element method Hromadka, T.V., II, [1987, 58p.) SR 87-08	Model study of uplifting ice forces the instrumentation.
Subsea permafrost distribution on the Alaskan shelf. Sell-	XYFREZ.4 user's manual. O'Neill, K., (1987, 55p.)	Zabilansky, L.J., (1988, p 745-748) MP 2487
mann, P.V., et al. (1984, p.75-82) MP 1852 Prototype deilt for core sampling fine-grained perennally	SR 87-28 Heat conduction with freezing or thawing. Lunardini, V.J.	Pile load tests Use of piling in frozen ground Crory, F.E., (1980, 21 p)
Prototype drill for core sampling fine-grained perennially frozen ground. Brockett, B.E., et al. [1985, 29p]	(1988, 329p.) M 88-01	MP 1407
CR 85-01	Phase change heat transfer program for microcomputers Buzzell, G.M., et al, [1988, p.645-650] MP 2383	Real-time measurements of uplifting ice forces Zabilansky, L.J., (1985, p 253-259) MP 2092
Arctic thermal design. Lunardini, V.J., (1985, p 70-75) MP 2167	Photoelasticity	Model study of uplifting ice forces: the instrumentation.
U.S. permafrost delegation visit to China, July 1984 Brown,	Photoelastic instrumentation—principles and techniques.	Zabilanský, L.J., [1988, p 745-748] MP 2487 Pile structures
J., (1985, 137p.) SR 85-09 Review of analytical methods for ground thermal regime cal-	Roberts, A., et al. (1979, 153p) SR 79-13 Photogrammetry	Ice forces on vertical piles Nevel, D.E., et al., [1972, p.104-
culations Lunardini, V.J., [1985, p.204-257]	Remote measurement of sea ice drift. Hibler, W.D., III, et	114 ₁ MP 1024
MP 1922 Heat transfer characteristics of thermosyphons with inclined	al, (1975, p 541-554) MP 849	Investigation of ice forces on vertical structures. Hirayama, K, et al. (1974, 153p) MP 1041
evaporator sections Haynes. F.D., et al, [1986, p.285-	Photography Lee thickness distribution across the Atlantic sector of the	Ice forces on model structures Zabilansky, L.J., et al,
292 ₁ MP 2034 Monitoring seasonal changes in seafloor temperature and	Antarctic Ocean in midwinter. Wadhams, P, et al. (1987,	(1975, p 400-407) MP 863 Ice forces on simulated structures Zabilansky, L J., et al,
salinity Sellmann, P.V., et al. [1986, p 110-114]	p.14,535-14,552; MP 2314 Photointerpretation	(1975, p.387-396) MP 864
MP 2147	Antarctic sea ice dynamics and its possible climatic effects	lce forces on vertical piles Nevel, D E., et al, (1977, 9p.) CR 77-10
Natural ground temperatures in upland bedrock terrain, in- terior Alaska. Collins, C M, et al. (1988, p 56-60)	Ackley, S.F., et al. (1976, p 53-76) MP 1378 Air photo interpretation of a small ice jam DenHartog, S.L.	ice engineering. O'Steen, D.A., r1980, p 41-471
MP 2360	(1977, p 705-719) MP 935	MP 1602 Construction of foundations in permafrost Linell, K.A., et
Seasonal variations in resistivity and temperature in discon- tinuous permafrost Delaney, A.J., et al. (1988, p. 927-	Aerial photointerpretation of a small ice jam DenHartog, SL, [1977, 17p] SR 77-32	al, (1980, 310p) SR 80-34
932 ₁ MP 2365	Aerial photography of Cape Cod shoreline changes Gatto.	Piling in frozen ground Crory, F.E., [1982, p.112-124] MP 1722
Thermal stabilization of permafrost with thermosyphons Zarling, J.P., et al. (1990, p.323-328) MP 2583	L.W., (1978, 49p) CR 78-17	Dynamic ice-structure interaction during continuous crush-
Permafrost thickness	River channel characteristics at selected ice jam sites in Vermont Gatto, LW, (1978, 52p) CR 78-25	ing Määttänen, M. [1983, 48p] CR 83-05
Electrical ground impedance measurements in Alaskan per- mafrost regions Hockstra, P. (1975, 60p)	Historical shoreline changes along the outer coast of Cape	Foundations in permafrost and seasonal frost, Proceedings (1985, 62p) MP 1730
MP 1049	Cod. Gatto, L.W., (1979, p 69-90) MP 1502 Aerial photointerpretation for shoreline changes Gatto.	Frost heave forces on piling Esch, D.C., et al, (1985, 2p)
Permeability Consolidating dredged material by freezing and thawing	L.W., (1980, p 167-170) MP 1503	MP 1732 Model study of ice forces on a single pile. Zabilansky, L.J.,
Chamberlain, E.J. (1977, 94p) MP 978	Wildlife habitat mapping in Lac qui Parle, Minnesota. Merry, C.J., et al., [1984, p 205-208] MP 2085	(1986, p.77-87) MP 2388
Freeze thaw effect on the permeability and structure of soils Chamberlain, E.J., et al., (1978, p. 31-44) MP 1080	Evaluation of SPOT HRV simulation data for Corps of Engi-	Pressure buildup in permafrost pile supports induced by freezeback Ayorinde, O A, [1989, p 236-251]
Chamberlain, E.J., et al., (1978, p. 31-44) MP 1080 Freeze thaw effect on the permeability and structure of soils	neers applications McKim, H.L., et al. (1985, p.61-71) MP 2184	MP 2467
Chamberlain, E.J., et al. (1979, p.73-92) MP 1225	Photomacrographs	Piles Application of ice engineering and research to Great Lakes
Soil infiltration on land treatment sites. Abele, G, et al. [1980, 41p] SR 80-36	Photomacrography of artifacts in transparent materials	problems Freitag, D.R., (1972, p 131-138)
Liquid distribution and the dielectric constant of wet snow	Marshall, SJ, [1976, 31p] CR 76-40 Photosynthesis	MP 1615 Foundation technology in cold regions Quinn, WF,
Colbeck, S.C., (1980, p.21-39) MP 1349 Soil hydraulic conductivity and moisture retention features	Case for comparison and standardization of carbon dioxide	Foundation technology in cold regions Quinn, WF, (1987, p 305-310) MP 2425
Ingersoil, J. (1981, 11p) SR 81-02	reference gases Kelley, JJ, et al. (1973, p 163-181) MP 964	Measurement of frost heave forces on H-piles and pipe piles
Evaluation of procedures for determining selected aquifer parameters Daly, C.J., (1982, 104p) CR 82-41	Physical properties	Johnson, J B., et al. (1988, 49p) CR 88-21 Pingos
Effect of freeze-thaw cycles on soils Chamberlain, E, et al.	Physical and structural characteristics of sea ice in McMurdo	On the origin of pingos—a comment Mackay, JR, (1976,
(1990, p 145-155) MP 2678	Sound Gow, A J. et al. (1981, p 94-95) MP 1542 Simulation of planar instabilities during solidification. Sul-	p.295-298 ₁ MP 916 Pipe flow
Petroleum industry Design considerations for airfields in NPRA Crory, F.E. et	livan, J M, Jr., et al. (1987, p.81-111) MP 2585	Ice bands in turbul a pipe flow Ashton, G.D., (1984,
al, [1978, p 441-458] MP 1086	Physiological effects Winter habitats of salmon and trout Calkins, D J. (1989.	7p j MP 2087
Phase transformations Compressibility characteristics of compacted snow. Abele.	9pj SR 89-34	Pipe laying Subsea trenching in the Arctic Mellor, M., (1981, 31p.)
G, ct al, [1976, 47p] CR 76-21	Piers	CR 81-17
Low temperature phase changes in moist, briny clays. Anderson, D.M., et al. (1980, p 139-144) MP 1330	Arching of model ice floes at bridge piers. Calkins, D.J., (1978, p.495-507) MP 1134	Pipeline freezing Freeze damage prevention in utility distribution lines
Phase change around a circular pipe Lunardini. V J.	Ice forces on the Yukon River bridge 1978 breakup John-	McFadden, T. (1977, p 221-231) MP 929
(1980, 18p ₁) CR 80-27	son, P.R., et al. (1979, 40p) MP 1304 lee action on pairs of cylindrical and conical structures	Freeze damage protection for utility lines McFadden, T, 1977, p 12-16; MP 953
Heat transfer in cold climates Lunardini, V J., [1981, 731p] MP 1435	Kato, K. et al. [1983, 35p.] CR 83-25	Cold climate utilities delivery design manual Smith, DW.
Some approaches to modeling phase change in freezing soils	Ice forces on a bridge pier, Ottauquechee River, Vermont	et al. (1979, c300 leaves; MP 1373
Hromadka, TV. H. et al. (1981, p 137-145) MP 1437	Sodhi, D.S., et al. (1983, 6p.) CR 83-32 Ice forces on inclined model bridge piers Haynes, F.D., et	Freezing in a pipe with turbulent flow. Albert, MR. et al. (1983, p. 102-112) MP 1893
Cylindrical phase change approximation with effective ther-	al. (1984, p.1167-1173) MP 2407	Ice bands in turbulent pipe flow Ashton, G D., (1984,
mal diffusivity	Vibration analysis of the Yamachiche lightpier Haynes, F.D., [1986, p.238-241] MP 1989	7p.; MP 2087 Pipeline insulation
Deforming finite elements with and without phase change	Vibration analysis of the Yamachiche Lightpier Haynes.	Freeze damage protection for utility lines. McFadden, T.
Lynch, D.R., et al. (1981, p.81-96) MP 1493 Phase change around a circular cylinder Lunardim, V.J.	F.D., [1986, p.9.18] MP 2253 Ice forces on bridge piers Haynes, F.D., [1986, p.83-101]	(1977, p.12-16) MP 953 Specialized pipeline equipment Hanamoto, B. (1978,
1981, p 598-600; MP 1507	MP 2160	300 1 SR 78-05

Phase change around insulated buried pipes, quasi-steady	Plant physiology	Pollution
method. Lunardini, V.J., [1981, p.201-207] MP 1496	Seasonal variations in plant nutrition in tundra soils. McCown, B.H., et al. (1971, p.55-57) MP 904	Mercury contamination of water samples Cragin, JH, (1979, p 313-319) MP 1270
Pipeline supports	McCown, B.H., et al, (1971, p.55-57) MP 904 Effects of inundation on six varieties of turfgrass. Erbisch.	Health aspects of land treatment Reed, S.C. [1979, 43p]
Movement study of the trans-Alaska pipeline at selected sites.	FH, et al, [1982, 25p] SR 82-12	MP 1389
Ueda, H.T, et al, [1981, 32p] CR 81-04	U.S. tundra biome publication list Brown, J. et al. (1983, 29p.) SR 83-29	Sensitivity of vegetation and soil flora to seawater spills, Alas- ka. Simmons, C.L., et al, (1983, 35p) CR 83-24
Performance of a thermosyphon with an inclined evaporator and vertical condenser Zarling, J.P., et al. [1984, p 64-	29p. ₁ SR 83-29 Growth and flowering of tussocks in northcentral Alaska	Freezing effect on waste contaminants Iskandar, IK,
68 ₁ MP 1677	Haugen, R K., et al. (1984, p 10-11) MP 1950	(1986, 33p) SR 86-19
Frost jacking forces on H and pipe piles embedded in Fair-	Effect and disposition of TNT in a terrestrial plant Palazzo. A J., et al., 1986, p 49-521 MP 2098	Low temperature effects on organophosphonates Britton, K.B., [1986, 47 refs.] SR 86-38
banks silt. Johnson, J.B., et al. [1985, p 125-133] MP 1930	A J., et al. (1986, p 49-52) MP 2098 TNT in a terrestrial plant Palazzo, A.J., et al. (1986, 17p.)	Losses of explosives residues on disposable membrane filters.
Frost heave forces on H and pipe foundation piles Buska,	CR 86-15	Je.,, ins, T.F., et al, [1987, 25p.] SR 87-02
J.S., et al, (1988, p 1039-1044) MP 2367	Effects of temperature and species on TNT injury to plants. Palazzo, A.J., et al., 1988, 703 SR 88-16	Decontamination of chemical agents on the winter battlefield. Parker, L.V., (1988, 48p) CR 88-07
Pipelines Workshop on permafrost-related research and TAPS. (1975.	Palazzo, AJ, et al, [1988, 7p] SR 88-16 Plant tissues	Comparison of EPA and USATHAMA detection capability
37p ₁ MP 1122	Aquatic plant growth in relation to temperature and unfrozen	estimators Grant, C L., et al. [1988, p 405-418] MP 2455
Utility distribution practices in northern Europe McFad-	water content Palazzo, AJ, et al. (1984, 8p) CR 84-14	Using bleach mixture for decontamination at low tempera-
den, T., et al, (1977, p 70-95) MP 928 Haines-Fairbanks pipeline, design, construction and opera-	Plants (botany)	tures Walsh, M.E., et al., (1989, 13p.) SR 89-33
tion. Garfield, D.E., et al., [1977, 20p] SR 77-04	Revegetation in arctic and subarctic North America—a litera-	CBR operations in cold weather a bibliography, Vol 1 Car- lon, H.R., et al., 1989, 88p.; MP 2574
Revegetation and erosion control of the Trans-Alaska Pipe-	ture review Johnson, L.A., et al. [1976, 32p] CR 76-15	lon, H R, et al, (1989, 88p.) MP 2574 Polymers
Line Johnson, L. A., et al. (1977, 36p) SR 77-08 Canol Pipeline Project, a historical review. Ueda, H.T., et al.	Urban waste as a source of heavy metals in land treatment	Ice releasing block-copolymer coatings Jellinek, H H G, et
(1977, 32p) SR 77-34	Iskandar, I K. (1976, p 417-432) MP 977	al, (1978, p 544-551) MP 1141
Large mobile drilling rigs used along the Alaska pipeline.	Effects of wastewater application on forage grasses Palazzo, A.J., (1976, 8p.) CR 76-39	Seeking low ice adhesion Sayward, J.M., [1979, 83p.] SR 79-11
Sellmann, P.V, et al, (1978, 23p) SR 78-04	A J., (1976, 8p) Reclamation of acidic dredge soils with sewage sludge and	Adhesion of ice to polymers and other surfaces Itagaki, K.,
Specialized pipeline equipment Hanamoto, B., (1978, 30p) SR 78-05	lime Palazzo, A J, [1977, 24p] SR 77-19	(1983, p 241-252) MP 1580
Construction equipment problems and procedures. Alaska	Effects of wastewater on the growth and chemical composi-	Cold-temperature characterization of polymer concrete. Bigl, S R, (1986, 46p) MP 2521
pipeline project. Hanamoto, B, (1978, 14p) SR 78-11	tion of forages. Palazzo, A J. (1977, p 171-180) MP 975	Wetting of polystyrene and urethane roof insulations.
Undersea pipelines and cables in polar waters Mellor, M.,	Ecology on the Yukon-Prudhoe haul road. Brown, J, ed,	Tobiasson, W. et al. (1988, p.421-430) MP 2011
(1978, 34p) CR 78-22	[1978, 131p] MP 1115 Effects of a tundra fire on soil and vegetation Racine, C.	On the design of polymetric composite structures for cold regions applications Lord, HW, et al. [1988, p.435]
Application of heat pipes on the Trans-Alaska Pipeline. Heuer, C.E., (1979, 27p) SR 79-26	Effects of a tundra fire on soil and vegetation Racine, C. [1980, 21p] SR 80-37	458 ₁ MP 2395
Heuer, C.E., (1979, 27p) SR 79-26 Snow pads for pipeline construction in Alaska. Johnson.	Aquaculture for wastewater treatment in cold climates	Polynyas
P R., et al. (1980, 28p) CR 80-17	Recd, S.C., et al., [1981, p.482-492] MP 1394 Wastewater treatment and plant growth Palazzo, A.J.	Turbulent heat flux from Arctic leads Andreas, E.L., et al, (1979, p 57-91) MP 1340
Environmental engineering, Yukon River-Prudhoe Bay Haul	Wastewater treatment and plant growth Palazzo, A.J. (1982, 21p.) SR 82-05	Physical oceanography of the seasonal sea ice zone.
Road. Brown, J., ed. (1980, 187p) CR 80-19 Environment of the Alaskan Haul Road Brown, J., (1980,	Vegetation and environmental gradients of the Prudhoe Bay	McPhee, M G, (1980, p 93-132) MP 1294
p 3-52 ₁ MP 1350	region, Alaska Walker, D.A., [1985, 239p] CR 85-14	Estimation of heat and mass fluxes over Arctic leads. Andreas, E.L., [1980, p.2057-2063] MP 1410
Revegetation along roads and pipelines in Alaska Johnson,	TNT in a terrestrial plant Palazzo, A J., et al, (1986, 17p)	Condensate profiles over Arctic leads Andreas, E L, et al,
L.A., (1980, p 129-150) MP 1353 Movement study of the trans-Alaska pipeline at selected sites	CR 86-15	(1981, p.437-460) MP 1479
Ueda, H T., et al. (1981, 32p) CR 81-04	Effects of temperature and species on TNT injury to plants Palazzo, AJ, et al. (1988, 7p) SR 88-16	Sea ace state during the Weddell Sea Expedition Ackley, SF, et al. (1983, 6p. + 59p) SR 83-2
Losses from the Fort Wainwright heat distribution system	Plastic deformation	Bulk transfer coefficients for heat and momentum over leads
Phetteplace, G, et al., [1981, 29p] SR 81-14	Mechanics of ice. Glen, J W., [1975, 43p] M II-C2b	and polynyas Andreas, E. L., et al., [1986, p. 1875-1883] MP 2187
Revegetation along the trans-Alaska pipeline, 1975-1978 Johnson, A.J. (1981, 115p) CR 81-12	In-plane deformation of non-coaxial plastic soil Takagi, S.	Estimating turbulent surface heat fluxes over polar, marine
Subsea trenching in the Arctic Mellor, M. (1981, p.843-	(1978, 28p.) CR 78-07 Plastic flow	surfaces Andreas, E.L. (1988, p.65-68) MP 2448
882 ₁ MP 1464	Modeling pack ice as a viscous-plastic continuum Hibler.	Environment of wintertime leads and polynyas Andreas, E L., [1989, p 273-288] Andreas
Revegetation along pipeline rights-of-way in Alaska. Johnson, L. [1984, p 254-264] MP 2113	W.D., III. (1977, p 46-55) MP 1164	Wind-generated polynyas off the coasts of the Bering Sea
Simple design procedure for heat transmission system piping.	Role of plastic ice interaction in marginal ice zone dynamics Leppäranta, M, et al. (1985, p 11,899-11,909)	islands. Kozo, T.L. et al. (1990, p.126-132)
Phetteplace, G. (1985, p. 1748-1752) MP 1942	MP 1544	Ponds MP 2734
Engineering surveys along the Trans-Alaska Pipeline God- frey, R.N., et al. (1986, 85p) SR 86-28	Plastic properties	Suppression of ice fog from cooling ponds McFadden, T.
Pipes (tubes)	Steady in-plane deformation of noncoaxial plastic soil Takagi, S, {1979, p.1049-1072} MP 1248	(1976, 78p) CR 76-43
Phase change around a circular pipe Lunardini, V J.	Analysis of non-steady plastic shock waves in snow Brown.	Wastewater stabilization pond linings Middlebrooks, E.J., et al., [1978, 116p] SR 78-28
(1980, 18p) CR 80-27 Phase change around a circular cylinder Lunardini, V.J.,	R L, (1980, p 279-287) MP 1354	Energy requirements for small flow wastewater treatment sys-
Phase change around a circular cylinder Lunardini, V.J., 1981, p 598-600; MP 1507	Plasticity tests Report of the ITTC panel on testing in ice, 1978 Franken-	tems Middlebrooks, E.J., et al. (1979, 82p) SR 79-07
Approximate phase change solutions for insulated buried cyl-	stein, GE, et al. (1978, p.157-179) MP 1140	Cost-effective use of municipal wastewater treatment ponds
inders Lunardini, V.J. (1983, p.25-32) MP 1593 Transient two-dimensional phase change Albert, M.R. et	Plastics	Reed, S.C., et al. (1979, p. 177-200) MP 1413
al, [1985, p 279-243] MP 2162	Utility distribution practices in northern Europe den, T, et al. (1977, p 70-95) McFad- MP 928	International and national developments in land treatment of
Polyvinyl chloride pipes and ground water chemistry. Park-	Plates	wastewater McKim, H L., et al. (1979, 28p) MP 1420
er, i. V, et al. (1985, 27p) SR 85-12 Heat transfer of a thermosyphon Zarling, J P, et al. (1987,	Viscoelasticity of floating ice plates subjected to a circular	Aquaculture systems for wastewater treatment an engineer-
p.79-84 ₁ MP 2190	load. Takagi, S. (1978, 32p) CR 78-05 Investigation of the acoustic emission and deformation re-	ing assessment Reed, S.C., et al. (1980, 127p) MP 1422
Thermosyphon for horizontal applications DenHartog.	sponse of finite ice plates Xirouchakis, P.C. et al. (1981.	Aquaculture systems for wastewater treatment Reed, S.C.
S.L., [1988, p. 319-321] MP 2444 Freezing and thawing of soils in cylindrical coordinates	19p) CR 81-06	ct al. (1980, p 1-12) MP 1423 lee growth on Post Pond, 1973-1982 Gow, A.J., et al.
Lunardini, V.J., (1989, p 185-208) MP 2594	Acoustic emission and deformation response of finite ice plates Xirouchakis, P.C., et al. (1981, p. 123-133)	(1983, 25p) CR 83-04
Investigation into the post-stable behavior of a tube array in	MP 1436	Nitrogen removal in wastewater stabilization ponds Reed,
cross-flow Lever, J.H., et al. (1989, p 457-465) MP 2561	On the buckling force of floating ire plates (1981, 7p.) CR 81-09	S C., (1983, 13p + figs) MP 1943 Nitrogen removal in wastewater ponds. Reed, S C., (1984,
PLAINS	Acoustic emission and deformation of ice plates Xiroucha-	26p) CR 84-13
Geology and physiography of cold regions Stearns, S.R.,	kis, P.C. et al. (1982, p.129-139) MP 1589	Pontoon bridges
(1965, 40p) St. 1-A1 Planetary environments	Pneumatic equipment Description of radomes and lock walls using pneumatic devices	Ice interaction with the U.S. Army ribbon bridge. Couler- marsh, B.A., (1986, 18p.) CR 86-01
Proceedings of the second planetary water and polar pro-	Ackley, S.F. et al. (1977, p.467-478) MP 1064	Porosity
cesses colloquium. 1978 (1978, 209p) MP 1193	Polar regions	Difficulties of measuring the water saturation and porosity of
First impressions of the comet drilling problem Mellor, M. 1989, p 229-2321 MP 2592	Are to research of the United States, Vol 1 (1987, 121p) MP 2306	Snow Colbeck, S.C., [1978, p.189-20] MP 1124 Configuration of ice in frezen media Colb. S.C., [1982.
Plankton	Arctic research of the United States, Vol.2 (1988, 76p)	p 116-123 ₁ MP 1512
Choanoflagellata from the Weddell Sea, summer 1977	MP 2379	Geometry and permittivity of snow at high f equencies. Col-
Buck, K.R., (1980, 26p.) CR 80-16 Morphology and ecology of diatoms in sea ice from the Wed-	United States arctic research plan biennial revision 1990- 1991 Brown, J., ed., [1989] 72p.j MP 2544	
dell Sea Clarke, D.B. et al. [1984, 41p] CR 84-05	Polarization (waves)	sure ridges in the Beaufort Sea Weeks, W.F., 1984.
Sea-ice pressure ridge microbial communities. Ackley, ST.	Polarization studies in sea ice Arcone, S.A., et al. (1980, p. 225-245) MP 1324	p 134-139 ₁ MP 1680 Influence of grain size on the ductility of ice Cole, D.M.
(1988, p.172-174) MP 2450	p 225-245 ₁ MP 1324 Polarization of skylight Bohren C , [1984, p 261-265 ₁	Influence of grain size on the ductility of ice Cole, D.M., 1984, p.150-157; MP 1686
Plant ecology Climatic and dendroclimatic indices in the discontinuous per-	MP 1794	Sea ice salinity and porosity changes dur storage. Cox.
mafrost zone of the Central Alaskan Uplands Haugen.	Model studies of surface noise interference in ground-probing radar. Arcone, S.A., et al., [1985, 23p]. CR 85-19	G I'N, et al. [1986, p.371-375] MP 2244 Undersaturation in thawed permafrost at the beginning of
R.K. et al. (1978, p. 392-398) MP 1099 Vegetation recovery after fundra fires in northwestern Alaska	Optical properties of sea ice structure Gow, A.J., (1986).	freezeback Ayorinde, O.A., [1990, p.317-321]
Racine, C., et al. (1987, p. 461-469) MP 2374	p 264-271) MP 2257	

Porous materials	Optical technique for characterizing precipitation. Koh, G.,	Bering Strait sea ice and the Fairway Rock icefoot. Kovacs,
Water flow through veins in ice Colbeck, S.C., [1976, 5p] CR 76-06	(1989, p.71-76) MP 2627 Snow concentration and precipitation rate measurements dur-	A, et al, [1982, 40p] CR 82-31 Properties of sea are in the coastal zones of the polar oceans.
Moving boundary problems in the hydrodynamics of porous	ing SNOW IV Lacombe, J, (1989, p 25-29) MP 2643	Weeks, W.F., et al, [1983, p.25-41] MP 1604
media Nakano, Y., [1978, p 125-134] MP 1343 Evaluation of the moving boundary theory. Nakano, Y.,	PRECIPITATION (METEOROLOGY)	Characteristics of multi-year pressure ridges. Kovacs, A. (1983, p.173-182) MP 1698
(1978, p.142-151) MP 1147	Climatology of the cold regions of the northern hemisphere,	Summary of the strength and modulus of ice samples from
Functional analysis of the problem of wetting fronts Naka- no, Y., (1980, p 314-318) MP 1307	II Wilson, C., [1969, 158p] M I-A3b Precipitation (meteorology)	multi-year pressure ridges Cox, G.F.N. et al, 1984, p 126-1331 MP 1679
Water and air horizontal flow in porous media Nal ino, Y , [1980, p.81-85] MP 1341	Changes in the composition of atmospheric precipitation Cragin, J.H., et al. (1977, p.617-631) MP 1079	Variation of ice strength within and between multiyear pres- sure ridges in the Beaufort Sea. Weeks, W.F., 1984,
Water and air vertical flow through porous media. Nakano,	Summer air temperature and precipitation in northern Alaska.	p.134-139 ₁ MP 1680
Y., [1980, p.124-133] MP 1342 Structural evaluation of porous pavement in cold climate	Haugen, R.K., et al. (1980, p 403-412) MP 1439 Climate of remote areas in north-central Alaska 1975-1979	Preliminary examination of the effect of structure on the com- pressive strength of ice samples from multi-year pressure
Eaton, R A, et al, [1980, 43p] SR 80-39	summary Haugen, R.K., [1982, 110p] CR 82-35	ridges Richter, J A, et al. (1984, p.140-144) MP 1685
Traveling wave solution to the problem of simultaneous flow of water and air through homogeneous porous media	Building materials and acid precipitation Merry, C.J., et al., [1985, 40p.] SR 85-01	Mechanical properties of multi-year sea ice. Phase 1: Test
Nakano, Y, [1981, p.57-64] MP 1419 Horizontal infiltration of water in porous materials Nakano,	Structure data bases for predicting building material distribu-	results Cox. G F.N., et al. (1984, 105p) CR 84-09 Method of detecting voids in rubbled ice Tucker, W.B., et
Y., (1982, p 156-166) NAVANO, MP 1840	Frozen precipitation and concurrently observed meteorologi-	al. (1984, p 183-188) MP 1772
Wetting fronts in porous media Nakano, Y, (1983, p.71-78) MP 1720	cal conditions Bilello, M.A., [1985, 11p.] MP 2075 Construction materials data base for Pittsburgh, PA. Merry,	Structure of first-year pressure ridge sails in the Prudhoe Bay region. Tucker, W B, et al. [1984, p 115-135]
Calculation of advective mass transport in heterogeneous	C.J., et al. (1986, 87p) SR 86-08	MP 1837 Some probabilistic aspects of ice gouging on the A _skan Shelf
media Daly, CJ, (1983, p 73-89) MP 1697 Boundary value problem of flow in porous media Nakano,	Description of the building materials data base for Portland, Maine Merry, C J. et al. (1986, 83p) SR 86-13	of the Beaufort Sea Weeks, W.F., et al. (1984, p 213-
Y., (1983, p 205-213) MP 1721 Role of heat and water transport in frost heaving of porous	Description of the building materials data base for Cincinnati, Ohio Merry, C.J., et al. (1986, 85p.) SR 86-31	236; MP 1838 Tensile strength of multi-year pressure ridge sea ice samples
soils. Nakano, Y, et al. [1984, p 93-102] MP 1842	Inventorying building materials Merry, C.J., (1986, 25p)	Cox, G.F.N., et al. (1985, p.186-193) MP 1856
Computation of porous media natural convection flow and phase change O'Neill, K, et al, [1984, p 213-229]	SR 86-33 Impact of wet snow on visible, infrared and millimeter wave	Structure, salinity and density of multi-year sea ice pressure ridges. Richter-Menge, J.A., et al. [1985, p.194-198]
MP 1895	attenuation Bates, R.E., et al. [1988, p 523-535]	MP 1857 Strength and modulus of ice from pressure ridges Cox,
Diffusivity of horizontal water flow through porous media. Nakano, Y, [1985, p 26-31] MP 1881	MP 2608 Optical measurement of precipitation Koh, G, (1989,	G F N., et al. [1985, p 93-98] MP 1848
Experimental measurement of channeling of flow in porous media. Oliphant, J.L., et al. (1985, p 394-399)	13p ₁ SR 89-30	Structure and the compressive strength of ice from pressure ridges Richter, J.A., et al. (1985, p. 99-102)
MP 1967	Pressure Review of the propagation of inclastic pressure waves in snow.	MP 1849
Natural convection in sloping porous layers Powers, D J, et al. [1986, p 697-710] MP 2158	Albert, D.G., (1983, 26p) CR 83-13 On the pressure drop through a uniform snow layer. Yen,	Compressive strength of pressure ridge ice samples. Richter- Menge, J.A., et al. (1985, p. 465-475) MP 1877
On the pressure drop through a uniform snow layer. Yen,	Y C., (1988, 10p) CR 88-14	Pressure ridge strength in the Beaufort Sea Weeks, W.F., [1985, p 167-172] MP 2121
Y.C., (1988, 10p) CR 88-14 Portable shelters	Pressure buildup in permafrost pile supports induced by freezeback Ayorinde, O A. (1989, p 236-251)	Pressure ridge and sea ice properties Greenland Sea. Tucker,
Operation of the CRREL prototype air transportable shelter. Flanders, S N, [1980, 73p] SR 80-10	MP 2467 Pressure control	W.B., et al., (1985, p. 214-223) MP 1935 Mechanical properties of multi-year pressure ridge samples.
Cold regions testing of an air-transportable shelter Flan-	Freeze damage prevention in utility distribution lines	Richter-Menge, J A. (1985, p 244-251) MP 1936
ders, S.N., (1981, 20p.) CR 81-16 Air-transportable Arctic wooden shelters Flanders, S.N., et	McFadden, T, (1977, p 221-231) MP 929 Pressure ridges	Tensile strength of multi-year pressure ridge sea ice samples Cox, G.F.N., et al. [1985, p.375-380] MP 1908
al, (1982, p 385-397) MP 1558	Classification and variation of sea ice ridging in the Arctic	Structure, salinity and density of multi-year sea ice pressure
Winter field testing of U.S. Navy fleet hospital Sletten, R.S., et al. (1988, 10p.) MP 2512	basin. Hibler, W.D., III, et al., [1974, p.127-146] MP 1022	ridges Richter-Menge, J A, et al. (1985, p.493-497) MP 1965
Ports	Height variation along sea ice pressure ridges Hibler, W.D., III. et al., 1975, p. 191-1991 MP 848	Confined compressive strength of multi-year pressure ridge sea ice samples Cox, G.F.N., et al. [1986, p 365-373]
Bibliography on harbor and channel design in cold regions Haynes, F.D., (1976, 32p) CR 76-03	III, et al. (1975, p. 191-199) MP 848 Grounded ice along the Alaskan Beaufort Sea coast Kovacs,	MP 2035
Methods of ice control for winter navigation in inland waters. Frankenstein, G E, et al. [1984, p 329-337] MP 1831	A. (1976, 21p.) CR 76-32 Some characteristics of grounded floebergs near Prudhoe Bay,	Mechanical properties of multi-year pressure ridge ice. Richter-Menge, J.A., [1987, p 108-119] MP 2299
Harbor design for ice conditions Wortley, CA., (1987,	Alaska Kovacs, A. et al, (1976, p 169-172)	Confined compressive strength of multi-year pressure ridge sea ice samples. Cox. G.F.N., et al. (1988, p 295-301)
p.14-15; MP 2588 lee control in river harbors and fleeting areas Perham, R.E.,	MP 1118 Grounded floebergs near Prudhoe Bay, Alaska Kovacs, A.,	MP 2403
(1988, 7p) SR 88-12	et al. (1976, 10p.) CR 76-34	Mechanical properties of multi-year sea ice. Richter-Menge, JA, [1988, p 54-61] MP 2619
Rebuilding infrastructure for pleasure boating C.A., et al. (1989, p 188-201) MP 2466	Sea ice properties and geometry Weeks, W.F., (1976, p.137-171) MP 918	On modeling the energetics of the ridging process Hopkins,
Position (location) Sea ice drift and deformation from LANDSAT imagery Hi-	Sea ice roughness and floe geometry over continental shelves. Weeks, W.F., et al. (1977, p. 32-41) MP 1163	M.A., et al. (1989, p.175-178) MP 2483 Sea are ridging in the Ross Sea, Antarctica, as compared with
bler, W D, III, et al. (1976, p 115-135) MP 1059	Radar profile of a multi-year pressure ridge fragment.	sites in the Arctic Weeks, W.F., et al. (1989, p 4984- 4988) MP 2490
Power line icing Utility distribution practices in northern Europe. McFad-	Kovacs, A., [1978, p 59-62] MP 1126 Profiles of pressure ridges and ice islands in the Beaufort Sea.	Probes
den, T., et al. (1977, p 70-95) MP 928	Hnatiuk, J., et al. (1978, p 519-532) MP 1187	Construction and performance of platinum probes for measurement of redox potential Blake, B J, et al. (1978, 8p.)
Mechanisms for ice bonding in wet snow accretions on power lines Colbeck, S.C., et al. [1983, p.25-30] MP 1633	Sea ice pressure ridges in the Beaufort Sea Wright, B.D., et al., (1978, p. 249-271) MP 1132	SR 78-27
Field measurements of combined icing and wind loads on	Dynamics of near-shore ice. Kovaes, A, et al. (1978, p.11- 22) MP 1205	Permafrost beneath the Beaufort Sea near Prudhoe Bay, Alaska. Sellmann, P.V., et al. (1980, p. 35-48)
wires Govoni, J.W., et al. (1983, p 205-215) MP 1637	Sea ice north of Alaska Kovacs, A., [1978, p.7-12]	MP 1346 Professional personnel
Combined icing and wind loads on a simulated power line test span Govoni, J W., et al. (1984, p 173-182)	MP 1252 Sea ice ridging over the Alaskan continental shelf Tucker.	Architects and scientists in research for design of buildings in
MP 2114	WB, et al, (1979, 24p) CR 79-08	Alaska Ledbetter, C.B., [1977, 8p] CR 77-23 Profiles
lce accretion measurement on a wire at Mt Washington McComber, P. et al. (1985, p 34-43) MP 2173	Multi year pressure ridges in the Canadian Reaufort Sea Wright, B, et al. (1979, p 107-126) MP 1229	leeberg thickness profiling Kovaes, A . [1978, p.766-774]
Computer interfacing of meteorological sensors in severe weather Rancourt, K., et al. (1985, p 205-211)	Ice pile-up and ride-up on Arctic and subarctic beaches Kovacs, A, et al. (1979, p. 127-146) MP 1230	MP 1019 Profiles of pressure ridges and ice islands in the Beaufort Sea
MP 2175	Sea ice ridging over the Alaskan continental shelf. Tucker,	Hnatiuk, J. et al. (1978, p 519-532) MP 1187
Transfer of meteorological data from mountain-top sites Govoni, J.W., et al. (1986, 6p.) MP 2107	W B, et al. (1979, p 4885-4897) MP 1240 Dynamics of near-shore ice Kovacs, A, et al. (1979,	Sea ice ridging over the Alaskan continental shelf. Tucker, WB, et al. [1979, 24p] CR 79-08
Conductor twisting resistance effects on ice build-up and ice shedding Govoni, J W. et al. (1986, 8p + figs)	p.181-207 ₁ MP 1291	Sea ice ridging over the Alaskan continental shelf Tucker, WB, et al. (1979, p.4885-4897) MP 1240
MP 2108	Shore ice pile-up and ride-up field observations, models, theoretical analyses. Kovacs, A, et al. (1980, p. 209-	Pooling of oil under sea ice. Kovacs, A , et al. (1981, p 912-
leing and wind loading on a simulated power line Govoni, JW, et al, [1986, p 23-27] MP 2206	298; MP 1295 See ice piling at Pairway Rock, Bering Strait, Alaska	922j MP 1459 Condensate profiles over Arctic leads Andreas, E. L. et al.
Ice accretion and aerodynamic loading of transmission lines	Kovacs, A. et al. (1981, p.985-1000) MP 1460	(1981, p.437-460) MP 1479
Egelhofer, K.Z., et al. (1987, p.103-109) MP 2279 Power line supports	Morphology of sea ice pressure ridge sails Fucker, W.B., et al. (1981, p.1-12) MP 1465	Electromagnetic subsurface measurements Dean, A.M., Jr., (1981, 19p.) SR 81-23
leing and wind loading on a simulated power line Govoni J.W., et al. [1986, p.23-27] MP 2206	Sea ice rubble formations off the NL Bering Sea and Norton Sound Koyaes, A. (1981, p. 1348-1363) MP 1527	Snowpack profile analysis using extracted thin sections Harrison, W.L., [1982, 15p.] SR 82-11
Precipitation gages	Dynamics of near-shore ice Kovacs, A. et al. [1981,	Airborne measurement of sea ice thickness and subice bath-
Meteorological measurements at Camp Ethan Allen Training Center, Vermont Bates R. (1982, p. 77-112)	p 125-135 ₁ MP 1599 Multi-year pressure ridges in t'. Canadian Beaufort Sea	ymetry Kovaes, A. et al, [1988 p 111-120] MP 2345
MP 1984	Wright, B., et al. (1981, p 125-145) MP 1514	Projectile penetration
Optical snow precipitation gauge Koh, G., et al. (1987, p. 26-31) MP 2259	lee pile-up and ride up on arctic and subarctic beaches Kovaes, A., et al. (1981, p. 247-273) MP 1538	Projectile and fragment penetration into ordinary snow, Swinzow, GK, (1977, 30p.) MP 1750
Solid precipitation measurement at Sleepers River, VT Bates, R.E., et al. (1987, p.1-7) MP 2396	Sea ice rubble formations in the Bering Sea and Norton Sound, Alaska Kovaes, A., (1981, 23p.) SR 81-34	Ferminal ballistics in cold regions materials Aitken, G.W., (1978, 6p.) MP 1182
Snow mass concentration and precipitation rate Koh, G. et	Modeling pressure - 'ge buildup on the geophysical scale	Bullet penetration in snow Cole, D. M., et al., (1979, 23p)
al. (1988, p.89-92) MP 2326	Hibler, W.D., III, (1982, p.141-155) MP_1590	SR 79:25

Nose shape and L/D ration, and projectile penetration in frozen soil Richmond, P.W., [1980, 21p] SR 80-17	Quaternary deposits Fox permafrost tunnel, a late Quaternary geologic record in	Wet precipitation in subfreezing air below a cloud influences radar backscattering Colbeck, S.C., [1987, p.135-144]
Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al. [1980, p 31-45]	central Alaska. Hamilton, T.D., et al, (1988, p 948-969) MP 2355	Field observations of mine detection in snow using UHF
MP 1347	Radar	short-pulse radar. Arcone, S.A., et al. [1987, 24p.] SR 87-19
Small caliber projectile penetration in frozen soil. Richmond, P.W., 1980, p.801-823; MP 1490	Extending the useful life of DYE-2 to 1986. Tobiasson, W., et al, [1980, 37p] SR 80-13	Radioglaciology by VV. Bogorodskii, et al. Jezek, KC.,
Deceleration of projectiles in snow. Albert, D.G., et al,	Radar echoes	(1988, p.55-56) MP 2338 Alaska SAR facility, an update. Weller, G., et al., (1988,
(1982, 29p) CR 82-20 Ice penetration tests Garcia, N.B, et al. (1985, p 223-	Imaging radar observations of frozen Arctic lakes. Elachi, C, et al. (1976, p 169-175) MP 1284	p 27-31 ₁ MP 2380
236 ₁ MP 2014	Dynamics of near-shore ice Kovacs, A., et al, 1977,	Radar backscattering from artificially grown sea ice. Bre- dow, J., et al, [1989, p 259-264] MP 2667
Some developments in shaped charge technology Mellor, M., (1986, 29p) SR 86-18	p 106-112 ₃ MP 924	Analysis of a short pulse radar survey of revetments along the
Small-scale projectile penetration in saline ice. Cole, D.M.,	Sea ice thickness profiling and under-ice oil entrapment. Kovacs, A, (1977, p.547-550) MP 940	Mississippi River. Arcone, S.A., 1989, 20p., MP 2692
et al, (1986, p 415-438) MP 2201 Equipment for making access holes through arctic sea ice	Dielectric constant and reflection coefficient of snow surface	Estimating sea ice thickness using data from impulse radar
Mellor, M., (1986, 34p.) SR 86-32	layers in the McMurdo Ice Shelf. Kovscs, A., et al., [1977, p.137-138] MP 1011	soundings Kovacs, A, et al., (1989, 10p) CR 89-22 Algorithm for extraction of ice-thickness data from short
Deviation of guidelines for blasting floating ice. Mellor, M., (1987, p.193-206) MP 2247	Iceberg thickness profiling using an impulse radar. Kovacs, A., [1977, p. 140-142] MP 1012	pulse radar signals. Rick, L., et al., (1990, p.137-145)
Propellers	Dynamics of near-shore ice Kovacs, A., et al. (1977.	MP 2698 Physical properties of brackish ice, Bay of Bothnia. Weeks,
Evaluation of ice deflectors on the USCG icebreaker Polar Star. Vance, G.P., [1980, 37p] SR 80-04	p 503-510 ₁ MP 1200	W.F., et al, [1990, p 5-15] MP 2725
Self-shedding of accreted ice from high-speed rotors ltaga-	Iceberg thickness and crack detection Kovacs, A. (1978, p.131-145) MP 1128	Airborne sea ice thickness sounding. Kovacs, A., et al., [1990, p 225-229] MP 2737
ki, K., (1983, p 1-6) MP 1719 Mechanical ice release from high-speed rotors Itagaki, K.	Iceberg thickness profiling Kovacs, A, (1978, p.766-774) MP 1019	Sea ice thickness versus impulse radar time-of-flight data.
[1983, 8p.] CR 83-26	Radar anisotropy of sea ice Kovacs, A, et al, (1978, p 171-	Radar backscatter measurements over saline ice. Gogineni
Natural rotor icing on Mount Washington, New Hampshire. Itagaki, K., et al, [1986, 62p.] CR 86-10	201; MP 1111	S, et al, (1990, p 603-615) MP 2741 Radar surveying of the bottom surface of ice covers. Arcone
Self-shedding of accreted ice from high-speed rotors. Itaga- ki, K., r1987, p.95-100; MP 2278	Radar profile of a multi-year pressure ridge fragment. Kovacs, A., (1978, p 59-62) MP 1126	S.A., ct al., [1990, p 30-39] MP 2766
ki, K., (1987, p 95-100) MP 2278 Effect of ice-floe size on propeller torque in ship-model tests.	Dynamics of near-shore ice. Kovacs, A., et al, [1978, p.11- 22] MP 1205	Radar photography
Tatinclaux, J C., (1987, p 291-298) MP 2289 Model tests on an icebreaker at two friction factors. Tatin-	Sea ice north of Alaska. Kovacs, A, (1978, p.7-12)	AIDJEX radar observations. Thompson, T.W., et al. (1972, p.1-16) MP 989
claux, J.C., [1989, p.774-784] MP 2622	MP 1252	Radar imagery of ice covered North Slope lakes Weeks, W.F., et al. (1977, p.129-136) MP 923
Protection	Radar anisotropy of sea ice. Kovacs, A., et al. (1978, p 6037-6046) MP 1139	W.F., et al. (1977, p.129-136) MP 923 Radiation
Ecological and environmental consequences of off-road traf- fic in northern regions Brown, J., (1976, p.40-53)	Remote detection of water under ice-covered lakes on the	Radiation and evaporation heat loss during ice fog conditions McFadden, T., r1975, p.18-27; MP 1051
MP 1383 Hydraulic model study of a water intake under frazil ice con-	North Slope of Alaska Kovacs, A, (1978, p.448-458) MP 1214	McFadden, T., (1975, p.18-27) MP 1051 Forward scatter meter for measuring extinction in adverse
ditions. Tantillo, T.J., (1981, 11p.) CR 81-03	Remote sensing of massive ice in permafrost along pipelines	weather Koh, G. [1987, p 81-84] MP 2295
Protective coatings Thermoinsulating media within embankments on perennially	in Alaska Kovacs, A, et al. (1979, p 268-279) MP 1175	Two-stream multilayer, spectral radiative transfer model for sea ice Perovich, D.K., [1989, 17p] CR 89-13
frozen soil. Berg, R.L., [1976, 161p] SR 76-03	Freshwater pool radar-detected near an Alaskan river delta Kovacs, A., et al, (1979, p 161-164) MP 1224	Radiation absorption
Evaluation of MESL membrane—puncture, stiffness, temperature, solvents. Sayward, J.M., [1976, 60p]	Surface-based scatterometer results of Arctic sea ice On-	Effects of radiation penetration on snowmelt runoff hydrographs. Colbeck, S.C., [1976, 9p.] CR 76-11
CR 76-22	stott, R.G., et al. [1979, p.78-85] MP 1260 Anisotropic properties of sea ice. Kovacs, A., et al. [1979,	ice fog as an electro-optical obscurant. Koh, G, r1985.
Water absorption of insulation in protected membrane roofing systems Schaefer, D., (1976, 15p.) CR 76-38	p 5749-5759 ₃ MP 1258	Comments on the characteristics of in situ snow at millimeter
Suppression of ice fog from cooling ponds. McFadden, T.,	Inlet current measured with Seasat-1 synthetic aperture radar Shemdin, O.H., et al., [1980, p.35-37] MP 1443	wavelengths Walsh, J., et al. (1986, p.317-320) MP 2660
[1976, 78p] CR 76-43 Ice removal from the walls of navigation locks Franken-	Method for measuring brash ice thickness with impulse radar.	RADIATION BALANCE
stein, G E., et al. (1976, p 1487-1496) MP 888	Martinson, C.R., et al. [1981, 10p] SR 81-11 Distortion of model subsurface radar pulses in complex die-	Climatology of the cold regions of the northern hemisphere I. Wilson, C., [1967, 141p.] M I-A3c
Lock wall deicing. Hanamoto, B, (1977, p.7-14) MP 972	lectrics Arcone, S.A., [1981, p.855-364] MP 1472	Radiation balance
Repetitive loading tests on membrane enveloped road sec-	Ice-covered North Slope lakes observed by radar Weeks, W.F., et al. [1981, 17p] CR \$1-19	Micrometeorological investigations near the tundra surface Kelley, J.J., (1973, p. 109-126) MP 1000
tions during freeze thaw. Smith, N., et al. [1977, p.171- 197] MP 962	Radar detection of sea ice and current alinement under the	Energy exchange over antarctic sea ice in the spring. An
Ice releasing block-copolymer coatings. Jellinek, H H G, et al., [1978, p.544-551] MP 1141	Ross Ice Shelf. Morey, R.M., et al., (1981, p.96-97) MP 1543	dress, E.L., et al., (1985, p.7199-7212) MP 1889 Lidar detection of leads in arctic seasee. Schnell, R.C., et al.
Freeze thaw loading tests on membrane enveloped road sec-	Dielectric properties of thawed active layers. Arcone, S.A.	(1990, p 119-123) MP 273
tions. Smith, N., et al. [1978, p 1277-1288] MP 1158	et al. (1982, p.618-626) MP 1547 Effects of conductivity on high-resolution impulse radar	Radio communication Low frequency surface impedance measurements Arcone
Performance of the USCGC Katmai Bay icebreaker. Vance, G.P., (1980, 28p.) CR 80-08	sounding Morey, R.M., et al. (1982, 12p.) CR 82-42	S A, et al. (1980, p 1-9) MP 1280
G.P., (1980, 28p) CR 80-08 Deicing a satellite communication antenna Hanamoto, B.	Radar profiling of buried reflectors and the groundwater table	Transfer of meteorological data from mountain-top sites Govoni, J.W., et al. (1986, 6p.) MP 210'
et al, (1980, 14p) SR 80-18	Sellmann, P.V., et al. (1983, 16p) CR 83-11 Detection of cavities under concrete pavement Kovacs, A.	Radio echo soundings
Ice adhesion tests on coatings subjected to rain erosion Minsk, L.D., [1980, 14p] SR 80-28	et al. [1983, 41p] CR 83-18	Internal properties of the ice sheet at Cape Folger by radii echo sounding Keliher, T.E., et al. (1978, 12p)
Potential icing of the space shuttle external tank. Ferrick.	Radar wave speeds in polar glaciers Jezek, K.C., et al. (1983, p. 199-208) MP 2057	Ice sheet internal reflections Ackley, S.F. et al. (1979)
MG, et al. (1982, 305p) CR 82-25 How effective are icephobic coatings Minsk, L.D., (1983,	Changes in the Ross Ice Shelf dynamic condition. Jezek,	p 5675-5680 ₁ MP 1319
p.93-951 MP 1634 Application of a block copolymer solution to ice-prone struc-	K C., (1984, p 409-416) MP 2058 Radar investigations above the trans-Alaska pipeline near	Radio echo sounding in the Allan Hills, Antarctica. Kovaci A. [1980, 9p] SR 80-2
tures Hanamoto, B., [1983, p.155-158] MP 1636	Fairbanks. Arcone, S.A., et al, [1984, 15p]	Ice flow leading to the deep core hole at Dye 3, Greenland
Acrostat icing problems. Hanamoto, B, [1983, 29p] SR 83-23	CR 84-27 Discrete reflections from thin layers of snow and ice Jezek.	Whillans, I.M., et al. (1984, p. 185-190) MP 182. Folding in the Greenland ice sheet. Whillans, I.M., et al.
Ice observation program on the semisubmersible drilling ves-	K.C., et al., (1984, p.323-331) MP 1871	(1987, p 485-493) MP 218
sel SEDCO 708. Minsk, L.D., [1984, 14p] SR 84-02	Borehole geometry on the Greenland and Antarctic ice sheets. Jezek, K.C., [1985, p.242-251] MP 1817	Airborne electromagnetic sensing of sea ice thickness. Beck er, A, et al. (1987, 77p) MP 267.
Polyethylene glycol as an ice control coating ltagaki, K.	Impulse radar sounding of frozen ground. Kovacs, A, et al.	Radar backscatter in snow as millimeter wave frequencies
[1984, 11p] CR 84-28 Blistering of built-up roof membranes pressure measure-	(1985, p 28-40) MP 1952 Analysis of wide-angle reflection and refraction measure-	Berger, R.H. et al. (1989, p 133-136) MP 263 Estimating sea ice thickness using defer from impulse rada
ments Korhonen, C. (1987, 22p) SR 86-29	ments Morey, R.M. et al. (1985, p 53-60)	soundings Kovacs, A, et al. (1989, 10p) CR 89-2
Wall coatings for concrete and masonry buildings Korhon- en, CJ, et al. (1989, 27 refs) SR 89-36	MP 1953 Mine detection in cold regions using short-pulse radar Ar-	Radio waves Electrical ground impedance measurements in Alaskan per
Protective vegetation	cone, S.A. (1985, 16p) SR 85-23	mafrost regions Hockstra, P. (1975, 60p) MP 104
Revegetation and crosson control of the Trans-Alaska Pipe- line Johnson, L.A., et al. (1977, 36p) SR 77-08	Model studies of surfactionise interference in ground-probing radar. Arcone, S.A. of al. (1985, 23p.) CR 85-19	Electrical ground impedance Arcone, S.A., et al. (1978.
Pumps	Impulse radar sounding of level first-year sea ice from an	92p 3 MP 122 Electrical resistivity of frozen ground Arcone, S. A. (1979)
Measuring unmetered steam use with a condensate pump cycle counter Johnson, PR, (1977, p 434-442) MP 957	observations of the backscatter from snow at millimeter	p 32-37 ₁ MP 162
	wavelengths Berger, R H, et al. (1986, p 311-316) MP 2665	Detection of Arctic water supplies with geophysical techniques Arcone, S.A., et al. [1979, 30p.] CR 79-1
Waste heat recovery for heating purposes Pheticplace, G. [1978, p. 30-33] Pheticplace, G. MP 1256		Low frequency surface impedance measurements Arconi
Bubblers and pumps for melting ice Ashton, G.D., [1986, p. 223-234] MP 2133	wavelengths Walsh, J, et al. (1986, p 317-320) MP 2666	S.A., et al. (1980, p. 1-9) MP 128 VHF electrical properties of frozen ground near Point Barroy
Water-source heat pumps Phetteplace G. (1986, p.14-	Short-pulse radar investigations of freshwater ice sheets and	Alaska Arcone, S.A., et al., [1981, 18p] CR 81-1
151 MP 2151 Quartz	brash ice Arcone, S.A., et al. (1986, 10p) CR 86-06	Electrical properties of frozen ground, Point Barrow, Alaski Arcone, S.A., et al. (1982, p.485-492) MP 157
Mechanisms of crack growth in quartz Martin, R.J., III, ct	Detecting underground objects, utilities Hironaka, M.C., et	Field dielectric measurements of frozen silt using VHF pulse
al. (1975, p.4837-4844) MP.855	al. :1987. p.36:43: MP 2281	Acone, S.A., et al., 11984, p.22-37; MP, 177

Radio waves (cont.)	Manager and a state of the stat	•
Pulse transmission through frozen silt. Arcone, SA.	Numerical solutions for a rigid-ice model of secondary frost heave. O'Neill, K., et al. (1982, 11p.) CR 82-13	Remote sensing for reconnaissance of proposed construction site. McKim, H.L., et al., [1978, 9 leaves] MP 1167
(1984, 9p) CR 84-17	Theory of microfracture healing in ice. Colbeck, S.C.,	Water resources by satellite. McKim, H.L., [1978, p.164-
Investigations of dielectric properties of some frozen materi-	(1986, p 89-95) MP 2146	169 ₃ MP 1090
als. Arcone, S.A., et al. (1989, 18p) CR 89-84	Reinforced concretes	Estuarine processes and intertidal habitats in Grays Harbor,
RADIOACTIVE ISOTOPES Radioactive fallout in northern regions Wilson, C., (1967,	Deteriorated concrete panels on buildings at Sondrestrom, Greenland. Korhonen, C., [1984, 11p] SR 84-12	Washington: a demonstration of remote sensing techniques. Gatto, L.W., (1978, 79p.) CR 78-18
35p ₁ M I-A3d	Deteriorated building panels at Sondrestrom, Greenland.	Remote sensing for land treatment site selection Merry,
Radiometry	Korhonen, C., (1985, p.7-10) MP 2017	CJ, (1978, p.107-119) MP 1146
Remote sensing of water quality using an airborne spec-	Brittleness of reinforced concrete structures under arctic con-	1977 tundra fire at Kokolik River, Alaska Hall, D K, et al. (1978, 11p) SR 78-10
troradiometer. McKim, H.L., et al, [1980, p.1353-1362] MP 1491	ditions. Kivekäs, L., et al. [1985, 28 + 14p] MP 1969	River channel characteristics at selected ice jam sites in Ver-
Summer conditions in the Prudhoe Bay area, 1953-75 Cox,	Brittleness of reinforced concrete structures under arctic con-	mont. Gatto, L.W., [1978, 52p] CR 78-25
G.F.N., et al, [1981, p.799-808] MP 1457	ditions. Kivekäs, L, et al. (1985, p 111-121)	Remote detection of water under ice-covered lakes on the
Water quality monitoring using an airborne spectroradiometer. McKim, H.L., et al, (1984, p.353-360)	MP 2272 Brittleness of reinforced concrete structures under arctic con-	North Slope of Alaska. Kovacs, A., [1978, p 448-458] MP 1214
MP 1718	ditions. Kivekäs, L., et al. [1986, 20p] CR 86-02	Remote sensing of massive ice in permafrost along pipelines
Remote sensing data for water masses in Delaware Bay and	Reinforcement (structures)	in Alaska Kovacs, A, et al, {1979, p 268-279 ₃ MP 1175
adjacent wetlands. Ackleson, S.G., et al. (1985, p. 1123- 1129; MP 1909	Cantilever beam tests on reinforced ice. Ohstrom, E.G., et	Landsat data collection platform, south central Alaska. Hau-
Thermal emissivity of diathermanous materials Munis,	al, (1976, 12p) CR 76-07 Relaxation (mechanics)	gen, R K., et al, [1979, 17 refs.] SR 79-02
R.H., et al, (1985, p 872-878) MP 1963	Mass transfer along ice surfaces. Tobin, T.M., et al. (1977,	Overview on the seasonal sea ice zone. Weeks, W.F., et al.
Passive microwave in situ observations of winter Weddell Sea	p 34-37 ₁ MP 1091	(1979, p 320-337) MP 1320 Dynamics of near-shore ice. Kovacs, A, et al. (1979,
ice. Comiso, J.C., et al. [1989, p 10,891-10,905] MP 2655	Ultrasonic tests of Byrd Station ice cores. Gow, A J., et al.	p 181-207; MP 1291
Antarctic ice sheet brightness temperature variations. Jezek,	(1979, p 147-153) MP 1282 Remote sensing	Survey of methods for soil moisture determination
K.C, et al. (1990, p 217-223) MP 2736	Progress report on ERTS data on Arctic environment. And-	Schmugge, T.J., et al. (1979, 74p) MP 1639 Recovery of the Kokolik River tundra area, Alaska. Hall,
Railroads	erson, D.M., et al. [1972, 3p] MP 991	D K, ct al, [1979, 15p] MP 1638
Snow and ice control on railroads, highways and airports Minsk, L.D., et al. (1981, p. 671-706) MP 1447	Arctic and subarctic environmental analysis through ERTS-	Remote sensing of water circulation in Grays Harbor, Wash-
Rain	1 imagery. Anderson, D.M., et al. (1972, p 28-30) MP 1119	ington. Gatto, L.W., (1980, p 289-323) MP 1283
Roof loads resulting from rain on snow Colbeck, S.C.	Permafrost and vegetation maps from ERTS imagery. And-	Mapping of the LANDSAT imagery of the Upper Susitna River. Gatto, L.W., et al. (1980, 41p.) CR 80-04
(1977, p.482-490) MP 982	erson, D M, et al, (1973, 75p) MP 1003	Physical properties of sea ice and under-ice current orienta-
Loading on the Hartford Civic Center roof before collapse Redfield, R, et al, [1979, 32p.] SR 79-09	Arctic and subarctic environmental analyses utilizing ERTS- 1 imagery. Anderson, D.M., et al., (1973, 5p.)	tion. Kovacs, A, et al, (1980, p.109-153) MP 1323
Recrystallization	MP 1611	Remote sensing for earth dam site selection and construction materials. Merry, C.J., et al., 1980, p.158-1701
Compressibility characteristics of compacted snow. Abele,	Mesoscale deformation of sea ice from satellite imagery,	MP 1316
G., et al. (1976, 47p) CR 76-21	Anderson, D.M., et al. (1973, 2p) MP 1120	Continuum sea ice model for a global climate model. Ling.
Growth of faceted crystals in a snow cover [1982, 19p.] CR 82-29	Arctic and subarctic environmental analyses. Anderson, D.M., et al, (1973, 3p) MP 1030	CH, ct al, (1980, p.187-196) MP 1622
Optical properties of sea ice structure Gow, A.J., [1986,	Arctic and subarctic environmental analyses from ERTS im-	Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., [1980, p 263-272]
p 264-271 ₁ MP 2257	agery. Anderson, D.M., et al. (1973, 6p.) MP 1031	MP 1391
Annealing recrystallization in laboratory and naturally de- formed ice. Gow, A.J., et al., (1987, p (C1)271-(C1)276;	ERTS mapping of Arctic and subarctic environments Anderson, D.M., et al. (1974, 128p) MP 1047	Remote sensing of water quality using an airborne spec- troradiometer. McKim, H L., et al. (1980, p.1353-1362)
MP 2230	Land use/vegetation mapping in reservoir management.	MP 1491
Reflection	Cooper, S, et al, [1974, 30p] MP 1039	Snowpack estimation in the St. John River basin. Power,
Near-infrared reflectance of snow-covered substrates O'- Brien, H.W., et al. [1981, 17p] CR 81-21	Remote sensing program required for the AIDJEX model Weeks, W.F., et al. (1974, p 22-44) MP 1040	J.M., et al. (1980, p.467-486) MP 1799 Inlet current measured with Seasat-1 synthetic aperture radar,
Discrete reflections from thin layers of snow and ice. Jezek.	Near real time hydrologic data a quisition utilizing the	Shemdin, O.H., et al. (1980, p 35-37) MP 1481
K.C., et al. (1984, p 323-331) MP 1871 Effects of water and ice on the scattering of diffuse reflectors.	LANDSAT system. McKim, H L., et al. (1975, p 200- 211) MP 1055	Ice distribution and winter surface circulation, Kachemak
Jezek, K.C., et al., [1936, p.259-269] MP 2664	ice dynamics, Canadian Archipelago and adjacent Arctic ba-	Bay, Alaska. Gatto, L.W., [1981, p 995-1001] MP 1442
Theoretical estimates of light reflection and transmission by	sin Ramseier, R O., et al, [1975, p 853-877]	Sea see piling at Fairway Rock, Bering Strait, Alaska.
spatially inhomogeneous and temporally varying ice covers.	MP 1585	Kovacs, A., et al. (1981, p.985-1000) MP 1460
Perovich, D K, (1990, p 45-49) MP 2729 Acoustics and morphology of undeformed sea ice. Jezek,	Remote sensing plan for the AIDJEX main experiment. Weeks, W.F., et al. [1975, p.21-48] MP 862	Electromagnetic subsurface measurements. Dean, A.M., Jr., [1981, 19p] SR 81-23
K C., et al. (1990, p 67-75) MP 2730	Applications of remote sensing in New England. McKim,	Sea ice: the potential of remote sensing Weeks, W.F.,
Reflectivity	H.L., et al. (1975, 8p. + 14 figs and tables) MP 913	[1981, p 39-48] MP 1468
Red and near-infrared spectral reflectance of snow. O'Brien, H.W., et al. (1975, p. 345-360) MP 872	Site access for a subarctic research effort Slaughter, C.W., [1976, 13p] CR 76-09	Environmental mapping of the Arctic National Wildlife Ref- uge, Alaska. Walker, D.A., et al., 1982, 59p + 2 maps;
Radar imagery of ice covered North Slope lakes Weeks.	Islands of grounded sea ice. Kovacs, A, et al. (1976, p. 35-	CR \$2-37
W.F., et al. (1977, p.129-136) MP 923	50 ₁ MP 987	Optical engineering for cold environments. Aitken, G.W.,
Observations of the ultraviolet spectral reflectance of snow O'Brien, H.W., [1977, 19p] CR 77-27	Techniques for studying sea ice drift and deformation at sites far from land using LANDSAT imagery. Hibler, W.D.	ed. [1983, 225p] MP 1646 Landsat-4 thematic mapper (TM) for cold environments
O'Brien, H.W., [1977, 19p] CR 77-27 Snowpack optical properties in the infrared Berger, R H.,	III. ct al. (1976, p.595-609) MP 866	Gervin, J.C., et al. (1983, p 179-186) MP 1651
(1979, 16p) CR 79-11	Land use and water quality relationships, eastern Wisconsin	Use of Landsat data for predicting snowmelt runoff in the
Effects of water and ice layers on the scattering properties of	Haugen, R.K., et al. (1976, 47p) CR 76-30	upper Saint John River basin. Merry, C.J., et al., (1983, p.519-533) MP 1694
diffuse reflectors. Jezek, K.C., et al. (1987, p.5143- 5147) MP 2301	Remote-reading tensiometer for use in subfreezing tempera- tures. McKim, H.L., et al. (1976, p.31-45) MP 897	Extraction of topography from side-looking satellite systems
Single-horn reflectometry for in situ dielectric measurements	Imaging radar observations of frozen Arctic lakes Elachi,	a case study with SPOT simulation data. Ungar, S.G.,
at microwave frequencies Arcone, S.A. et al. [1988.	C., et al. (1976, p 169-175) MP 1284	et al. (1983, p 535-550) MP 1695 Size and shape of ice floes in the Baltic Sea in spring Lep-
p 89-92; MP 2333 Refraction	Dynamics of near-shore ice. Weeks, W.F., et al. (1976, p. 267-275) MP 922	päranta, M., (1983, p.127-136) MP 2061
Atmospheric turbulence measurements at SNOW-ONE-B	Analysis of snow water equivalent using LANDSAT data	Offshore petroleum production in ice-covered waters Tuck- er, W.B., [1983, p. 207-215] MP 2086
Andreas, E.L., (1983, p.81-87) MP 1846	Merry, C.J., et al., [1977, 16 leaves] MP 1113	er, WB, [1983, p 207-215] MP 2086 Spaceborne SAR and sea ice: a status report Weeks, WF,
Measurements of refractive index spectra over snow Andreas, E.L., [1986, p. 248-260] MP 2212	Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., (1977, 19p.) CR 77-08	(1983, p 113-115) MP 2225
Estimating Cn square over snow and sea ice from meteorolog-	River Dean, A.M., Jr., (1977, 19p.) CR 77-08 Remote sensing of accumulated frazil and brash ice. Dean,	Hydrologic forecasting using Landsat data Merry, CJ, et
ical quantities Andreas, E.L., (1988, p 258-267)	A.M., Jr., (1977, p 693-704) MP 934	al, [1983, p 159-168] MP 1691 Science program for an imaging radar receiving station in
MP 2440 Estimating Cn square over snow and sea ice from meteofolog-	Applications of remote sensing in the Boston Urban Studies Program, Parts I and II Merry, C.J., et al. (1977, 36p.)	Alaska Weller, G. et al, [1983, 45p] MP 1884
ical data. Andreas, E.L., (1988, p 481-495)	CR 77-13	Antarctic sea ice microwave signatures Comiso, J.C., et al, r1984, p.662-6721 MP 1668
MP 2393	Integrated approach to the remote sensing of floating ice	Hydrologic modeling from Landsat land cover data
Kolmogorov Constants for temperature, humidity, and refrac-	Campbell, W.J., et al. (1977, p. 445-487) MP 1069 Investigation of an airborne resistivity survey conducted at	McKim, H L, et al. (1984, 19p) SR 84-01
tive index spectra Andreas, E L., [1988, p 2399-2406]	very low frequency Arcone, S.A., (1977, 48p.)	Using Landsat data for snow cover/vegetation mapping, Merry, C.J., et al. [1984, p.11(140)-11(144)] MP 1975
MP 2437	CR 77-20	Potential use of SPOT HRV imagery for analysis of coastal
Refractive index structure parameter for a rear over the frozen Beaufort Sea Andreas, E. L., (1987, p. 667-679)	Detection of moisture in construction materials Morey, R.M., et al., (1977, 9p.) CR 77-25	sediment plumes Band, L.E. et al. (1984, p 199-204)
MP 2575	Landsat data for watershed management Cooper, S., et al.	Wildlife habitat mapping in Lac qui Parle, Minnesota Mer-
Refrigeration	(1977, c150p) MP 1114	ry. C J, et al. (1984, p 205-208) MP 2085
lee engineering facility heated with a central heat pump sys- tem Aamot, HWC, et al. (1977, 4p.) MP 939	Automatic data collection equipment for oceanographic ap- plication Dean, A.M., Jr., [1978, p.1111-1121]	Spatial analysis in recreation resource management Edwar-
Data acquisition in USACRREL's flume fac 'ity Daly, S.F.	MP 1028	do. H.A., et al. (1984, p. 209-219) MP 2084 Geographic features and floods of the Ohio River Edwardo,
ct al. (1985, p 1053-1058) MP 2089	Inundation of vegetation in New England McKim, H L., et	H A , et al. [1984, p 265-281] MP 2083
Regulation Heat transfer in drill holes in Antarctic ice. Yen Y C. et	al. [1978, 13p] MP 1169 1977 tundra fire in the Kokolik River area of Alaska. Hall	Radar investigations above the trans-Alaska pipeline near
al. (1976, 15p) CR 76-12	DK, et al. [1978, p 54-58] MP 1125	Fairbanks Arcone, S.A., et al., [1984, 15p.] CR 84-27
Regulation and the deformation of wet snow Colbeck, S.C.	Landsat data analysis for New England reservoir manage-	Mesoscale air-ice-ocean interaction experiments. Johan-
ct al. (1978, p.639-650) MP 1172	ment. Merry, CJ, et al. [1978, 61p] SR 78-06	nessen, O.M., ed. [1984, 176p.] SR 84-29

Discrete reflections from thin layers of snow and ice Jezek, K.C., et al. (1984, p. 323-331) MP 1871	Recent measurements of sea are topography in the eastern Arctic. Krabill, W.B, et al. (1990, p 132-136)	United States arctic research plan biennial revision 1990- 1991. Brown, J., ed. (1989, 72p) MP 2544
Use of remote sensing for the U.S. Army Corps of Engineers	MP 2735	Cold regions engineering research-strategic plan. Carlson,
dredging program. McKim, H L., et al, [1985, p.1141- 1150] MP 1890	Antarctic ice sheet brightness temperature variations Jezek, K.C., et al. [1990, p.217-223] MP 2736	R.F., et al. [1989, p 172-190] MP 2571 US global ice core research program West Antarctica and
Measuring multi-year sea ice thickness using impulse radai, Kovacs, A, et al. (1985, p.55-67) MP 1916	Airborne sea ice thickness sounding. Kovacs, A, et al. 1990, p 225-229; MP 2737	beyond Grootes, P.M., et al. (1989, 32p) MP 2709
Air-ice ocean interaction in Arctic marginal ice zones	Multiband imaging systems. McKim, H.L., et al, 11990,	Arctic research of the United States, Vol.4. (1990, 120p) MP 2765
MIZEX-West. Wadhams, P., ed, (1985, 119p) SR 85-06	10p 3 SR 90-15 Rescue operations	Reservoirs Skylab imagery Application to reservoir management in New
Electromagnetic properties of multi-year sea ice. Morey, R.M., et al, [1985, p.151-167] MP 1902	Detection of sound by persons buried under snow avalanche	England McKim, H L., et al. (1976, 51p)
Ice electrical properties. Gow, A.J., (1985, p.76-82)	Johnson, J.B., [1984, p.42-47] MP 1920 Research projects	SR 76-07 Environmental analyses in the Kootenai River region, Mon-
MP 1910 Dielectric measurements of snow cover. Burns, B.A., et al.	Abiotic overview of the Tundra Biome Program, 1971, Weller, G., et al. (1971, p 173-181) MP 906	tana. McKim, H.L., et al. (1976, 53p) SR 76-13 Slumping failure of an Alaskan earth dam. Collins, C.M., et
(1985, p 829-834) MP 1913	U.S Tundra Biome central program 1971 progress report.	al, (1977, 21p) SR 77-21
Ice conditions on the Ohio and Illinois rivers, 1972-1985. Gatto, L.W., [1985, p.856-861] MP 1914	Brown, J., [1971, p.244-270] MP 909 Summary of the 1971 US Tundra Biome Program Brown,	Landsat data analysis for New England reservoir manage- ment. Merry, C.J., et al. (1978, 61p.) SR 78-06
Evaluation of SPOT HRV simulation data for Corps of Engineers applications McKim, H L., et al. [1985, p 61-71]	J, (1972, p.306-313) MP 995	Limnology and primary productivity, Lake Koocanusa, Mon- tana. Woods, P.F., et al. (1982, 106p.) SR 82-15
MP 2184	Pedologic investigations in northern Alaska Tedrow, J.C.F., [1973, p. 93-108] MP 1005	Water quality measurements at six reservoirs Parker, L.V.,
Remote sensing data for water masses in Delaware Bay and adjacent wetlands. Ackleson, S.G., et al, [1985, p.1123-	Micrometeorological investigations near the tundra surface. Kelley, J.J., [1973, p.109-126] MP 1006	et al. (1982, 55p) SR 82-30 Reservoir bank erosion caused and influenced by ice cover
1129 ₁ MP 1909 Potential of remote sensing in the Corps of Engineers dredg-	Arctic limnology a review Hobbic, J E., [1973, p 127-	Gatto, L.W., (1982, 26p.) SR 82-31
ing program. McKim, H.L., et al, (1985, 42p.) SR 85-20	1683 MP 1007 Vegetative research in arctic Alaska. Johnson, P.L., et al,	Bank recession of Corps of Engineers reservoirs. Gatto, L.W., et al. (1983, 103p) SR 83-30
Terrain analysis from space shuttle photographs of Tibet.	(1973, p 169-198) MP 1008 Remote sensing program required for the AIDJEX model.	Spatial analysis in recreation resource management. Edwardo, HA, et al. [1984, p 209-219] MP 2004
Kreig, R.A., et al, [1986, p 400-409] MP 2097 Remote sensing of the Arctic seas. Weeks, W.F., et al,	Weeks, W.F., et al. (1974, p 22-44) MP 1040	Reservoir bank erosion caused by ice. Gatto, L.W., (1984,
(1986, p.59-64) MP 2117	Workshop on permafrost-related research and TAPS, [1975, 37p] MP 1122	p 203-2141 MP 1787 Erosion of northern reservoir shores Lawson, D.E. (1985,
Weddell-Scotia Sea MIZ, October 1984. Crasey, F.D., et al. (1986, p.3920-3924) MP 1536	Research activities of U.S. Army Cold Regions Research and Engineering Laboratory. Buzzell, T.D., 1975, p 9-12;	198p 1 M 85-01 Ice problems associated with rivers and reservoirs. Benson,
Meteorological variation of atmospheric optical properties in an antarctic storm Egan, W.G., et al, (1986, p.1155-	MP 1244	C., et al. (1986, p.70-98) MP 2155
1165 ₁ MP 2099	Snow and ice Colbeck, S.C., et al., [1975, p.435-441, 475-487] MP 844	Techniques for measuring reservoir bank erosion. Gatto, L.W., [1988, 27p] SR 88-03
Winter marginal ice zone experiment, Fram Strait/Greenland Sea, 1987/89. Davidson, K, ed, [1986, 53p]	High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., et al. [1975, p.1V/57-	lce cover formation downstream of a reservoir Ashton, G.D., [1988, p 189-198] MP 2498
SR 86-09 Electromagnetic properties of sea ice Kovacs, A, et al.	IV/68 ₃ MP 917	Residential buildings
[1986, p 57-133] MP 2197	Catalog of Snow Research Projects. (1975, 103p ; MP 1129	Life-cycle cost effectiveness of modular megastructures in cold regions. Wang, L.RL., et al. (1976, p.760-776)
Remote sensing of ice and snow (review) Jezek, K.C., [1987, p.51] MP 2429	Delineation and engineering characteristics of permafrost beneath the Beaufort Sea Sellmann, P.V., et al. [1976,	MP 892
River ice mapping with Landsat and video imagery. Gatto, L.W., et al. [1987, p 352-363] MP 2273	p 391-408 ₁ MP 1377	Tracer gas measurement of air exchange in buildings. Flanders, S.N., et al., £1989, p.433-4441 MP 2557
Electromagnetic property trends in sea ice, Part 1. Kovacs,	Site access for a subarctic research effort. Slaughter, C.W., (1976, 13p.) CR 76-09	Resins Resins and non-portland cements for construction in the cold.
Scientific challenges at the poles. Welch, J.P., et al. (1987,	Influence of grazing on Arctic tundra ecosystems. Batzli, GO., et al. (1976, p.153-160) MP 970	Johnson, R., (1980, 19p.) SR 90-35
p 23-26 ₃ MP 2228 Glaciological investigations using the synthetic aperture radar	Dynamics of near-shore ice Weeks, W.F., et al. [1976,	Polyethylene glycol as an ace control coating Itagaki, K, t1984, 11p3 CR 84-28
imaging system Bindschadler, R.A. et al. (1987, p 11-	p 267-275; MP 922 Update on snow load research at CRREL. Tobiasson, W., et	Revegetation
imaging system Bindschadler, R.A. et al. (1987, p. 11- 19) MP 2342 Use of Landsat for snow cover mapping, Saint John River	Update on snow load research at CRREL. Tobiasson, W., et al. (1977, p.9-13) MP 1142	Revegetation in arctic and subarctic North America a litera- ture review. Johnson, L.A. et al. (1976, 32p)
imaging system Bindschadler, R.A., et al. (1987, p. 11- 19) MP 2342	Update on snow load research at CRREL. Tobiasson, W. et al. (1977, p.9-13) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al. (1977, 66p.) SR 77-15	Resegration in arctic and subarctic North America—a litera- ture review. Johnson, L.A. et al. (1976, 32p.) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska.
imaging system Bindschadler, R.A. et al. [1987, p.11-19] MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J. et al. [1987, 68p] CR 87-06 Alaska synthetic aperture radar (SAR) facility project. Car-	Update on snow load research at CRREL. Tobiasson, W. et al. (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al. (1977, 66p.) SR 77-15 Ross Ice Shelf Project environmental impact statement July.	Resegration in arctic and subarctic North America—a litera- ture review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) MP 394
imaging system Bindschadler, R.A., et al. (1987, p.11-19) MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project Sept. F., et al. (1987, p. 593-596) Camp Century survey 1986 Gundestrup, N.S., et al. (1987, p. 1987)	Update on snow load research at CRREL. Tobiasson, W. et al. (1977, p.9-13) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al. (1977, 66p.) Ross Ice Shelf Project environmental impact statement July. 1974. Parker, B.C. et al. (1978, p.7-36) Subarctic watershed research in the Soviet Union Slaugh-	Revegetation in arctic and subarctic North America—a litera- ture review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traf- fic in northern regions. Brown, J., (1976, p 40-53)
imaging system 19; 19; 19se of Landsat for snow cover mapping, Saint John River basin, Maine. MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al., (1987, 68p.) CR 87-06 Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al., (1987, p. 593-596) Camp Century survey 1986 Gundestrup, N.S., et al., (1987, p. 281-288) MP 2331	Update on snow load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1975 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p. 305-313) MP 1273 Ecological baseline on the Alaskan haul road Brown, J., ed.	Resegration in arctic and subarctic North America—a litera- ture review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) MP 894 Ecological and environmental consequences of off-road traf-
imaging system Bindschadler, R.A., et al. (1987, p. 11-19) Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al. (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al. (1987, p. 593-596) Camp Century survey 1986 Gundestrup, N.S., et al. (1987, p. 128-1288) Remote sensing and water resources. McKum. H.L., et al. (1987, p. 186-190) MP 2335	Update on snow load research at CRREL. Tobiasson, W. et al. (1977, p.9-13) Scientists wsit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al. (1977, 66p.) Ross Ice Shelf Project environmental impact statement July. 1974. Parker, B. C., et al. (1978, p. 736) MP 1075 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al. (1978, p. 305-313) Ecological baseline on the Alaskan haul road (1978, 131p.) SR 78-13	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G. et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J. (1976, p 40-53) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M. (1977, 116p) SR 77-67
imaging system 193 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al., (1987, 68p.) Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al., (1987, p. 593-596) Camp Century survey 1986 Gundestrup, N.S. et al., (1987, p. 121-288) Remote sensing and water resources. Merry, C.J., 186-190, Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., (1987, p. 49-58)	Update on snow load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B. C., et al., (1978, p. 736) Subarcite watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p. 305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157)	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J. (1976, p. 40-53) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M. (1977, 116p) SR 77-07 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska. Johnson, L.A. (1978)
imaging system Bindschadler, R.A., et al. [1987, p 11-19] Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. [1987, 68p] CR 87-08 Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al. [1987, p 593-596] MP 2408 Camp Century survey 1986 Gundestrup, N.S., et al. [1987, p 281-288] Remote sensing and water resources. McKim, H.L., et al. [1987, p 186-190] MP 2331 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. [1987, p 49-58] Geographic information system for river basin Merry, C.J.	Update on snow load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) R7-15 R7-15 Subarctic watershed research in the Soviet Union tert. C.W., et al., (1978, p. 10-3-13) MP 1073 Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea tee zone. Weeks, W.F., et al.	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Heological and environmental consequences of off-road traffic in northern regions. Brown, J. (1976, p. 40-53) MP 1383 Bibliography of soil conservation activities in USSR permafost areas. Andrews, M. (1977, 116p) SR 77-67 Biological restoration strategies in relation to nutrients at a
imaging system Bindschadler, R.A., et al. (1987, p. 11-19) MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al. (1987, p. 593-596) Amp Century survey 1986. Gundestrup, N.S., et al. (1987, p. 128-1288) Remote sensing and water resources. McKim. H.L., et al. (1987, p. 186-190) Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. (1987, p. 49-58) Geographic information system for river basin. Merry, C.J., et al. (1987, p. 265-269) CRREL's experiences of femote sensing technology transfer	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists usit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1975 Subarcite watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J. ed., (1978, 131p.) SR 78-13 Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p.55-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) MP 1320	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J. (1976, p. 40-53) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M. (1977, 116p) SR 77-07 Biological restoration strategies in relation to nutrients as subarctic site in Fairbanks, Alaska. Johnson, L.A. (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M. (1978, 175p) SR 78-19
imaging system Bindschadler, R.A., et al., [1987, p.11-19] Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al., [1987, 68p.] Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al., [1987, p.593-596] MP 2408 Camp Century survey 1986 Gundestrup, N.S., et al., [1987, p.281-288] MP 2331 Remote sensing and water resources. McKim, H.L., et al., (1987, p.186-190) MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., [1987, p.49-58] MP 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p.271-273] MP 2550	Update on snow load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) R7-15 R0ss Lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union tert. C.W., et al., (1978, p. 305-313) MP 1273 Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Morkshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea tee zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. snow research Colbeck, S.C., (1979, p. 126-152) MP 1261	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Beological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-55) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-67 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28
imaging system Bindschadler, R.A., et al. (1987, p. 11-19). MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. (1987, 68p.) Alaska synthetic aperture radar (SAR) facility project. Caracy, F., et al. (1987, p. 593-596). MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. (1987, p. 281-288). MP 2331 Remote sensing and water resources. McKim, H.L., et al. (1987, p. 186-190). MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake. Ene. Merry, C.J., et al. (1987, p. 49-58). MP 2549 Geographic information system for river basin. Merry, C.J., et al. (1987, p. 265-269). MP 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., 1987, p. 271-273).	Update on snow load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p. 73-5) MP 1075 Subarcite watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p. 305-313) MP 1273 Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Morkshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. snow research. Colbeck, S.C., (1979, p. 341-52) Snow and the organization of snow research in the United States. Colbeck, S.C., (1979, p. 55-58) MP 1261	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) MP 984 Evological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p 40-5); MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p). SR 77-07 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p 460-466). MP 1100 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p). SR 78-19 Tundra recovery, since 1949 near Fish Creek, Alaska. Law-
imaging system Bindschadler, R.A., et al. (1987, p. 11-19) MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. (1987, 58p.) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al. (1987, p. 593-596) Camp Century survey 1986. Gundestrup, N.S., et al. (1987, p. 128-1288) Remote sensing and water resources. McKim. H.L., et al. (1987, p. 186-190) Use of SPOT HRV data in a Corps dredging operation in Lake Enc. Merry, C.J., et al. (1987, p. 49-58) Geographic information system for river basin. Merry, C.J., et al. (1987, p. 265-269) CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p. 271-273]. MP 2550 Sea ice thrikness and sub-ice bath) metry. Kovacs, A., et al. (1987, 40p.) Single-horn reflectometry for in situ dielectric measurements	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union Staughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p.355-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) Focus on U.S. snow research Colbeck, S.C., (1979, p.41-52) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p.55-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p.55-58) MP 1262	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G, et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G, et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G, et al. (1976, 7p) Brown, J., (1976, p. 40-53) MP 1303 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-07 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Tundra recovery since 1949 near Fish Creck, Alaska. Lawson, D. E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D. K. et al., [1979, 15p] MP 1638 Revegetation at two construction sites in New Hampshire and
imaging system Bindschadler, R.A. et al. [1987, p 11-19] Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J. et al. [1987, 68p] CR 87-08 Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al. [1987, p 593-596] CR 87-08 Camp Century survey 1986 Gundestrup, N.S., et al. [1987, p 281-288] Remote sensing and water resources. McKim, H.L., et al. [1987, p 186-190] MP 2331 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. [1987, p 49-58] Geographic information system for river basin Merry, C.J., et al. [1987, p 265-269] CR REL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] MP 2550 Sea ice thickness and sub-ice bathy metry. Kovacs, A., et al. [1987, 40p] CR 87-23 Single-horn retlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al., [1988, p 89-92] MP 2333	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) SR 77-15 Ross Lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarcite watershed research in the Soviet Union ter, C.W., et al., (1978, p. 305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. snow research. Colbeck, S.C., (1979, p. 341-52) MP 1261 Snow and the organization of snow research in the United States. Colbeck, S.C., (1979, p. 55-58) MP 1262 Alt-ice-ocean interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) SR 81-19 National Chinese Conference on Permaifrost, 2nd, 1981	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) MP 994 Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-53) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Tundra recoverty since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) Recovery of the Kokokik River tundra area, Alaska. Hall, D.K., et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p.) CR 80-63 Remote sensing of revegetation of burned tundra, Kokolik
imaging system Bindschadler, R.A., et al. [1987, p 11-19] MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. [1987, 68p] CR 87-08 Alaska synthetic aperture radar (SAR) facility project Caracy, F., et al. [1987, p 593-596] MP 2408 Camp Century survey 1986 Gundestrup, N.S., et al. [1987, p 281-288] MP 2331 Remote sensing and water resources. McKim, H.L., et al. [1987, p 186-190] MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al. [1987, p 49-58] MP 2548 Geographic information system for river basin Merry, C.J. et al. [1987, p 265-269] CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] Sea ice thickness and sub-ice bath) metry. Kovacs, A. et al. [1987, 40p] Single-horn reflectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al. [1988, p 89-92] Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., [1988, 162p] SR 88-01	Update on show load research at CRREL. Tobiasson, W. et al. (1977, p.9-13) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W. et al. (1977, 66p.) Ross Ice Shelf Project environmental impact statement July. 1974. Parker, B. C., et al. (1978, p. 7-36) Subarcite watershed research in the Soviet Union Slaughter, C.W., et al. (1978, p. 305-313) Ecological baseline on the Alaskan haul road Brown, J. ed. (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al. (1978, p. 155-157) MP 1183 Overview on the ecasonal sea ice zone Weeks, W.F., et al. (1979, p. 310-337) Focus on U.S. show research Colbeck, S.C. (1979, p. 41-52) Sonow and the organization of show research in the United States Colbeck, S.C. (1979, p. 55-58) MP 1262 Alti-tec-ocean interaction in Arelic marginal ice zones. Wadhams, P., ed. (1981, 20p.) SR 81-19 National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al. (1982, 58p.) SR 82-03 Science program for an imaging radar receiving station in	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. MP 894 Evological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-51) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-18 Biological restoration strategies in relation to nutrients at subarctic site in Fairbanks, Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D. E., et al., (1978, 81p) CR 78-28 Recovery of the Kokokik River tundra area, Alaska. Hall, D. K., et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A. J., et al., (1980, 21p.) CR 80-03
imaging system Bindschadler, R.A. et al. [1987, p 11-19] Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J. et al. [1987, 68p] CR 87-08 Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al. [1987, p 593-596) Cm 87-08 Alaska synthetic aperture radar (SAR) facility project Carsey, F., et al. [1987, p 593-596] Cmp Century survey 1986 Gundestrup, N.S., et al. [1987, p 281-288] Remote sensing and water resources. McKim, H.L., et al. [1987, p 186-190] MP 2331 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. [1987, p 49-58] MP 2549 CR 87-08 Geographic information system for river basin Merry, C.J., et al. [1987, p 265-269] CR 87-23 Sea ice thickness and sub-ice bathy metry. Kovacs, A., et al. [1987, 40p] CR 87-23 Single-horn ietlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al. [1988, p 89-92] MP 2333 Ice conditions along the Ohio River, 1972-1985, Gatto, L.W. [1988, 162p] Alaska SAR facility Weeks, W.F., et al. [1988, p 103-1	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union terr. C.W., et al., (1978, p. 105-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Morkshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea tee zone Weeks, W.F., et al., (1979, p. 320-337) Sovens on U.S. snow research Colbeck, S.C., (1979, p. 415-21) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1261 Air-ice-ocean interaction in Aretic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrosi, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1884	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, 6, et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-53) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-67 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) MP 1180 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D.K., et al., (1970, 15p) MP 1638 Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p.) CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272). MP 1391 Environmental engineering, Yukon River-Prudhoe Bay Haul
imaging system Bindschadler, R.A., et al. (1987, p. 11-19). MP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. (1987, 68p). CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Caracy, F., et al. (1987, p. 593-596). MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. (1987, p. 281-288). MP 2331 Remote sensing and water resources. McKim, H.L., et al. (1987, p. 186-190). MP 2335 Use of SPOT HRV data in a Corps dredging operation in Lake. Ene. Merry, C.J., et al., (1987, p. 265-269). MP 2549 Geographic information system for river basin. Merry, C.J., et al., (1987, p. 265-269). MP 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p. 271-273). MP 2550 Sea ice thickness and sub-ice bath) metry. Kovacs, A., et al., (1987, 40p). Sea lee thickness and sub-ice bath) metry. Kovacs, A., et al., (1987, 40p). MP 2333 Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., (1988, 162p). SR 88-01 Alaska SAR facility. Weeks, W.F., et al., (1988, p. 103-110). MP 2344 Ice conditions along the Allegheny and Monongahela Rivers.	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B. C., et al., (1978, p.7-36) Subarcite watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.195-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Syllis in Alaska. Atlas, R.M., et al., (1978, p.155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) Focus on U.S. show research Colbeck, S.C., (1979, p.41-32) Focus on U.S. show research Colbeck, S.C., (1979, p.41-32) Sinon and the organization of show research in the United States Colbeck, S.C., (1979, p.55-58) MP 1262 Air-ice-ocean interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) SR 81-19 National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) SR 82-03 Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1288 MP 1288	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-5); MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p). SR 77-07 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska. Johnson, L.A., (1978, p. 460-466). MP 1180 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p). SR 78-19 Fundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p). CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D.K., et al., (1970, 15p). MP 1638 Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p.). CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272). MP 1391 Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 18p.). CR 80-19 Revegetation along roads and pipelines in Alaska. Johnson,
imaging system Bindschadler, R.A., et al. [1987, p 11-19] Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al. [1987, 68p] CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al. [1987, p 593-596] MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. [1987, p 121-288] Remote sensing and water resources. McKim. H.L., et al. [1987, p 186-190] Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al. [1987, p 49-58] Geographic information system for river basin. Merry, C.J. et al. [1987, p 265-269] CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J. [1987, p 271-273] MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al. [1987, 40p] Single-horn ietlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al. [1988, p 89-92] Le conditions along the Ohio River, 1972-1985. Gatto, L.W. [1988, 162p] Alaska SAR facility. Weeks, W.F., et al. [1988, p 103-110] SR 88-01 Filtering and classification routines in land use imagery.	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul troad Brown, J., ed., (1978, p.135-157) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p.155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) Focus on U.S. show research Colbeck, S.C., (1979, p.41-32) Snow and the organization of show research in the United States Colbeck, S.C., (1979, p.55-58) MP 1261 Snow and the organization of show research in the United States Colbeck, S.C., (1979, p.55-58) MP 1261 Ait-ice-ocean interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, J.d., 1981 Brown, J., et al., (1982, 58p.) SR 81-19 National Chinese Conference on Permafrost, J.d., 1981 Science program for an imaging radar receising station in Alaska Weller, G., et al., (1983, 45p.) MP 1884 Perspectives in ice technology Ashton, G.D., (1986, 4p.) MP 2288 Scientific challenges at the poles Welch, J.P., et al., (1987, MP 2288)	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. America in cushion services of off-road traffic in northern regions. Brown, J., (1976, p. 40-51) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-07 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 17p) Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area. Alaska. Hall, D.K., et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p.) CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) Revegetation at Genering. Yukon River-Prudhoe Bay Hallanda. Brown, J., ed., (1980, 187p) CR 80-19 Revegetation and long roads and pipelines in Alaska. Johnson, MP 1303 Stabilizing fire breaks in tundra vegetation. Patterson, W.A.
imaging system lindschadler, R.A., et al. (1987, p. 11- 19) WP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project Samp Century survey 1986 Gundestrup, N.S., et al. (1987, p. 593-596) MP 2331 Remote sensing and water resources. McKim, H.L., et al. (1987, p. 186-190) Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. (1987, p. 49-58) Geographic information system for river basin Merry, C.J., et al. (1987, p. 271-273) CR 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. MP 2550 Sea ice thickness and sub-ice bath) metry. Kovacs, A., et al. (1987, 40p) Single-horn reflectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al. (1988, p. 99-92) Alaska SAR facility Mecks, W.F., et al. (1988, p. 103- Ilo., MP 2344 Ilee conditions along the Ohio River, 1972-1985. Gatto, L.W., (1988, 106p) SR 88-06 Filtering and classification routines in land use imagery, Merry, C.J., et al. (1988, p. 57-58) MP 2534 MP 2534	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p. 9-13) NP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p. 7-36) NP 1075 Subarctic watershed research in the Soviet Union tert, C.W., et al., (1978, p. 105-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. snow research Colbeck, S.C., (1979, p. 1920-1920) Focus on U.S. snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1262 Air-ice-ocean interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles Welch, J.P., et al., (1987, 1978) MP 2288	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-5); MP 1383 Bibliography of soil conservation activities in USSR permafrost area. Andrews, M., (1977, 116p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Resolved of the Kokolik River tundra area, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D.K., et al., (1970, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p-) Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) MP 1391 Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Prown, J., ed., (1980, 189-190) Revegetation along reads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) Stabilizing fire breaks in tundra vegetation. Patterson, W.A., MP 1353 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., MP 1384
imaging system ling MP 2342 MP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al., (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., (1987, p. 593-596) MP 2408 Camp Century survey 1986 Gundestrup, N.S., et al., (1987, p. 231-288) MP 2331 Remote sensing and water resources. McKim. H.L., et al., (1987, p. 186-190) MP 2335 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., (1987, p. 49-58) MP 2548 Geographic information system for river basin Merry, C.J., et al., (1987, p. 265-269) MP 2548 Graphic information system for river basin Merry, C.J., et al., (1987, p. 265-269) MP 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., (1987, p. 271-273) MP 2550 Sea ice thirkness and sub-ice bathymetry. Kovacs, A., et al., (1987, 40p) CR 87-23 Single-horn retlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al., (1988, p. 99-92) Lee conditions along the Ohio River, 1972-1985. Gatto, L.W., (1988, 165p) SR 88-01 Alaska S.AR facility Weeks, W.F., et al., (1988, p. 103-110) MP 2344 Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., (1988, 106p) SR 88-06 Filtering and classification routines in land use imagery, Merry, C.J., et al., (1988, 57-58) MP 2334 Airborne sea ice thickness sounding Kovacs, A., et al., (1989, p.1042-1052) MP 2623	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J. ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 555-187) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. show research Colbeck, S.C., (1979, p. 41-52) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 555-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 555-58) MP 1262 Alti-tec-ocean interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 2288 Scientific challenges at the poles Welch, J.P., et al., (1987, 121p.) MP 2288 Scientific challenges at the poles Welch, J.P., et al., (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.)	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) MP 383 Bibliogical and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-51) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-05 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area. Alaska. Hall, D.K., et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p.) CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) Revegetation and geneering. Yukon River-Prudhoe Bay Haulan Road. Brown, J., ed., (1980, 187p) CR 80-19 Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) MP 1303 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., Ill., et al., (1981, p. 188-189) Level of the service of the presence of the pr
imaging system ling MP 2342 MP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al., (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., (1987, p. 593-596) MP 2408 Camp Century survey 1986 Gundestrup, N.S., et al., (1987, p. 186-190) MP 2331 Remote sensing and water resources. McKim. H.L., et al., (1987, p. 186-190) MP 2335 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., (1987, p. 49-58) MP 2548 Geographic information system for river basin Merry, C.J., et al., (1987, p. 265-269) MP 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., (1987, p. 271-273) MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al., (1987, 40p) MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al., (1987, 40p) MP 2333 Single-horn ietlectometry for in situ dielectric measuremiss at microwave frequencies. Arcone, S.A., et al., (1988, p. 89-92) Lee, (1988, 162p) SR 28-01 Alaska SAR facility Weeks, W.F., et al., (1988, p. 103-110) MP 2344 Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., (1988, 106p) SR 288-01 Alforme sea ice thickness sounding Knvacs, A., et al., (1989, p. 1042-1052) MP 2623 Oceanic heat flux in the Fram Strait measured by a drifting buoy. Perovich, DK, et al., (1989, p. 995-998)	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. show research Colbeck, S.C., (1979, p.41-52) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1262 Snow and the organization of Primarine ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981. Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 2208 Scientific challenges at the poles Welch, J.P., et al., (1987, p. 23-26) Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 2, (1988, 76p.)	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-67 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 17p) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 18p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D.K., et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palatro, A.J., et al., (1980, 12p) CR 80-03 Remote sensing of revegetation of burned tundra. Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Prown, J., ed., (1980, 187p) Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Prown, J., ed., (1980, 187p) CR 80-19 Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 1291, 15p) CR 80-19 Revegetation along the trans-Alaska pipeline, 1975-1972. Johnson, A.J., (1981, 115p) CR 81-12 Chena River Lakes Project revegetation study summary. Johnson, L.A., et al., (1981, 199)
imaging system lindschadler, R.A., et al. (1987, p. 11-19) WP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al. (1987, 659) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al. (1987, p. 593-596) MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. (1987, p. 281-288) Remote sensing and water resources. McKim. H.L., et al. (1987, p. 186-190) MP 2331 Remote sensing and water resources. McKim. H.L., et al. (1987, p. 186-190) MP 2335 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. (1987, p. 49-58) Geographic information system for river basin. Merry, C.J., et al. (1987, p. 265-269) CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., (1987, p. 271-273) MP 2536 Sea ice thirkness and sub-ice bathymetry. Kovacs, A. et al. (1987, 40p) Sca ice thirkness and sub-ice bathymetry. Kovacs, A. et al. (1987, 40p) Sca ice thirkness and sub-ice bathymetry. Kovacs, A. et al. (1987, 40p) Sca ice odditions along the Ohio River, 1972-1985. Gatto, L.W., (1988, 162p) Alaska SAR facility Weeks, W.F., et al., (1988, p. 103-110) MP 2344 Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., (1988, 106p) SR 88-06 Filtering and classification routines in land use imagery, Merry, C.J., et al., (1988, p. 57-58) MP 2534 Alrborne sea ice thickness sounding Kovacs, A. et al., (1989, p. 104-21032) Oceanic heat flux in the Fram Stratt measured by a drifting buoy. Perovich, D.K., et al., (1989, p. 995-998)	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1073 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J. ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 555-187) MP 1183 Overview on the seasonal sea ice zone Weeks, W. F., et al., (1979, p. 320-337) Focus on U.S. show research Colbeck, S.C., (1979, p. 41-52) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 555-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 555-58) MP 1262 Adit-tee-ocean interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles Welch, J.P., et al., (1987, 121p.) MP 2288 Scientific challenges at the poles Welch, J.P., et al., (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-5); MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Ry 71-19 Final recovery since 1949 near Fish Creek, Alaska. Lawson, D. E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D. K., et al., (1970, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palatro, A. J., et al., (1980, 21p.) CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D. K., et al., (1980, p. 263-272) Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Prown, J., ed., (1980, 187p) Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) Stabilizing fire breaks in tundra vegetation. Patterson, W.A., Ill., et al., (1981, p. 188-189) Chena River, Lakes Project revegetation studythree-year summary. Johnson, L.A., et al., (1981, 39p) CR 81-18
imaging system ling MP 2342 MP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al., (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., (1987, p. 593-596) MP 2408 Camp Century survey 1986 Gundestrup, N.S., et al., (1987, p. 186-190) MP 2331 Remote sensing and water resources. McKim. H.L., et al., (1987, p. 186-190) MP 2335 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., (1987, p. 49-58) MP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., (1987, p. 49-516) MP 2548 Geographic information system for river basin Merry, C.J., et al., (1987, p. 265-269) MP 2549 CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., (1987, p. 271-273) MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al., (1987, 40p) MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al., (1987, 40p) MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al., (1988, p. 69-92) MP 2333 Ice conditions along the Ohio River, 1972-1985, Gatto, L.W., (1988, 162p) SR 88-01 Alaska SAR facility Weeks, W.F., et al., (1988, p. 103-110) MP 2344 Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., (1988, 106p) SR 88-06 Filtering and classification routines in land use imagery, Merry, C.J., et al., (1988, p. 57-58) MP 234 Arborne sea ice thickness sounding Kovacs, A., et al., (1989, p. 1042-1052) Oceanic heat flux in the Fram Strait measured by a drifting buoy. Perovich, D.K., et al., (1989, p. 995-998) MP 2531 Data reduction of GOES information from DCP networks DeCoff, G.W., et al., (1989, 15p) SR 89-29	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, p.1305-313) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p.155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) Focus on U.S. snow research Colbeck, S.C., (1979, p.41-52) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p.55-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p.55-58) MP 1261 Air-tee-occan interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) SR 82-03 Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles Welch, J.P., et al., (1987, p.23-26) Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 2, (1988, 76p., MP 2379 Engineering geology studies on the National Petroleum Reserve in Alaska. Kachadoorian, R., et al., (1988, p.89)	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of MP 184 Evological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-51) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) SR 77-67 Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, 1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 17p) SR 78-19 Tundra recovery since 1949 near Fish Creck, Alaska. Lawson, D. E., et al., (1978, 18p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D. K., et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazzo, A. J., et al., (1980, 21p.) CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D. K., et al., (1980, p. 263-272) Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Prown, J., ed., (1980, 187p) CR 80-19 Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) MP 1353 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., Ill., et al., (1981, p. 188-189) Revegetation along the trans-Alaska pipeline, 1975-1972 Johnson, A. J., (1981, 115p) CR 81-12 Chena River Lakes Project revegetation study. *three-year summary. Johnson, L.A., et al., (1982, A.) et al., (1983, 199)
imaging system Bindschadler, R.A., et al. [1987, p 11-19] Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al., [1987, 635] CR 87-08 Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596] Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596] Amp 2303 Camp Century survey 1986. Gundestrup, N.S., et al., [1987, p 121-288] Remote sensing and water resources. McKim. H.L., et al., [1987, p 136-190] Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al., [1987, p 49-58] Geographic information system for river basin. Merry, C.J., et al., [1987, p 25-269] CRREL's experiences of femote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] MP 2550 Sea ice thrikness and sub-ice bathymetry. Kovacs, A., et al., [1987, 40p] Single-horn ietlectometry for in situ dielectric measurements at microwave frequencies. Arconc. S.A., et al., [1988, p 89-92] MP 2333 Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., [1988, 162p] Alaska SAR facility. Weeks, W.F., et al., [1988, p 103-110] Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., [1988, 106p] Filtering and classification routines in land use imagery, Merry, C.J., et al., [1988, p 57-58] Amp 2344 Arborne sea ice thickness sounding. Kovacs, A., et al., [1989, p.1042-1052] Oceanic heat flux in the Fram Stratt measured by a drifting buoy. Perovich, D.K., et al., [1989, p.59-998] Data reduction of GOES information from DCP networks DeCoff, G.W., et al., [1980, 159] Satellite remote sensing in Arctic for 1990's Mercy, C.J., 1989, p.510-530, MP 2699	Update on snow load research at CRREL. Tobiasson, W., et al., (1977, p. 9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p. 73-36) MP 1075 Subarctic watershed research in the Soviet Union tert, C.W., et al., (1978, p. 105-313) MP 1273 Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Morkshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 120-337) Focus on U.S. snow research Colbeck, S.C., (1979, p. 41-52) Som and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1262 Ait-tec-occan interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981, Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 35p.) MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26) Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 2, (1988, 76p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1988, 1899, 1999) Engineering geology studies on the National Petroleum Reserve in Alaska. Kachadoorian, R	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, 6, et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, 6, et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, 6, et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, 6, et al. (1976, 7p) Bological and environmental consequences of off-road traffic in northern regions. Brown, J., (1977, 116p) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1978, 17p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 17p) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area. Alaska. Hall, D.K. et al., (1979, 15p) MP 1638 Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p.) CR 78-28 Revegetation at two construction of burned tundra. Kokolik River, Alaska. Hall, D.K. et al., (1980, p. 263-272) MP 1393 Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1940, 187p.) CR 80-19 Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1930, p. 129-150, MP 1353 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., 111, et al., (1981, p. 188-189) Revegetation along the trans-Alaska pipeline, 1975-1973. Johnson, A.J., (1981, p. 188-189) Chena River Lakes Project revegetation studythree-year summary. Johnson, L.A. et al., (1981, 59p.) CR 81-18 Sewage sludge aids revegetation. Palazzo, A.J., et al., (1982, p. 198-301) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, p. 543).
imaging system ling MP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al., [1987, 68p] Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596) Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596) MP 2408 Amp 26ntury survey 1986 Gundestrup, N.S., et al., [1987, p 121-288] Remote sensing and water resources. McKim. H.L., et al., [1987, p 186-190) MP 2331 Remote sensing and water resources. McKim. H.L., et al., [1987, p 186-190) Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al., [1987, p 49-58] Geographic information system for river basin. Merry, C.J., et al., [1987, p 265-269] CRREL's appetiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] MP 2550 Sea ice thickness and sub-ice bathymetry. Kovacs, A., et al., [1987, 40p] Single-horn retlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al., [1988, p 89-92] Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., [1988, 162p] Alaska SAR facility. Weeks, W.F., et al., [1988, p 103-110] Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., [1988, 106p] SR 88-01 Altborne sea tice thickness sounding. Knvacs, A., et al., [1989, p,1042-1052] Oceanic heat flux in the Fram Strait measured by a drifting buoy. Perovich, D.K., et al., [1989, p, 995-998] Data reduction of GOES information from DCP networks. DeCoff, G.W., et al., [1980, p, 1995-998] Data reduction of GOES information from DCP networks. DeCoff, G.W., et al., [1980, p, 1995-998] Satellite data collection platforms for temperature measure.	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocathon Spills in Alaska. Atlas, R.M., et al., (1978, p.355-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) Focus on U.S. snow research Colbeck, S.C., (1979, p.41-52) Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p.55-58) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p.55-58) MP 1262 Air-tee-occan interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles Welch, J.P., et al., (1987, p.23-26) Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 2, (1988, p.80) MP 2379 Engineering geology studies on the National Periodicum Reserve in Alaska Kachadoorian, R., et al., (1988, p.80) MP 2519 Arctic research in the Linited States, Vol. 3, (1988, p.80) MP 2519 Arctic research in the Linited States, Vol. 3, (1988, p.80) MP 2519 Arctic research in the Linited States, Vol. 3, (1988, p.80)	Resegration in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G. et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-51) MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of permafrost soils and vegetation to nutrients at a subarctic site in Fairbanks, Alaska. Johnson, L.A., (1978, Andrews, M., (1978, 175p) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) Recovery of the Kokolik River tundra area, Alaska. Hall, D.K., et al., (1970, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palatzo, A.J., et al., (1980, 21p). CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) Benvironmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 187p). CR 80-19 Evegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150). Stabitizing fire breaks in tundra vegetation. Patterson, W.A., III., et al., (1981, p. 188-189). CR 81-12 Chena River Lakes Project revegetation study -three-year summary. Johnson, L.A., et al., (1981, 5p). CR 81-18 Sewage sludge aids revegetation. Palazzo, A.J., et al., (1981, p. 54), p. 178-180.
imaging system Bindschadler, R.A., et al. [1987, p 11-19] WP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. [1987, 68p] CR 87-08 Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al. [1987, p 593-596] MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. [1987, p 186-190] Remote sensing and water resources. McKim, H.L., et al. [1987, p 186-190] WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al. [1987, p 49-55] Geographic information system for river basin. Merry, C.J. et al. [1987, p 49-55] GRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] Sea ice thickness and sub-ice bathy metry. Kovacs, A., et al. [1987, 40p] Single-horn retlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al., [1988, p 99-92] In Page 233 Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., [1988, 163p] Alaska SAR facility Weeks, W.F., et al., [1988, p 103-110] Alaska SAR facility Weeks, W.F., et al., [1988, p 103-110] Filtering and classification routines in land use imagery, Merry, C.J., et al., [1988, p 57-58] Alroories aca tec thickness sounding. Kovacs, A., et al., [1989, p.1042-1052] Oceanic heat flux in the Fram Strait measured by a dinfting buoy. Perovich, D.K., et al., [1989, p.995-998] Data reduction of GOES information from DCP networks. DeCoff, G.W., et al., [1989, 149] SR 88-05 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1989, 149] SR 88-29 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1980, 149] SR 88-30 SET 88-01 MP 2699 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1980, 149] SR 88-05 SET 88-06 MP 2699 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1980, 149] SR 88-06 SR 88-07 SET 88-07 SET 88-08 SET 88-08 S	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July. 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarctic watershed research in the Soviet Union ter. C.W., et al., (1978, p.305-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Morkshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p.320-337) Focus on U.S. snow research. Colbeck, S.C., (1979, p.41-52) Some and the organization of snow research in the United States. Colbeck, S.C., (1979, p.55-58) MP 1261 Snow and the organization of snow research in the United States. Colbeck, S.C., (1979, p.55-58) MP 1262 Air-tec-occan interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) Sational Chinese Conference on Permafrost, 2nd, 1981, 1991 National Chinese Conference on Permafrost, 2nd, 1981, 1991 Steinee program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 35p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 35p.) MP 2308 Scientific challenges at the poles. Welch, J.P., et al., (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research in the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research in the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research in the United States, Vol. 1, (1987, 121p., MP 2306 Ar	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) CR 76-15 Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of a sir cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Biological and environmental consequences of off-road traffic in northern regions. Brown, J., (1977, 116p) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1978, 175p) Franciscopies of permafrost soils and vegetation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D. E., et al., (1978, 175p) Recovery of the Kokolik River tundra area. Alaska. Hall, D. K. et al., (1979, 15p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 21p) Revegetation at two construction sites in New Hampshire and Alaska. Palazro, A.J., et al., (1980, 12p) Remote sensing of revegetation of burned tundra. Kokolik River, Alaska. Hall, D. K. et al., (1980, p. 263-272) MP 1303 Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Prown, J., ed., (1980, 187p) CR 80-19 Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 128-193) Stabilizing fire breaks in tundra vegetation. Patterson, W.A., III., et al., (1981, p. 188, 189) Revegetation along the trans-Alaska pipeline, 1973-1978. Johnson, A.J., (1981, p. 188, 189) Chena River Lakes Project revegetation study summary. Johnson, L.A. et al., (1981, 59p) Sewage sludge ands revegetation. Palazzo, A.J., et al., (1982, p. 543-547) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1982, p. 543-547) Restoration of acadic dredge soils with sewage sludge and lime. Pal
imaging system Bindschadler, R.A., et al. [1987, p 11-19] WP 2342 Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. [1987, 635p] CR 87-08 Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al. [1987, p 593-596] Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al. [1987, p 593-596] MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. [1987, p 186-190] Remote sensing and water resources. McKim. H.L., et al. [1987, p 186-190] Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al. [1987, p 49-58] Geographic information system for river basin. Merry, C.J. et al. [1987, p 265-269] CRREL's experiences of femote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] MP 2550 Sea ice thrickness and sub-ice bathymetry. Kovacs, A., et al. [1987, 40p] Single-horn ietlectometry for in situ dielectric measurements at microwave frequencies. Arconc. S.A., et al. [1988, p 89-92] MP 2333 Ice conditions along the Ohio River, 1972-1985. Gatto, L.W. [1988, 162p] Alaska SAR facility. Weeks, W.F., et al. [1988, p 103-110] Ice conditions along the Allegheny and Monongahela Rivers Gatto, L.W., [1988, 106p] Filtering and classification routines in land use imagery, Merry, C.J., et al. [1988, p 57-58] MP 2534 Arrborne sea ice thickness sounding. Kovacs, A., et al. [1989, p.1042-1052] Oceanic heat flux in the Fram Stratt measured by a drifting buoy. Perovich, D.K., et al. [1989, p.59-98] MP 2531 Data reduction of GOES information from DCP networks DeCoff, G.W., et al. [1989, 159] Satellite data collection platforms for temperature measurements. Daly, S.F., et al. [1989, 10p] SR 88-04 SR 88-05 MP 2699 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1989, 10p] SR 88-07 SR 88-08 SR 88-09 SR 88-09	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p. 9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p. 7-36) MP 1075 Subarctic watershed research in the Soviet Union tert. C.W., et al., (1978, p. 105-313) Ecological baseline on the Alaskan haul road Brown, J., ed., SR 78-13 Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea tee zone Weeks, W.F., et al., (1979, p. 1320-337) MP 1230 Overview on the seasonal sea tee zone Weeks, W.F., et al., (1979, p. 1320-337) MP 1241 Sonow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1262 Air-ice-ocean interaction in Arctic marginal ice zones Wadhams, P., ed., (1981, 20) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles Welch, J.P., et al., (1987, p. 23-26) Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1988, 76p.) MP 2306 Arctic research of the United States, Vol. 1, (1988, 78p.) Engineering geology studies on the National Petroleum Reserve in Alaska Kachadoorian, R., et al., (1988, 889) 2221 Arctic research in the Linited States, Vol. 3, (1988, 889) 2222 Arctic research in the Linited States, Vol. 3, (1988, 889) 2223 Arctic research in the Linited States, Vol. 3, (1988, 889) MP 2306 Arctic research in the Linited States, Vol. 3, (1988, 889) MP 2306 Arctic research in the Linited States, Vol. 3, (1988, 889) MP 2306 Arctic research in the Linited States,	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-53) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of permafrost soils and vegetation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recoverty since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) Revegetation at two construction sites in New Hampshire and Alaska. Palatro, A.J., et al., (1980, 21p.) Revegetation at two construction of burned tundra. Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) MP 1391 Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 187p) Revegetation along reads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) MP 1393 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., (1981, 115p) Chena River Lakes Project revegetation studythree-year summaty. Johnson, L.A., et al., (1981, 59p) Sewage sludge aids revegetation. Palazzo, A.J., et al., (1982, p. 1983, 101) Sewage sludge aids revegetation. Palazzo, A.J., et al., (1982, p. 1983, 14p) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, p. 543-547) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, p. 543-547) Revegetation along propline rights-of-way in Alaska. Johnson, L., (1984, p. 254-264) MP 2113
imaging system ling MP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al., [1987, 68p] Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596] Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596] Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., [1987, p 593-596] MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al., [1987, p 231-288] Remote sensing and water resources. McKim. H.L., et al., [1987, p 186-190] MP 2331 Remote sensing and water resources. McKim. H.L., et al., [1987, p 186-190] Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al., [1987, p 49-58] Geographic information system for river basin. Merry, C.J. et al., [1987, p 265-269] CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] MP 2550 Sea ice thi:kness and sub-ice bathymetry. Kovacs, A., et al., [1987, 40p] Single-horn ietlectometry for in situ dielectric measurements at microwave frequencies. Acconc. S.A., et al., [1988, p 89-92] Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., [1988, 162p] Alaska SAR facility. Weeks, W.F., et al., [1988, p 103-110] Ice conditions along the Allegheny and Monongahela Rivers. Gatto, L.W., [1988, 106p] SR 88-01 Altborne sea ice thickness sounding. Kovacs, A., et al., [1988, p 57-58] MP 2534 Airborne sea ice thickness sounding. Kovacs, A., et al., [1989, p, 1042-1052] Oceanic heat flux in the Fram Strait measured by a drifting buoy. Perovich, D.K., et al., [1989, p, 995-998] Data reduction of GOES information from DCP networks. DeCoff, G.W., et al., [1989, 15p] SR 89-37 Estimating sea ice thickness using data from impulse radar soundings. Kovacs, A., et al., [1989, 14p] SR 89-37 Estimating sea ice thickness using data from impulse radar soundings. Kovacs, A., et al., [1989, 109] Extending the allegen of temperature measurements. Daly, S	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p.9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p.7-36) MP 1075 Subarcite watershed research in the Soviet Union Slaughter, C.W., et al., (1978, p. 105-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 130-337) MP 1320 Focus on U.S. show research. Colbeck, S.C., (1979, p. 14-52) Snow and the organization of snow research in the United States. Colbeck, S.C., (1979, p. 55-58) MP 1261 Snow and the organization of snow research in the United States. Colbeck, S.C., (1979, p. 55-58) MP 1262 Ait-ice-ocean interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) SR 81-19 National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles. Welch, J.P., et al., (1987, 121p.) MP 2236 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2236 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2308 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2308 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2308 Arctic research of the United States, Vol. 1, (1987, 121p.) MP 2308 Arctic research of the United States, Vol. 2, (1988, 26p.) MP 2309 Arctic research in the Linited States, Vol. 3, (1988, p.99) Arctic research in the Linited Stat	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-5); MP 1383 Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Ry 1190 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Ry 1190 Pundra recovery since 1949 near Fish Creek, Alaska. Lawson, D. E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D. K., et al., (1979, 15p) Revegetation attwo construction sites in New Hampshire and Alaska. Palazro, A. J., et al., (1980, 21p.) CR 80-03 Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D. K., et al., (1980, p. 263-272) Environmental engineering, Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 187p) Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) Stabilizing fire breaks in tundra vegetation. Patterson, W.A., 111, et al., (1981, p. 188-189) CR 80-19 Chena River Lakes Project revegetation study -three-year summary. Johnson, L.A., et al., (1981, 59p) CR 81-18 Sewage sludge aids revegetation. Palazzo, A.J., et al., (1982, p. 198-301) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, p. 543-547) MP 1600 Restoration along pipeline rights-of-way in Alaska. Johnson, L., et al., (1983, p. 543-547) MP 1600 Restoration along pipeline rights-of-way in Alaska. Johnson, L. et al., (1983, p. 543-547) MP 1600
imaging system Bindschadler, R.A., et al. [1987, p 11-19] Use of Landsat for snow cover mapping, Saint John River basin, Maine. Merry, C.J., et al. [1987, 635p] CR 87-08 Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al. [1987, p 593-596] Alaska synthetic aperturie radar (SAR) facility project. Carsey, F., et al. [1987, p 593-596] MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al. [1987, p 121-288] Remote sensing and water resources. McKim, H.L., et al. [1987, p 136-190] WP 2535 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J. et al. [1987, p 49-55] Geographic information system for river basin. Merry, C.J. et al. [1987, p 49-55] GRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., [1987, p 271-273] MP 2540 CR 87-23 Single-horn retlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al. [1988, p 99-92] In Page 233 Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., [1988, 163p] Alaska SAR facility. Weeks, W.F., et al., [1988, p 103-110] Alaska SAR facility. Weeks, W.F., et al., [1988, p 103-110] Filtering and classification routines in land use imagery, Merry, C.J., et al., [1988, p 57-58] Alroories aca tec thickness sounding. Kovacs, A., et al., [1989, p.1042-1052] Oceanic heat flux in the Fram Strait measured by a dinfting buoy. Perovich, D.K., et al., [1989, p 995-998] Data reduction of GOES information from DCP networks. DeCoff, G.W., et al., [1989, 149] SR 88-09 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1989, 190] SR 88-29 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1980, 190] MP 2699 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1990, p.109]. SR 88-29 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., [1990, p.109]. SR 88-29 Satellite data collection platforms for temperatur	Update on show load research at CRREL. Tobiasson, W., et al., (1977, p. 9-13) MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., (1977, 66p.) Ross Lee Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., (1978, p. 7-36) MP 1075 Subarctic watershed research in the Soviet Union tert. C.W., et al., (1978, p. 105-313) Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Morkshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., (1978, p. 155-157) MP 1183 Overview on the seasonal sea tee zone Weeks, W.F., et al., (1979, p. 320-337) Focus on U.S. snow research Colbeck, S.C., (1979, p. 3120-337) Focus on U.S. snow research of the United States. Colbeck, S.C., (1979, p. 55-58) MP 1261 Sinow and the organization of snow research in the United States. Colbeck, S.C., (1979, p. 55-58) MP 1262 Air-tee-ocean interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost., 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receiving station in Alaska. Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26) Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 121p., MP 2306 Arctic research of the United States, Vol. 1, (1987, 721) Engineering geology studies on the National Petroleum Reserve in Alaska. Kachadoorian, R., et al., (1988, 899) 221 Arctic research in the Linited States, Vol. 1, (1988, 899) 2221 Arctic research in the Linited States, Vol. 1, (1988, 899) MP 2306 Arctic research in the Linited States, Vol. 1, (1988, 899) 2221 Arctic research in the Linited States, Vol. 1, (1988, 899) Arctic research in the Linited States, Vol. 1, (1988, 899) Arctic research of the United States, Vol. 1, (1988, 899) A	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G. et al. (1976, 7p) Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-53) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of permafrost soils and vegetation to nutrients at a subarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) SR 78-19 Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al., (1978, 81p) CR 78-28 Recovery of the Kokolik River tundra area, Alaska. Hall, D.K. et al., (1979, 15p) MP 1638 Revegetation at two construction sites in New Hampshire and Alaska. Palazzo, A.J., et al., (1980, 21p) Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) Benvironmental engineering. Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 187p) Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) MP 1393 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., (1980, p. 129-150) MP 1303 Stabilizing fire breaks in tundra vegetation. Patterson, W.A., (1980, p. 129-150) Revegetation along the trans-Alaska pipeline, 1975-1978. Chena River Lakes Project revegetation studythree-year summary. Johnson, L.A., et al., (1981, 155p) Chena River Lakes Project revegetation studythree-year summary. Johnson, L.A., et al., (1981, 954). 547 Revegetation along pipeline right-of-way in Alaska. Johnson, L., (1981, 1982, p. 198-190) Restoration of acidic dredge soils with sewage sludge and time. Palazzo, A.J., (1983, 11p). CR 83-28 Revegetation along pipeline right-of-way in Alaska. Johnson, L., (1984, p. 254-264
imaging system ling MP 2342 Use of Landsat for snow cover mapping. Saint John River basin, Maine. Merry, C.J., et al., (1987, 68p) CR 87-08 Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., (1987, p. 593-596) Alaska synthetic aperture radar (SAR) facility project. Carsey, F., et al., (1987, p. 593-596) MP 2408 Camp Century survey 1986. Gundestrup, N.S., et al., (1987, p. 186-190) MP 2331 Remote sensing and water resources. McKim. H.L., et al., (1987, p. 186-190) MP 2335 Use of SPOT HRV data in a Corps dredging operation in Lake Ene. Merry, C.J., et al., (1987, p. 49-58) Geographic information system for river basin. Merry, C.J., et al., (1987, p. 265-269) CRREL's experiences of remote sensing technology transfer to the Corps user. Merry, C.J., (1987, p. 271-273) MP 2550 Sea ice thirkness and sub-ice bathymetry. Kovacs, A., et al., (1987, 40p) CR 87-23 Single-horn ietlectometry for in situ dielectric measurements at microwave frequencies. Arcone, S.A., et al., (1988, p. 89-92) Ice conditions along the Ohio River, 1972-1985. Gatto, L.W., (1988, 162p) Alaska SAR facility. Weeks, W.F., et al., (1988, p. 103-110) Ice conditions along the Allegheny and Monongahela Rivers. Gatto, L.W., (1988, 106p) SR 88-06 Filtering and classification routines in land use imagery, Merry, C.J., et al., (1988, p. 57-58) Airborne sea ice thickness sounding. Kovacs, A., et al., (1989, p. 995-998) MP 2531 Data reduction of GOEs information from DCP networks. DeCoff, G.W., et al., (1989, 15p) SR 89-37 Satellite data collection platforms for temperature measurements. Daly, S.F., et al., (1989, 199) SR 89-37 Estimating sea ice thickness using data from impulse radar soundings. Kovacs, A., et al., (1989, 199) MP 2590 ME	Update on show load research at CRREL. Tobiasson, W., et al., [1977, p.9-13] MP 1142 Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al., [1977, 66p.] Ross Ice Shelf Project environmental impact statement July, 1974. Parker, B.C., et al., [1978, p.7-36] MP 1075 Subarcite watershed research in the Soviet Union Slaughter, C.W., et al., [1978, p. 105-313] Ecological baseline on the Alaskan haul road Brown, J., ed., SR 78-13 Ecological baseline on the Alaskan haul road Brown, J., ed., (1978, 131p.) Workshop on Ecological Effects of Hydrocarbon Spills in Alaska. Atlas, R.M., et al., [1978, p. 155-157] MP 1183 Overview on the seasonal sea ice zone Weeks, W.F., et al., (1979, p. 130-337) MP 1261 Snow and the organization of snow research in the United States Colbeck, S.C., (1979, p. 55-58) MP 1262 Ait-ice-ocean interaction in Arctic marginal ice zones. Wadhams, P., ed., (1981, 20p.) National Chinese Conference on Permafrost, 2nd, 1981 Brown, J., et al., (1982, 58p.) Science program for an imaging radar receising station in Alaska. Weller, G., et al., (1983, 45p.) MP 1288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p. 23-26). MP 2288 Scientific challenges at the poles. Welch, J.P., et al., (1987, p	Resegetation in arctic and subarctic North America—a literature review. Johnson, L.A. et al. (1976, 32p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) Evaluation of an air cushion vehicle in Northern Alaska. Abele, G., et al. (1976, 7p) MP 1994 Ecological and environmental consequences of off-road traffic in northern regions. Brown, J., (1976, p. 40-53) Bibliography of soil conservation activities in USSR permafrost areas. Andrews, M., (1977, 116p) Bibliography of soil conservation activities in USSR permafrost areas asubarctic site in Fairbanks. Alaska. Johnson, L.A., (1978, p. 460-466) Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Ry 1190 Bibliography of permafrost soils and vegetation in the USSR Andrews, M., (1978, 175p) Ry 1291 Recovery of the Kokokik River tundra area, Alaska. Lawson, D.E., et al., (1978, 81p) Revegetation attwo construction sites in New Hampshire and Alaska. Palazzo, A.J., et al., (1980, 21p-) Remote sensing of revegetation of burned tundra, Kokolik River, Alaska. Hall, D.K., et al., (1980, p. 263-272) MP 1391 Environmental engineering. Yukon River-Prudhoe Bay Haul Road. Brown, J., ed., (1980, 187) Revegetation along roads and pipelines in Alaska. Johnson, L.A., (1980, p. 129-150) Stabilizing fire breaks in tundra vegetation. Patterson, W.A., Ill., et al., (1981, p. 188-189) Revegetation along the trans-Alaska pipeline, (1975-1978, Johnson, A.J., (1981, 115p) Cr. 81-12 Chena River Lakes Project revegetation study -three-year summary. Johnson, L.A., et al., (1981, 59p) Cr. 81-18 Sewage sludge aids revegetation. Palazzo, A.J., et al., (1982, p. 198-301) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, 1982, p. 198-301) Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al., (1983, 1982, p. 198-301) Recovery and active layer changes following a tundra fire in northwestern Alaska. J

Reregetation (cont.)	Modeling rapidly varied flow in tailwaters. Ferrick, M.G. et	Modeling of ice in rivers. Ashton, G.D., [1979, p.14/1-
Management of northern gravel sites for successful reclama- tion: a review. Johnson, L.A., [1987, p.530-536]	al, [1984, p.271-289] MP 1711 Computer simulation of see cover formation in the Upper St.	14/26; MP 1335 Break-up of the Yukon River at the Haul Road Bridge: 1979.
MP 2375	Lawrence River. Shen, H.T., et al. 11984, p.227-2451	Stephens, C.A., et al. (1979, 22p. + Figs.) MP 1315
Rheology Crystal fabrics of Weat Antarctic ice sheet. Gow, A.J., et al,	MP 1814 Numerical simulation of freeze-up on the Ottauquechee Riv-	Suppression of river ice by thermal effluents. Ashton, G.D., (1979, 23p.) CR 79-30
(1976, p.1665-1677) MP 1382	er. Calkins, D.J. (1984, p.247-277) MP 1815	Maximum thickness and subsequent decay of lake, river and
Thermal and creep properties for frozen ground construction. Sanger, F.J., et £l, [1978, p.95-117] MP 1624	Analysis of rapidly varying flow in ice-covered rivers. Ferrick, M.G., [1984, p.359-368] MP 1833	fast sea ice in Canada and Alaska. Bilello, M.A., (1980, 160p) CR 88-86
Rheology of ice. Fish, A.M., [1978, 196p.] MP 1988	Geographic features and floods of the Ohio River H A., et al. [1984, p 265-281] Edwardo, MP 2083	Sediment displacement in the Ottauquechee River-1975-
Thermal and creep properties for frozen ground construction. Sanger, F.J., et al. (1979, p 311-337) MP 1227	Effect of ice cover on hydropower production. Yapa, P.D.,	1978. Martinson, C.R., (1980, 14p) SR 88-29 Freshwater ice growth, motion, and decay. Ashton, G.D.
Acoustic emission response of snow. St. Lawrence, W.F.,	et al. (1984, p.231-234) MP 1876	(1980, p.261-304) MP 1299
(1980, p.209-216) MP 1366 Modeling mesoscale ice dynamics. Hibler, W.D., III, et al.	Analysis of river wave types. Ferrick, M.G., (1985, p.209- 220] MP 1875	Single and double reaction beam load cells for measuring ice forces. Johnson, P.R., et al, (1980, 17p.) CR 80-25
(1981, p.1317-1329) MP 1526	Analysis of river wave types. Ferrick, M.G., (1985, 17p.) CR 85-12	Clearing ice-clogged shipping channels. Vance, GP.,
Acoustic emissions during creep of frozen soils. Fish, A.M., et al., (1982, 2.194-206) MP 1495	Hydrologic aspects of ice jams. Calkins, D.J., (1986, p.603-	[1980, 13p.] CR 86-28 Harnessing frazil ice. Perham, R.E., [1981, p.227-237]
Creep behavior of frozen silt under constant uniaxial stress.	609 ₁ MP 2116 Sub-ice channels and frazil bars, Tanana River, Alaska.	MP 1398
Zhu, Y., et al. [1984, p 33-48] MP 1887 Analysis of linear sea ice models with an ice margin. Lep-	Lawson, D.E., et al. (1986, p.465-474) MP 2129	Ice jams and meteorological data for three winters, Ottauque- chee River, Vt. Bates, R.E., et al. (1981, 27p)
pilranta, M., (1984, p.31-36) MP 1782	Morphology, hydraulics and sediment transport of an ice- covered river. Lawson, D.E., et al, (1986, 37p.)	CR 81-01
Modeling the resilient behavior of frozen soils using unfrozen water content. Cole, D.M., [1984, p.823-834]	CR 86-11	Ice control arrangement for winter navigation. Perham, R.E., [1981, p.1096-1103] MP 1449
MP 1715	River wave response to the friction-inertia balance. Ferrick, M.G., et al. (1987, p.764-769) MP 2237	Breakup of solid see covers due to rapid water level variations. Billfalk, L., (1982, 17p.) CR 82-03
Creep model for constant stress and constant strain rate. Fish, A.M., (1984, p.1009-1012) MP 1766	Study of dynamic ice breakup on the Connecticut River near	River ice suppression by side channel discharge of warm wa-
Ice flow leading to the deep core hole at Dye 3, Greenland. Whillans, I.M., et al, [1984, p.185-190] MP 1824	Windsor, Vermont. Ferrick, M.G., et al. (1987, p.163- 177) MP 2400	ter. Ashton, G.D., [1982, p.65-80] MP 1528 Port Huron ice control model studies. Calkins, D.J., et al.
Whillans, I.M., et al. [1984, p.185-190] MP 1824 Thermodynamic model of creep at constant stress and con-	Preliminary results of an experiment using a 16 ft x 50 ft long	(1982, p.361-373) MP 1536
stant strain rate. Fish, A.M., [1984, p.143-161] MP 1771	frazil collector line array. Perham, R.E., (1988, p.139- 156) MP 2474	Field investigations of a hanging ice dam. Beltaos, S., et al. [1982, p.475-488] MP 1533
Ice dynamics. Hibler, W.D., III, (1984, 52p)	Transverse velocities and ice jamming potential in a river bend. Zufelt, J.E., [1988, p.193-207] MP 2476	Theory of thermal control and prevention of ice in rivers and
M 84-03	Laboratory study of transverse velocities and ice jamming in	lakes. Ashton, G.D., [1982, p.131-185] MP 1554
Preliminary investigation of thermal ice pressures. Cox. G.F.N., (1984, p.221-229) MP 1788	a river bend. Zufelt, J.E., et al, [1988, p.189-197] MP 2501	Ottauquechee River-analysis of freeze-up processes. Cal- kins, D.J., et al. (1982, p.2-37) MP 1738
On the rheology of a broken ice field due to floe collision. Shen, H., et al. (1984, p.29-34) MP 1812	Perturbation solution of the flood problem. Discussion and	Force measurements and analysis of river ice break up. Deck. D.S., {1982, p.303-336 ₁ MP 1739
Rheology of glacier ice. Jezek, K.C., et al. (1985, p.1335-	author's reply. Ferrick, M.G., (1988, p.346-349) MP 2536	Using the DWOPER routing model to simulate river flows
1337 MP 1844 Foundations in permafrost and seasonal frost; Proceedings.	Detection of coarse sediment movement using radio transmit-	with ice. Daly, S.F., et al. (1983, 199.) SR 83-01 Measurement of ice forces on structures. Sodhi, D.S., et al.
(1945, 62p.) MP 1730	ters. Chacho, E.F., Ir., et al. (1989, p.367-373(B)) MP 2752	(1983, p.139-155) MP 1641
Evaluation of the rheological properties of columnar ridge sez- ice. Brown, R.L., et al. (1916, p 55-66) MP 2177	Simulation of oil slicks in rivers and lakes. Shen, H.T., et al. [1990, 29p.] CR 98-0]	Unsteady over flow beneath an ice cover Ferrick, M.G., et at, [1983, p.254-260] MP 2079
Ice dynamics. Hibler, W.D., III, [1986, p.577-640]	ice cover effect on river flow. Ashton, G.D., 11990, 24p.	Modeling of ice discharge in river models. Calkins, D.J.,
MP 2211 Some peculiarities of creep behavior of frozen silt. Fish,	SR 90-06 River ice	(1 #83, p.285-290) MP 2001 Ice jams in shallow rivers with floodplain flow. Calkins, D.J.,
A.M., (1989, p.721-724) MP 2601	Temperature and flow conditions during the formation of	(1583, p.538-548) MP 1644
On modeling the energetics of the ridging process. Hopkins, M.A., et al. (1989, p.175-178) MP 2483	nver ice. Ashton, G D., et al. (1970, 12p.) MP 1723	Mechanics of ice jam formation in rivers. Ackermann, N.L., et al., (1983, 14p.) CR 83-31
Cavitating fluid sea ice model. Flato, G M, et al. (1990,	RIVER ICE	
		Navigation ice booms on the St. Marys River. Perham, R.E.,
p.239-242 ₁ MP 2738	Surveys of river and take ice. Michel, B., (1971, 131p.)	(1984, 12p.) CR 84-04
p.239-242; MP 2738 River basins Permafrost distribution on the continental shelf of the Beau-	Surveys of river and take ice. Michel, B., [1971, 13]p.; M III-Bla River ice	(1984, 12p.) CR 84-66 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al., (1984, p. 85-101)
p.239-242 ₁ MP 2738 River books	Surveys of river and take ice. Michel, B., [1971, 131p.; M 111-Bla River ice Formation of ice ripples on the underside of river ice covers.	(1984, 12p.) CR 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) MP 1712
p.239-242; MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al. (1979, p.135-141) MP 1288 Snowpack estimation in the St. John River basin. Power,	Surveys of river and take ice. Michel, B., [1971, 131p.] M III-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice.	(1984, 12p.) CR 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) MP 1713
p.239-242; MP 2738 River beates Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141; MP 1288 Snowpack estimation in the St. John River basin. Power. J.M., et al., [1980, p.467-486; MP 1799 Hydrologic modeling from Landsat land cover data.	Surveys of river and take ice. Michel, B., [1971, 131p.] M III-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] Growth and mechanical properties of river and like ice. Ramseier, R.O., [1972, 243p.] MP 1883	(1984, 12p.) CR 84-84 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al.
p.239-242) MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141) MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81	Surveys of river and take ice. Michel, B., [1971, 131p.] M III-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-	(1984, 12p.) CR 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) SR 84-13 Ice cover melting in a shallow river. Calkins, D.J., (1984,
p.239-242; MP 2738 River beates Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141; MP 1288 Snowpack estimation in the St. John River basin. Power. J.M., et al., [1980, p.467-486; MP 1799 Hydrologic modeling from Landsat land cover data.	Surveys of river and take ice. Michel, B., [1971, 131p.] Mili-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-340] Ruer ice problems. Burgi, P.H., et al., [1974, p.1-15]	[1984, 12p.] Cr. 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.] SR 84-13 Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion.
p.239-242) MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1934, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] Snow hydrology in the upper Yamuna basin, India. Matho-	Surveys of river and take ice. Michel, B., [1971, 131p.] M III-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] MP 1883 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-540] MP 1026 River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002	cl 1984, 12p.1 CR 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p 85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p 177-190] MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.] SR 84-13 Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion, Beltaod. S., [1984, p.370-371] MP 1798
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] Geographic information system for river basin. Merry, C.J. MP 2549	Surveys of river and take ice. Michel, B., [1971, 131p.] Mili-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-340] Ruer ice problems. Burgi, P.H., et al., [1974, p.1-15]	[1984, 12p.] Cr. 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.] SR 84-13 Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion.
p.239-242) MP 2738 River basins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] River creasings Operation of the U.S. Combat Support Boat (USCSBMK 1)	Surveys of river and take ice. Michel, B., [1971, 131p.] River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] MP 1883 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-540] MP 1026 River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.; Third International Symposium on Ice Problems, 1975	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.] SR 84-13 Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion, Reliasol. S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.524-528] Salmon River ice jams. Cunningham, L.L., et al. [1984]
p.239-242) MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin. India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River creasings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.] SR 84-95 SR 84-95	Surveys of river and take ice. Michel, B., [1971, 131p.] MIII-Bla River Ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] MP 1883 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1974, p.323-540) River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 123p.] MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 245 Mechanics and hydraulics of river ice pars. Tatinclaus, J.C.	(1984, 12p.) CR 84-04 Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) SR 8-6-13 Ice cover melting in a shallow river. Calkins, D.J., (1984, p.255-265) MP 1763 Ice jams in shallow rivers with floodplain flow Discussion. Reltaos. S., (1984, p.370-371) MP 1796 Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.524-528) MP 1795 Salmon River ice jams. Cunningham, L.L., et al. (1984, p.529-533) MP 1796 Forecasting water temperature decline and freeze-up in nivers.
p.239-242) MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1934, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] Snow hydrology in the upper Yamuna basin, India. Mathotra, R.V., et al., [1988, p.84-93] River creatings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1934, 28p.] SR 84-95 Tactical bridging during winter: 1986 Korean bridging exer-	Surveys of river and take ice. Michel, B., [1971, 131p.] M III-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] MP 1883 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al, [1973, p.528-540] MP 1026 River ice problems. Burgi, P.H., et al, [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al, [1974, 128p.] MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed, [1975, 627p.] MP 845 Mechanics and hydraulics of river ice jams. Tatinclasu, J.C., MP 1006	(1984, 12p.) Credeted flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) SR 84-13 lce cover melting in a shallow river. Calkins, D.J., (1984, p.255-265) Ice jams in shallow rivers with floodplain flow: Discussion, Reltaos. S., (1984, p.370-371) MP 1763 Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.524-528) MP 1795 Salmon River ice jams. Cunningham, L.L., et al. (1984, p.529-533) Forecasting water temperature decline and freeze-up in 1996 Shen, H.T., et al. (1984, 17p.) CR 84-19
p.239-242) MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin. India. Malhotra, R.V., et al., [1988, p.34-93] MP 26-33 River crosseless Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubsted, J., et al., [1982, 28p.] SR 84-65 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] Deployment of floating bridges in ice-covered rivers. Mel-	Surveys of river and take ice. Michel, B., [1971, 131p.] Mili-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.523-540] River ice problems. Burgi, P.H., et al., [1974, p.1-15]. MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 2008 Mechanics and hydraulics of river ice jams. et al., [1976, 97p.] Potential river ice jams at Windsor, Vermont Calkins, D.J., ct al., [1976, 31p.]	(1984, 12p.) Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) Ice cover melting in a shallow river. Calkins, D.J., (1984, p.255-265) Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., (1984, p.370-371) Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.524-528) MP 1795 Salmon River ice jams. Cunningham, L.L., et al. (1984, p.529-533) Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., (1984, 17p.) Ice jam research needs. Gerard, R., (1984, p.181-193) MP 1813
p.239-242) MP 2738 River basins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141) MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1299 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1934, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] Snow hydrology in the upper Yamuna basin, India. Mathotra, R.V., et al., [1988, p.84-93] River creatings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1984, 28p.] SR 84-95 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] Deployment of floating bridges in ice-covered rivers. McIor. M., et al., [1928, 38p.] SR 88-20	Surveys of river and take ice. Michel, B., [1971, 131p.] M III-Bla River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-340] MP 1026 Ruer ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctuc and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 845 Mechanics and hydraulies of river ice jams. Tatinclaux, J.C., et al., [1976, 97p.] Potential river ice jams at Windsor, Vermont. Calkins, D.J.,	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1712 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.] SR 84-13 Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] MP 1763 Ice jams in shallow rivers with floodplain flow: Discussion, Reltaos. S., [1984, p.370-371] MP 1798 Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.524-528] MP 1795 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al. [1984, 17p.] CR 84-19 Ice jam research needs Gerard, R., [1984, p.81-193] Computer simulation of ice cover formation in the Upper St
p.239-242) MP 2738 River basins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-01 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 26-33 River creasings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.] SR 84-05 Tactical bridging during winter: 1996 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging exercise on thick ice. Fort McCo., Wisconsin, 1988 Contermarsh, B.A., [1990, 24p.]	Surveys of river and take ice. Michel, B., [1971, 131p.] River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 137p.] Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-540] River ice problems. Burgi, P.H., et al., [1974, p.1-15]. MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1002 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 1004 Potential river ice jams at Windsor, Vermont Calkins, D.J., et al., [1976, 31p.] Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 26p.] CR 76-31 Force setsing of frazil and brash ice in the St. Lawrence	(1984, 12p.) Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) Ice cover melting in a shallow river. Calkins, D.J., (1984, p.255-265) Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., (1984, p.370-371) Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.370-371) Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.370-371) Salmon River ice jams. Cunningham, L.L., et al. (1984, p.259-533) Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., (1984, 17p.) Ice jam research needs. Gerard, R., (1984, p.181-193) MP 1813 Computer simulation of ice cover formation in the Upper St Lawrence River. Shen, H.T., et al., (1984, p.227-265) MP 1814
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 199.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crossdags Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.) Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 84-85 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 88-20 Winter bridging exercise on thick ice. Fort McCoy, Wiscon-	Surveys of river and take ice. Michel, B., [1971, 131p.] **M III-Bla **River fee Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] **MP 1243 Growth and mechanical properties of river and lake ice. **Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al. [1973, p.52a-340] **River ice problems.** Burgi, P.H., et al. [1974, p.1-15] **MP 1002 **ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al. [1974, 128p.; **MP 1002 **ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al. [1974, 128p.; **MP 1002 **ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al. [1974, 128p.; **MP 1002 **ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al. [1974, 128p.; **MP 1002 **ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M., et al. [1976, 179] **MP 1002 **ERTS mapping of Arctic and Subarctic environments. Anderson, D.M.,	(1984, 12p.) Ice-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. (1984, p.85-101) St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) St. 8-6-13 lee cover melting in a shallow river. Calkins, D.J., (1984, p.255-265) Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., (1984, p.370-371) Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.525-525) Salmon River ice jams. Cunningham, L.L., et al. (1984, p.525-533) Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., (1984, 17p.) Cr. 86-19 Ice jam research needs. Gerard, R., (1984, p.821-195). MP 1813 Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., (1984, p.227-245)
p.239-242) MP 2738 River basins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-01 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 26-33 River crosselags Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.] SR 84-05 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging exercise on thick ice. Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 99-10 River flow ERTS mapping of Arctic and subarctic environments.	Surveys of river and take ice. Michel, B., [1971, 131p.] **M 111-B1a** **River ice** Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] **Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-540] River ice problems. Burgi, P.H., et al., [1974, p.1-15] **MP 1002** ERTS mapping of Arctic and subarctic environments. Anderson. D.M., et al., [1974, 128p.] **Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] **MP 1004** **Mechanics and hydraulics of river ice jams. Tatinclaus, J.C., et al., [1976, 97p.] **Potential river ice jams at Windsor, Vermont Calkins, D.J., et al., [1976, 31p.] Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 18p.] **CR 77-64** Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., [1977, 19p.] Some economic benefits of ice booms. Perham, R.E., [1977, p.570-591] **MP 999**	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Deck, D.S., et al. [1984, p.85-101] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.528-528] MP 1798 Salmon River ice to alleviate ice jam flooding. Deck, D.S., [1984, p.528-528] MP 1795 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-531] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al. [1984, 17p3] Ice jam research needs. Gerard, R., [1984, p.811-193] MP 1813 Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-285] MP 1815 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.247-277] MP 1815 Rise pattern and velocity of frazzl ice. Wuebben, J.L.,
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1298 Hydrologic modeling from Landsst land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River cressings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.] SR 84-65 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 88-20 Winter bridging exercise on thick ice. Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] River flow	Surveys of river and take ice. Michel, B., [1971, 131p.] River ice Formation of ice ripples on the underside of river ice covers, Ashton, G.D., [1971, 157p.] Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1971, 157p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.523-540] River ice problems. Burgi, P.H., et al., [1974, p.1-15]. MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 121p.] MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 2045 Mechanics and hydraulics of river ice pars. Tatinclaux, J.C., et al., [1976, 31p.] Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al., [1976, 31p.] Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 19p.] Remote sensing of frazil and brash ice in the St. Lawrence River. Dean, A.M., Jr., [1977, 19p.] Some economic benefits of ice booms. Perham, R.E., (1977, p.570-591) Yukon River breakup 1976. Johnson, P., et al., [1977, p.592-596]	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Deck, D.S., et al. [1984, p.85-101] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, p.173-15] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.524-528] MP 1798 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] Proceasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 1793] Ice jam research needs. Gerard, R., [1984, p.181-193] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-225] MP 1814 Numerical simulation of freeze-up on the Ottaquechee River. Calkins, D.J., [1984, p.247-277] MP 1815 Rise pattern and selectly of frazil ice. Wuebben, J.L., [1984, p.297-316] Field investigation of St. Lawrence River hanging ice dams.
p.239-242) MP 2738 River basins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-01 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 26-33 River crossings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.] SR 84-05 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging exercise on thick ice. Fert McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 98-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] Turbulent heat transfer from a river to its ice cover. F.D., et al., [1979, 5p.) CR 79-13	Surveys of river and take ice. Michel, B., [1971, 131p.] River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramscier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-540] River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson. D.M., et al., [1974, 128p.] Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 1004 Mechanics and hydraulics of river ice jams. Tatinclaus, J.C., et al., [1976, 197]. Potential river ice jams at Windsor, Vermont Calkins, D.J., et al., [1976, 31p.] Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 18p.] C.R. 77-68 Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., [1977, 19p.] Some economic benefits of the booms. Perham, R.E., [1977, p.570-591] Yukon River breakup 1976 Johnson, P., et al., [1977, p.592-596] Les breakup on the Chena River 1975 and 1976 MeFadden,	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.52-523] MP 1798 Salmon River ice to alleviate ice jam flooding. Deck, D.S., [1984, p.52-523] MP 1795 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] MP 1796 Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 17p.3] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-225] MP 1813 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.247-277] MP 1816 Nie pattern and velocity of frazil ice. Wuebben, J.L., [1984, p.297-316] Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p.247-249] MP 1816
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1298 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin. India. Malhotra, R.V., et al., [1988, p84-93] MP 2639 Show hydrology in the upper Yamuna basin. India. Malhotra, R.V., et al., [1988, p84-93] MP 2639 Stever creasess Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubsted, J., et al., [1984, 28p.] SR 84-95 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 85-20 Winter bridging exercise on thick ice. Fort McCo.), Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover.	Surveys of river and take ice. Michel, B., [1971, 131p.] River ice Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.523-540] River ice problems. Burgi, P.H., et al., [1974, p.1-15]. MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 124p.] MP 1007 Frankenstein, G.E., ed., [1975, 627p.] MP 1006 MP 1006 Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al., [1976, 31p.] Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 26p.) CR 77-04 Remote sensing of frazil and brash ice in the St. Lawrence River. Dean, A.M., Jr., [1977, 19p.] CR 77-05 Some economic benefits of ice booms. Perham, R.E., [1977, p.592-596] Visual observations of floating ice from Skylab Campbell,	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Deck, D.S., et al. [1984, p.85-101] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, p.173-15] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.524-528] MP 1798 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] Proceasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 1793] Ice jam research needs. Gerard, R., [1984, p.181-193] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-225] MP 1814 Numerical simulation of freeze-up on the Ottaquechee River. Calkins, D.J., [1984, p.247-277] MP 1815 Rise pattern and selectly of frazil ice. Wuebben, J.L., [1984, p.297-316] Field investigation of St. Lawrence River hanging ice dams.
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.] Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] River creasings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1984, 28p.] Tactical bridging during winter: 1986 Korean bridging exercise. Contermarsh, B.A., [1987, 23p.] Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1981, 38p.] SR 88-03 Winter bridging earresse on thick ice. Fert McCo., Wisconsin, 1988 Contermarsh, B.A., [1990, 24p.] SR 99-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 5p.] Harnessing frazil ice. Perham, R.E., [1981, p.227-237, MP 1398 River ice suppression by side channel discharge of warm was	River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) M 1181 River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) MP 1243 Growth and mechanical properties of river and lake ice. Ramscier, R.O., (1972, 243p.) MP 1883 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.528-540) River ice problems. Burgi, P.H., et al., (1974, p.1-15) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson. D.M., et al., (1974, 128p.) MP 1002 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., (1975, 627p.) MP 2045 Mechanics and hydraulics of river ice jams. Tatinclaus, J.C., et al., (1976, 97p.) Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al., (1976, 31p.) Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., (1977, 18p.) CR 77-64 Remote sensing of frazil and brash ice in the St. Lawrence River. Dean, A.M., Jr., (1977, 19p.) Some economic benefits of ice booms. Perham, R.E., (1977, p.570-591) Yukon River breakup 1976 Johnson, P., et al., (1977, 48p.) Visual observations of floating ice from Skylab W-J. et al., (1977, 44p.) Wisual observations of floating ice from Skylab MP 1263	(1984, 12p.) Ico-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p.) St. 8-6-13 Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265; MP 1763 Ice jams in shallow rivers with floodplain flow: Discussion, Reliaco, S., [1984, p.370-371] MP 1798 Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.324-528] Salmon River kee jams. Cunningham, L.L., et al. [1984, p.529-533] MP 1795 Salmon River kee jams. Cunningham, L.L., et al. [1984, p.529-533] MP 1796 Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 17p.) Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-225] Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.247-277] MP 1815 Numerical simulation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.247-273] MP 1816 Field in visitigation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.247-273] MP 1816 Field in visitigation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.247-2373] MP 1839 Methods of see control for winter navigation in inland waters. Frankenstein, G.E., et al., [1984, p.247-2373] MP 1839 Methods of see control for winter navigation in inland waters. Frankenstein, G.E., et al., [1984, p.247-2373] MP 1839 Methods of see control for winter navigation in inland waters. Frankenstein, G.E., et al., [1984, p.247-2373] MP 1839
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat Iand cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin. India. Malhotra, R.V., et al., [1988, p.34-93] MP 26-33 River crosseless Operation of the U.S. Combat Support Boat (USCSBMK I) on an ice-covered waterway. Stubsted, J., et al., [1982, 28p.] SR 84-85 Tactical bridging during winter: 1996 Korean bridging exercise. Coutermarsh, B.A., (1987, 23p.) SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging earresse on thick ice. Fert McCo., Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] Turbulent heat transfer from a river to its ice cover. F.D., et al., [1979, 5p.] Harnessing frail ice. Perham, R.E., [1981, p.227-237, MP 1998 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D.	River for M 111-B1a River for M 111-B1a River for Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) M 123 Growth and mechanical properties of river and like ice. Ramseier, R.O., (1972, 243p.) Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.523-540) River ice problems. Burgi, P.H., et al., (1974, p.1-15). MP 1022 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 124p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 124p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 124p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 124p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 91p.) MP 1007 Frankenstein, G.E., ed., (1975, 627p.) MP 1006 Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al., (1976, 31p.) CR 76-31 Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., (1977, 19p.) CR 77-04 Remote sensing of frazil and brash ice in the St. Lawrence River. Dean, A.M., Jr., (1977, 19p.) CR 77-04 Remote sensing of frazil and brash ice in the St. Lawrence River. Dean, A.M., Jr., (1977, 19p.) Some economic benefits of ice booms. Perham, R.E., (1977, p.570-591) Yukon River breakup 1976 Johnson, P., et al., (1977, p.592-596) Ice breakup on the Chena River 1975 and 1976 T., et al., (1977, p.353-379) MP 1263 Physical measurement of see jams 1976-77 field season, Woebben, J.L., et al., (1978, p.371-379) SR 78-03	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Deck, D.S., et al. [1984, is as the control structure, 1983. Deck, D.S., et al. [1984, is control structure, 1983. Deck, D.S., et al. [1984, is as the cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p.370-371] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p.370-371] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p.525-232] MP 1798 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 1793] Ice jam research needs. Gerard, R., [1984, p.181-193] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-265] MP 1816 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.247-277] MP 1816 Rise pattern and velocity of frazil ice. Wuebben, J.L., [1984, p.297-316] Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p.239-337] MP 1839 Methods of ice control for winter navigation in inland waters. Frankenstein, G.E., et al., [1984, p.329-337] MP 1831 Analysis of rapidly varying flow in ice-covered rivers. MP 1831 Controlling river ice to allevate ice jam flooding. Deck, 1000.
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power. J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 199.] SR 84-01 Geographic information system for river basin. Merry. C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] River crossings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1984, 28p.] Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 88-05 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Melor, et al., [1981, 38p.] SR 88-05 Winter bridging exercise on thick ice. Fort McCoy. Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 99-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover Haynes, E.D., et al., [1979, 5p.] CR 79-13 Harnessing frazil ice. Perham, R.E., [1981, p.227-237, MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1558 On zero-inertia and kinematic waves. Katopodes, N.D., [1982, p.65-80] MP 2653	River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] MP 1243 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.528-340] MP 1026 River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1002 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 845 Mechanics and hydraulies of river ice jams. Tatinclasu., J.C., et al., [1976, 97p.] MP 1004 Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al., [1976, 31p.] Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., [1977, 26p.] CR 77-04 Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., [1977, 19p.] CR 77-704 Some economic benefits of ice booms. Perham, R.E., [1977, 19p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some reconomic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice booms. Perham, R.E., [1977, 26p.] CR 77-705 Some economic benefits of ice bo	(1984, 12p.) Ice-related flood frequency analysis: application of analytical estimates. Gerard. R., et al. (1984, p.85-101) MP 1712 St. Lawrence River freeze-up forecast. Shen, H.T., et al. (1984, p.177-190) Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. (1984, 15p.) SR 88-13 Ice cover melting in a shallow river. Calkins, D.J., (1984, p.255-265; MP 1763 Ice jams in shallow rivers with floodplain flow: Discussion, Beltaos. S., (1984, p.370-371) MP 1798 Controlling river ice to alleviate ice jam flooding. Deck, D.S., (1984, p.524-528) Salmon River ice jams. Cunningham, L.L., et al. (1984, p.529-533) Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., (1984, p.759-53) Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., (1984, p.811-19) MP 1813 Computer simulation of ice cover formation in the Upper St Lawrence River. Shen, H.T., et al., (1984, p.227-225) MP 1816 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., (1984, p.287-277) MP 1816 Numerical simulation of St. Lawrence River hanging ice dams. Shen, H.T., et al., (1984, p.287-216) MP 1816 Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., (1984, p.287-217) MP 1816 Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., (1984, p.319-337) MP 1816 Namistor of rapodly swrying flow in riversector rivers. Fernakristen. G.E., et al., (1984, p.319-337) MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1835 Controlling river ice to alleviate ice jam flooding. Deck, MP 1835
p.239-242) MP 2738 River basins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat Iand cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin, India. Mathotra, R.V., et al., [1988, p.34-93] MP 25-93 River crossdags Operation of the U.S. Combat Support Boat (USCSBMK I) on an ice-covered waterway. Stubstad, J., et al., [1982, 28p.] SR 48-65 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging expresse on thick ice, Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 90-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] SR 90-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1947 Turbulent heat transfer from a river to its ice cover. F.D., et al., [1979, 5p.] Harnessing frami ice. Perham, R.E., [1981, p.227-237], MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D., [1982, p.1381-1387] Using the DWOPER routing model to simulate river flows on the ince. Dally, S.F., et al., [1931, 195] SR 83-01	River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 137p.) M 118-Bia River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 137p.) Growth and mechanical properties of river and lake ice. Ramscier, R.O., (1972, 243p.) Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.528-540) River ice problems. Burgi, P.H., et al., (1974, p.1-15) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1975, 627p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1975, 627p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 1979.) ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 48p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 48p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 48p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 48p.) MP	correlated flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Deck, D.S., et al. [1984, p.85-101] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.325-238] MP 1796 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.25-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 17p3] Ice jam research needs. Gerard, R., [1984, p.181-193] MP 1813 Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-225] MP 1816 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.287-277] MP 1816 Numerical simulation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p.247-277] MP 1816 Rise pattern and velocity of frazil ice. Wuebben, J.L., [1984, p.297-106] Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p.247-277] MP 1839 Methods of ice control for winter navigation in inland waters. Frankmistion, G.E., et al., [1984, p.128-3]7, MP 1831 Analysis of rapidly varying flow in ice-covered rivers. Fernical, M.G., [1984, p.39-363] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p.69-76] Ice regime reconnaissance, Yukon River, Yukon R., et al., [1984, p.1059-107].
p.239-242] MP 2738 River busins River busins Remarkost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 199,] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crossings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1984, 28p.] Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 84-95 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 33p.] Winter bridging exercise on thick ice. Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 89-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover. Haynes, E.D., et al., [1979, 5p.] Hamessing frail ice. Perham, R.E., [1981, p.227-237], MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D., (1982, p.1331-13137] MP 2053 Unitesoy river flow beneath an ice cover. Ferrick, M.G., et	River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., (1971, 157p.) River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., (1971, 157p.) MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., (1972, 243p.) Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.52s. 340) River ice problems. Burgi, P.H., et al., (1974, p.1-15) River ice problems. Burgi, P.H., et al., (1974, p.1-15) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 128p.) CR 77-04 Remote sensing of first and brash ice in the St. Lawrence River Dean, A.M., Jr., (1977, 19p.) Some economic benefits of tee booms. Perham, R.E., (1977, p.570-591) MP 2004 New 1002 Remote sensing of first and brash ice in the St. Lawrence River Dean, A.M., Jr., (1977, 19p.) Some economic benefits of tee booms. Perham, R.E., (1977, p.570-591) MP 2004 Remote sensing of first and brash ice in the St. Lawre	los-related flood frequency analysis: application of analytical estimates. Gerard. R., et al. [1984, p. 85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 159.] St. 8-6-13 lee cover melting in a shallow river. Calkins, D.J., [1984, p. 255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] MP 1793 Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] MP 1795 Salmon River ice jams. Cunningham, L.L., et al. [1984, p. 259-531] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 1793] Ice jam research needs. Gerard, R., [1984, p. 181-193] MP 1813 Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p. 227-225] MP 1815 Rise pattern and velocity of frazil ice. Wuebben, J.L., [1984, p. 297-316] Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p. 247-277] MP 1815 Fish my stigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p. 379-316] MP 1830 Centrolling river ice to allevate ice jam flooding. Deck. M.P. [1984, p. 159-363] Controlling river ice to allevate ice jam flooding. Deck. M.P. [1984, p. 159-364] Ice regime reconnaissance, Vulon River, Vulon. MP 2466 St. Lawrence River hanging ice dams, winter 1983-1984
p.239-242] MP 2738 River beates River beates Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141]. MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486]. MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 19p.]. Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269]. Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93]. River creasings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1984, 28p.] Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.]. SR 84-05 Tactical bridging expresses on thick ice. Fert McCo., Wisconsin, 1988. Coutermarsh, B.A., [1987, 23p.]. SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1981, 38p.]. SR 98-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.]. Turbulent heat transfer from a river to its ice cover. Haynes, F.D., et al., [1979, 5p.]. CR 79-13 Hamessing frazil ice. Perham, R.E., [1981, p.227-237, MP 1398. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80]. MP 1358. River ice suppression by side channel discharge of warm water	River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) M 11-B1a River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) Growth and mechanical properties of river and lake ice. Ramscier, R.O., (1972, 243p.) Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.528-540) River ice problems. Burgi, P.H., et al., (1974, p.1-15) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1975, 627p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 97p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., p. 1002 ERTS mapping of Arctic and subarctic envi	correlated flood frequency analysis: application of analytical estimates. Gerard. R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] MP 1713 Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 155-3] St. Boek, D.S., et al. [1984, 155-3] St. Boek, D.S., et al. [1984, 155-3] St. Boek, D.S., et al. [1984, 155-3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265; MP 1795 Ice jams in shallow rivers with floodplain flow: Discussion, Reliaos. S., [1984, p.370-371] MP 1796 Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.524-528] Salmon River kee jams. Cunningham, L.L., et al. [1984, p.529-533] MP 1795 Salmon River kee jams. Cunningham, L.L., et al. [1984, p.529-533] MP 1796 Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, p.191-193] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-265] Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.247-277] MP 1816 Numerical simulation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.249-337] MP 1816 Field investigation of St. Lawrence River hanging ce dams, Shen, H.T., et al., [1984, p.19-337] MP 1839 Methods of see control for winter navigation in inland waters. Frankenstein. G.E., et al., [1984, p.19-337] MP 1830 MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1835 Ice regime reconnaissance, Yukon River, Yukon MP 2486 St. Lawrence River hanging ice dams, winter 1981-1984 Shen, H.T., et al., [1984, p.591-1073] Fiffect of ice cover on hydropower production. Yapa, P.D.
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 1993] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crossdags Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Substad, J. et al., [1984, 28p.) Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 84-85 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 88-20 Winter bridging exercise on thick ice. Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 98-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover. Haynes, CR 79-13 Harnessing frain ice. Perham, R.E., [1981, p.227-237], MP 1097 Usite of the product of the simulate river flows with ice. Daly, S.F., et al., [1931, 192] SR 83-01 Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1933, p.253-260] MP 2697 Modeling of ice discharge in river models. Calkins, D.J., (1982, p.253-260)	River for River for Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] M 111-B1a River for Formation of ice ripples on the underside of river ice covers. Ashton, G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.523-540) River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 123p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 123p.) MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., (1975, 627p.) MP 1007 MP 1007 MP 1007 MP 1007 MP 1007 MP 1008 MP 1008 MP 1008 MP 1008 MP 1009 MP 1134 MP 1009 MP 1134 MP 1136 MP 1126	les-related flood frequency analysis: application of analytical estimates. Gerard. R., et al. [1984, p. 85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p. 255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 370-371] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 252-253] MP 1796 Salmon River ice jams. Cunningham, L.L., et al. [1984, p. 259-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 17p3] Ice jam research needs. Gerard, R., [1984, p. 181-193] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p. 227-265] MP 1816 Numerical simulation of freeze-up on the Ottauquechee River Calkins, D.J., [1984, p. 287-2777] MP 1816 Numerical simulation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p. 237-235] MP 1819 Methods of ice control for winter navigation in initiand waters. Frankenstein, G.E., et al., [1984, p. 139-313] Analysis of rapidly varying flow in ice-covered rivers. MP 1831 Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 59-363] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 59-363] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 59-363] Controlling river ice to allevate ice jam flooding. Deck, MP 2486 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1984, 85p. MP 1835] Cottelling river ice to allevate ice jam flooding. Deck, MP 2466 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., 231-2314 Ice block stability. Daiv. S.F., [1984, p
p.239-242] MP 2738 River busins River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power. J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 199.] SR 84-01 Geographic information system for river basin. Merry. C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crosslags Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J. et al., [1984, 28p.] Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 82-05 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 827-13 Deployment of floating bridges in ice-covered rivers. Meller, M., et al., [1981, 38p.] SR 82-05 Winter bridging exercise on thick ice. Fort McCoy. Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover. Haynes, E.D., et al., [1979, 5p.] CR 79-13 Harnessing frazil ice. Perham, R.E., [1981, p.227-237, MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D., (1982, p.1381-1387) United Dyrer flow beneath an ice cover. Ferrick, M.G., et al., [1983, p.253-260] MP 2651 Wholeing of ice discharge in river models. Calkins, D.J., (1983, p.238-248) Legams in shallow rivers with floodplain flow. (21kins, D.J., (1983), p.338-344) MP 1644	River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., [1971, 157p.] MII-BIa River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., [1971, 157p.] MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., [1972, 243p.] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.52a-340] Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.52a-340] River ice problems. Burgi, P.H., et al., [1974, p.115] MP 1042 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1040 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 1040 Mechanics and hydraulies of river ice jams. Tatinclasu., J.C., et al., [1976, 97p.] MP 1040 Mechanics and hydraulies of river ice jams. Tatinclasu., J.C., et al., [1976, 97p.] Potential river ice jams at Windsor, Vermont. Calkins, D.J., et al., [1976, 97p.] Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., [1977, 19p.] CR 77-04 Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., [1977, 19p.] CR 77-04 Some economic benefits of ice booms. Perham, R.E., [1977, p.570-591] Yukon River breakup 1976 Johnson, P., et al., [1977, 199.] Some conomic benefits of ice booms. Perham, R.E., [1977, 45p.] Visual observations of floating ice from Skylab Cappbell, W.J., et al., [1977, p.353-77] MP 1263 Physical measurement of ice jams 1976-77 field season, Woebben, J.L., et al., [1978, 19p.] SR 78-03 Passing of model ice flores at bridge piers Lip78, p.495-507, MP 1134 Calkins, D.J., [1978, p.93-0-87] Region of model ice flores at bridge piers Lip78, p.993-695) River ice Ashton, G.D., [1978, p.369-392] MP 1216 Characteristics of ice on two vermont rivers Calkins, D.J., SR 78-30	los-related flood frequency analysis: application of analytical estimates. Gerard. R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 158-3] St. Bock, D.S., et al. [1984, 158-3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p.255-265] Ice jams in shallow rivers with floodplain flow: Discussion, Beltaos. S., [1984, p.370-371] MP 1795 Salmon River ice to alleviate ice jam flooding. Deck, D.S., [1984, p.524-528] Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, p.839-539] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, p.839-539] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p.227-225] NP 1813 Computer simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.287-277] NP 1814 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p.287-277] MP 1816 Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p.289-337] MP 1839 Methods of see control for winter navigation in inland waters. Frankenstern, G.E., et al., [1984, p.289-337] MP 1830 MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1835 Ice regime reconnaissance, Yukon River, Yukon Gerard, R., et al., [1984, p. 159-167] MP 2178 Fifect of ice cover on hydropower production Yapa, P.D., et al., [1984, p. 211-234] Ice block stability. Daly, S.F., [1984, p. 544-548]
p.239-242] MP 2738 River busines Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1299 Hydrologic modeling from Landsat Iand cover data. McKim, H.L., et al., [1984, 19p.] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 25-99 Snow hydrology in the upper Yamuna basin. India. Malhotra, R.V., et al., [1988, p.34-93] MP 25-93 River creasings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubsted, J., et al., [1982, 28p.] SR 84-95 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., (1987, 23p.) SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging earcrase on thick ice. Fert McCo.y. Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] Turbulent heat transfer from a river to its ice cover. F.D., et al., [1979, 5p.] Harnessing frazil ice. Perham, R.E., [1981, p.227-237], MP 1992 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D., (1982, p.1381-1387) Using the DWOPER routing model to simulate river flows onth ice. Daly, S.F., et al., [1983, 19p.] SR 83-01 Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1983, p.235-240] MP 2061 Unsteady river flow beneath an ice cover. Ferrick, M.G., et al., [1983, p.335-548] MP 1644 Tanana River monitoring and research studies near Fairbanks, Alaska. Neill, C.R., et al., [1984, 93p. 5 5p.	River for River for Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) River for Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) River for Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) River ice problems of river and like ice. Ramscier, R.O., (1972, 243p.) Sessonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.523-540) River ice problems. Burgi, P.H., et al., (1974, p.1-15). MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 121p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 121p.) MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., (1975, 627p.) MP 1007 MP 1	les-related flood frequency analysis: application of analytical estimates. Gerard. R., et al. [1984, p. 85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p. 255-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 370-371] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 252-253] MP 1796 Salmon River ice jams. Cunningham, L.L., et al. [1984, p. 259-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 17p3] Ice jam research needs. Gerard, R., [1984, p. 181-193] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p. 227-265] MP 1816 Numerical simulation of freeze-up on the Ottauquechee River Calkins, D.J., [1984, p. 287-2777] MP 1816 Numerical simulation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p. 237-235] MP 1819 Methods of ice control for winter navigation in initiand waters. Frankenstein, G.E., et al., [1984, p. 139-313] Analysis of rapidly varying flow in ice-covered rivers. MP 1831 Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 59-363] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 59-363] Controlling river ice to allevate ice jam flooding. Deck, D.S., [1984, p. 59-363] Controlling river ice to allevate ice jam flooding. Deck, MP 2486 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1984, 85p. MP 1835] Cottelling river ice to allevate ice jam flooding. Deck, MP 2466 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., 231-2314 Ice block stability. Daiv. S.F., [1984, p
p.239-242] MP 2738 River busines Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1288 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1799 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 199,] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2589 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crossings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.) Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 84-95 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 87-13 Deployment of floating bridges in ice-covered rivers. Mellor, M., et al., [1988, 38p.] Winter bridging exercise on thick ice. Fort McCoy, Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 89-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover. Haynes, E.D., et al., [1979, 5p.] Hamessing frazil ice. Perham, R.E., [1981, p.227-237], MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D., (1982, p.1331-13137] MP 2053 Usiteacoy river flow beneath an ice cover. Ferrick, M.G., et al., [1983, p.254-260] MP 2079 Modeling of ice discharge in river models calkins, D.J., (1983, p.254-260) MP 2081 Legams in shallow rivers with floedplain flow Calkins, D.J., (1983, p.285-290) Legams in shallow rivers with floedplain flow Calkins, D.J., (1983, p.285-290) SR 84-37 S	River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., (1971, 157p.) River foe Formation of ice ripples on the underside of river ice covers. Ashton. G.D., (1971, 157p.) MP 1243 Growth and mechanical properties of river and lake ice. Ramseier, R.O., (1972, 243p.) Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.528-340) River ice problems. Burgi, P.H., et al., (1974, p.1-15) River ice problems. Burgi, P.H., et al., (1974, p.1-15) River ice problems. Surgi, P.H., et al., (1974, p.1-15) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 128p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 162p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1976, 162p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1977, 128p.) CR 76-31 Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., (1977, 18p.) CR 77-08 Some economic benefits of ice booms. Perham. R.E., (1977, p.50-1591) NP 900 NP 900 NP 900 NP 900 MP 1203 MP 1203 Physical measurement of exe jams 1976-77 field season, West, D.E., CR 78-03 Arcting of model ice flows at bridge piers (1978, 12p.) Arcting of model ice flows at bridge piers (1978, 12p.) Physical measurements of river ice for vichicles. Nevel, D.E., CR 78-03 Arcting of model ice flows at bridge piers. (1978, 12p.) Arctin	los-related flood frequency analysis: application of analytical estimates. Gerard. R., et al. [1984, p. 85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 155-] St. Bock, D.S., et al. [1984, 155-] St. Bock, D.S., et al. [1984, 155-] Forecover melting in a shallow river. Calkins, D.J., [1984, p. 255-265-] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] MP 1793 Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] MP 1795 Salmon River ice jams. Cunningham, L.L., et al. [1984, p. 259-253] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 175-] Ice jam research needs. Gerard, R., [1984, p. 181-193] MP 1813 Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p. 227-225] MP 1813 Computer simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p. 247-277] MP 1815 Rise pattern and velocity of frarii ice. Wuebben, J.L., [1984, p. 297-316] MP 1816 Field investigation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p. 237-317] MP 1819 Methods of see control for winter navigation in inland waters. Frankenstein, G.E., et al., [1984, p. 33-337] MP 1830 Controlling river ice to allevate ice jam flooding. Deck. MP 1830 Controlling river ice to allevate ice jam flooding. Deck. MP 1830 Controlling river ice to allevate ice jam flooding. Deck. MP 1830 Controlling river ice to allevate ice jam flooding. Deck. MP 1830 Controlling river ice to allevate ice jam flooding. Deck. MP 1840 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1984, p. 59-107-] MP 1876 Ice regime reconnaissance, Yukon River, Yukon Gerard, MP 2466 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1984, p. 59-107-] MP 1876 Ice block stabelity. Daly,
p.239-242] MP 2738 River busines Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power. J.M., et al., [1980, p.467-486] MP 1298 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 199.] SR 84-01 Geographic information system for river basin. Merry. C.J., et al., [1987, p.265-269] MP 2569 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crosslags Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 28p.] Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 82-05 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 23p.] SR 82-05 Winter bridging exercise on thick ice. Fort McCoy. Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] Winter bridging exercise on thick ice. Fort McCoy. Wisconsin, 1988 Coutermarsh, B.A., [1990, 24p.] SR 99-10 River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 128p.] MP 1047 Turbulent heat transfer from a river to its ice cover. Haynes, E.D., et al., [1979, 5p.] GR 99-19 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1528 On zero-inertia and kinematic waves. Katopodes, N.D., (1982, p.1381-1387) Using the DWOPER routing model to simulate river flows on thice. Daly, S.F., et al., [1981, 19p.] SR 83-01 Unsteacy river flow beneath an ice cover. Ferrick, M.G., et al., [1983, p.254-260] MP 2657 Modeling of ice discharge in river models. Calkins, D.J., (1983, p.238-240) Logians in shallow rivers with floodplain flow. Calkins, D.J., (1983, p.238-240). N.P. 2641 Tanana River monitoring and research studies near Fairbanks, Alaska. Neill, C.R., et al., [1984, 939, b. 5 ap-pends.] Chem. Proceeding and research studies near Fairbanks, Alaska. Riska, 1.5., et al., [1984, 939, b. 5	River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) River foe Formation of ice ripples on the underside of river ice covers. Ashton, G.D., (1971, 157p.) Growth and mechanical properties of river and like ice. Ramseier, R.O., (1972, 243p.) Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., (1973, p.523-540) River ice problems. Burgi, P.H., et al., (1974, p.1-15). MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 123p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 123p.) MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., (1974, 123p.) MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., (1975, 627p.) MP 1007 MP 1008 Mechanics and hydraulics of river ice pams. Tatinclaus, J.C., (1976-31) Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., (1977, 19p.) CR 76-31 Force estimate and field measurements of the St. Marys River ice booms. Perham, R.E., (1977, 19p.) Remote sensing of frazil and brash ice in the St. Lawrence River Dean, A.M., Jr., (1977, 19p.) Some economic benefits of ice booms. Perham, R.E., (1977, p.592-596) Ike breakup on the Chena River 1975 and 1976 T. et al., (1977, 44p.) Wisual observations of floating see from Skylab McFadden, T., et al., (1977, p.35)-379, MP 960 Rebothen, J.L., et al., (1978, p.199-30) MP 1104 Physical measurement of ice jams 1976-77 field season, Woebben, J.L., et al., (1978, p.391-392) MP 1109 River ice. Ashton, G.D., (1978, p.369-392) MP 1110 CR 76-31 CR 77-40 Arching of model ice floes at bridge piers (1978, p.495-307) MP 1109 River ice. Ashton, G.D., (1978, p.369-392) MP 1110 CR 76-31 Grand Gran	les-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p. 85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p. 177-190] St. Deck, D.S., et al. [1984, 15p3] Forfornance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p3] Ice cover melting in a shallow river. Calkins, D.J., [1984, p. 1955-265] Ice jams in shallow rivers with floodplain flow: Discussion. Beltaos. S., [1984, p. 370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p. 370-371] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p. 522-528] MP 1796 Salmon River ice jams. Cunningham, L.L., et al. [1984, p. 225-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al., [1984, 17p3] Ice jam research needs. Gerard, R., [1984, p. 181-193] Romputer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al., [1984, p. 227-225] MP 1814 Numerical simulation of freeze-up on the Ottauquechee River. Calkins, D.J., [1984, p. 241-249] MP 1816 Numerical simulation of St. Lawrence River hanging ice dams. Shen, H.T., et al., [1984, p. 241-249] Methods of ice control for winter navigation in inland waters. Frankenstein. G.E., et al., [1984, p. 139-337] Analysis of rapidly varying flow in ice-concrete rivers. Ferrich, M.G., [1914, p. 159-363] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p. 69-76] St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1914, 85p.] Filed of ice control for winter navigation in inland waters. Frankenstein. G.E., et al., [1984, p. 159-163] Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p. 69-76] MP 1805 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1914, 85p.] MP 1805 St. Lawrence River hanging ice dams, winter 1983-1984 Shen, H.T., et al., [1914, 85p.] MP 1806 St. Lawrence River hanging ice dams, winter 1983-1
p.239-242] MP 2738 River busins Permafrost distribution on the continental shelf of the Beaufort Sea. Hopkins, D.M., et al., [1979, p.135-141] MP 1298 Snowpack estimation in the St. John River basin. Power, J.M., et al., [1980, p.467-486] MP 1298 Hydrologic modeling from Landsat land cover data. McKim, H.L., et al., [1984, 1992] SR 84-81 Geographic information system for river basin. Merry, C.J., et al., [1987, p.265-269] MP 2549 Snow hydrology in the upper Yamuna basin, India. Malhotra, R.V., et al., [1988, p.84-93] MP 2633 River crossings Operation of the U.S. Combat Support Boat (USCSBMK 1) on an ice-covered waterway. Stubstad, J., et al., [1984, 2892] SR 84-85 Tactical bridging during winter: 1986 Korean bridging exercise. Coutermarsh, B.A., [1987, 2392] SR 84-20 Winter bridging extracts on thick ice. Fort McCo2, Wisconsin, 1988 Coutermarsh, B.A., [1990, 2492] Winter bridging extracts on thick ice. Fort McCo3, Wisconsin, 1988 Coutermarsh, B.A., [1990, 2492] River flow ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 12892] MP 1994 Turbulent heat transfer from a river to its ice cover Haynes, F.D., et al., [1979, 592] Harnessing frazil ice. Perham, R.E., [1981, p.227-237] MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1398 River ice suppression by side channel discharge of warm water. Ashton, G.D., [1982, p.65-80] MP 1398 Using the DWOPER routing model to simulate river flows with ice. Daly, S.F., et al., [1983, 1992] Unsteacy river flow beneath an ice cover Fernek, M.G., et al., [1983, p.235-260] MP 2673 MP 2671 Hannessing and research studies near Fairbanks, Alaska Neill, C.R., et al., [1984, 989. + 5. appends.] Netal Pool Control Project and the Tanana River near Fairbanks, Alaska Neill, C.R., et al., [1984, 989. + 5. appends.] Chena Flood Control Project and the Tanana River near Fair-	River foe Formation of ice ripples on the underside of river ice covers. Ashton, GD., [1971, 157p.] River foe Formation of ice ripples on the underside of river ice covers. Ashton, GD., [1971, 157p.] River foe Formation of ice ripples on the underside of river ice covers. Ashton, GD., [1971, 157p.] River foe Formation of ice ripples on the underside of river ice covers. Ashton, GD., [1972, 243p.] MP 1243 Seasonal regime and hydrological significance of stream icings in central Alaska. Kane, D.L., et al., [1973, p.523-540) River ice problems. Burgi, P.H., et al., [1974, p.1-15] MP 1002 ERTS mapping of Arctic and subarctic environments. Anderson, D.M., et al., [1974, 123p.] MP 1007 Third International Symposium on Ice Problems, 1975 Frankenstein, G.E., ed., [1975, 627p.] MP 1007 Remote sensing of firarl and brash ice in the St. Lawrence rice booms. Perham, R.E., [1977, 26p.] CR 77-08 River Dean, A.M., Jr., [1977, 19p.] Some economic benefits of ice booms. Perham, R.E., (1977, p.570-591) Yukon Ruer breakup 1976 Johnson, P., et al., [1977, p.89-2596] Ice breakup on the Chena River 1975 and 1976 MP 1008 MP 1008 MP 1009 River ice Ashton, G.D., [1978, 1939-302] MP 1124 Characteristics of ice on two Vermont rivers (1978, 10p.) MP 1172 Accelerated ice growth in rivers CR 77-14 Break-up dates for the Yukon River, Pt.2 Alakanuk to Tana-	los-related flood frequency analysis: application of analytical estimates. Gerard, R., et al. [1984, p.85-101] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] St. Lawrence River freeze-up forecast. Shen, H.T., et al. [1984, p.177-190] Performance of the Allegheny River ice control structure, 1983. Deck, D.S., et al. [1984, 15p3] St. Boek, D.S., et al. [1984, 15p3] St. Boek, D.S., et al. [1984, 15p3] St. Boek, D.S., et al. [1984, 15p3] Ice jams in shallow rivers with floodplain flow: Discussion, Beltaos. S., [1984, p.370-371] MP 1798 Controlling river ice to alleviate ice jam flooding. Deck, D.S., [1984, p.320-528] MP 1798 Salmon River ice jams. Cunningham, L.L., et al. [1984, p.529-533] Forecasting water temperature decline and freeze-up in rivers. Shen, H.T., et al. [1984, 17p3] Computer simulation of ice cover formation in the Upper St. Lawrence River. Shen, H.T., et al. [1984, p.829-257-265] Numerical simulation of freeze-up on the Ottsuquechee River. Calkins, D.J., [1984, p.227-227] MP 1813 Numerical simulation of freeze-up on the Ottsuquechee River. Calkins, D.J., [1984, p.241-227] MP 1816 Field investigation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.241-249] MP 1816 Field investigation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.329-337] MP 1816 Field investigation of St. Lawrence River hanging ice dams, Shen, H.T., et al., [1984, p.39-361] Analysis of rapidly varying flow in ice-covered rivers. Fernech, MG, [1984, p.39-361] Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MP 1830 Controlling river ice to alleviate ice jam flooding. Deck, MG, [1984, p.954-558] MP 1831 Controlling river ice to alleviate ice jam flooding. Dec

Ice conditions on the Ohio and Illinois rivers, 1972-1985.	Time estimation for maximum supercooling in dynamic frazil	Reads
Gatto, L.W., (1985, p.856-861) MP 1914	ice formation Daly, S.F., et al. [1989, 13p] SR 89-26	Approach roads, Greenland 1955 program, (1959, 100p.) MP 152
Ice jam flood prevention measures, Lamoille River, Hardwick VT. Calkins, D.J., [1985, p.149-168] MP 1940	Cryogenic sampling of frazil ice deposits. Chacho, E.F., Jr.,	Heat and moisture flow in freezing and thawing soils-a fiel
Hudson River ice management. Ferrick, M.G., et al., (1985, p.36-110) MP 2174	et al. [1989, 6p] SR 89-28 Winter habitats of salmon and trout Calkins, D.J., [1989,	study. Berg, R.L., (1975, p.148-160) MP 161 Road construction and maintenance problems in central Ala:
Construction and calibration of the Ottauquechee River model. Gooch, G., (1985, 10p.) SR 85-13	9p 1 SR 89-34	ka. Clark, E.F., et al, (1976, 36p) SR 76-0
Cazenovia Creek Model data acquisition system. Bennett,	River-ice mounds on Alaska's North Slope. Arcone, S.A., et al., [1989, p 288-290] MP 2563	Pipeline haul road between Livengood and the Yukon River Berg, R L., et al. (1976, 73p) SR 76-1
B.M., et al. (1985, p.1424-1429) MP 2090 Determining the effectiveness of a navigable ice boom. Per-	lee conditions along Illinois Waterway, 1972-1985. Gatto, L.W., 1989, 112p ; CR 89-20	Repetitive loading tests on membrane enveloped road sections during freeze thaw. Smith, N. et al. 11977, p.171-
ham, R.E., (1985, 28p) SR 85-17	Ice force measurements on a bridge pier in a small river.	197 ₁ MP 96
Techniques for measurement of snow and ice on freshwater Adams, W.P., et al. (1986, p.174-222) MP 2000	Sodhi, D.S., et al. (1989, p.1419-1427) MP 2764 Freezeup dynamics of a frazil ice screen. Axelson, K.D.	Resiliency in cyclically frozen and thawed subgrade soil: Chamberlain, E.J., et al., (1977, p.229-281) MP 172
Upper Delaware River ice control—a case study. Zufelt, J.E., et al. (1986, p.760-770) MP 2005	[1990, 8p.] SR 98-86 In-situ sampling and characterization of frazil ice deposits.	Ecology on the Yukon-Prudhoe haul road. Brown, J. et [1978, 131p] MP 112
Hydrologic aspects of see jams. Calkins, D.J. (1986, p.603-	Lawson, D.E., et al. (1990, p.193-205) MP 2694	Chemical composition of haul road dust and vegetation. Is
609) MP 2116 Ice problems associated with rivers and reservoirs. Benson,	Ice cover effect on river flow. Ashton, G D., [1990, 24p] SR 99-08	kandar, I K., et al. (1978, p.110-111) MP 111. Load tests on membrane-enveloped road sections. Smith
C., et al. (1986, p.70-98) MP 2155 St. Lawrence River freeze-up forecast Foltyn, E.P., et al.	Salmon River ice jam control studies, interim report. Asel- son, K D, et al., [1990, 8p.] SR 98-96	N., et al. (1978, 16p.) CR 78-1 Permafrost and active layer on a northern Alaskan road
[1986, p 467-481] MP 2120	Radar surveying of the bottom surface of see covers. Arcone,	Berg, R L., et al. (1978, p.615-621) MP 110
Design and model testing of a river see prow. Tatinelaux, J.C., [1986, p.137-150] MP 2132	S.A., et al. (1990, p.30-39) MP 2766 Rivers	Resiliency of silt under asphalt during freezing and thawing Johnson, T.C., et al. 1978, p.662-6681 MP 110
River and lake ice engineering. Ashton, G.D., ed., c1986, 485p.; MP 2144	Debris of the Chena River. McFadden, T., et al. 11976.	Construction on permafrost at Longycarbyen on Spitsberger Tobiasson, W., (1978, p.884-890) MP 110
Controlled river ice cover breakup; part 1. Hudson River field	14p ₁ CR 76-26 Environmental atlas of Alaska. Hartman, C.W., et al.	Ecological baseline on the Alaskan haul road. Brown, J., ed
experiments. Ferrick, M.G., et al. (1986, p.281-291) MP 2391	[1978, 95p.] MP 1204 Freshwater ice growth, motion, and decay. Ashton, G.D.	(1978, 131p) SR 78-1 Freeze thaw loading tests on membrane enveloped road see
Controlled river ice cover breakup; part 2. Theory and numerical model studies. Ferrick, M.G., et al, [1986,	(1980, p 261-304) MP 1299	tions. Smith, N., et al. (1978, p.1277-1288) MP 115
p.293-305 ₁ MP 2392	Bank erosion of U.S. northern rivers. Gatto, L.W., (1982, 752); CR 82-11	Nondestructive testing of in-service highway pavements it Maine Smith, N., et al. (1979, 22p) CR 79-0
Ice atlas, 1984-1985: Ohio River, Allegheny River, Monon- gahela River. Gatto, L.W., et al. (1986, 185p.)	Data acquisition for refrigerated physical model. Zufelt,	Sulfur foam as insulation for expedient roads. Smith, N., e
SR 86-23 River ice and salmonids. Walsh, M., et al. (1916, p.D-4.1-	Analysis of a short pulse radar survey of revetments along the	al. (1979, 21p.) CR 79-1: Noncorrosive methods of see control. Minsk, LD., (1979,
D-4.26 ₁ MP 2477	Mississippi River. Arcone, S.A., [1989, 20p.; MP 2692	p.133-162 ₁ MP 126
River ice mapping with Landsat and video imagery. Gatto, L.W., et al. (1987, p.352-363) MP 2273	Read icing	Environmental engineering, Yukon River-Prudhoe Bay Hay Road. Brown, J., ed., (1980, 187p.) CR 30-1
Corps of engineers seek see solutions. Frankenstein, G.E., [1987, p.5-7] MP 2219	Road construction and maintenance problems in central Alas- ka. Clark, E.F., et al. (1976, 36p.) SR 76-68	Environment of the Alaskan Haul Road. Brown, J., (1980, p.3-52; MP 135
Analysis of 112 years of ice conditions observed on the Ohio	Drainage facilities of airfields and heliports in cold regions.	Road dust along the Haul Road, Alaska. Everett, K.R.
River at Cincinnati. Daly, S.F., et al, [1987, p.70-79] MP 2260	Lobacz, E.F., et al. (1981, 56p.) SR 81-22 Optimizing deicing chemical application rates Minsk, L.D.	(1980, p.101-128) MP 135. Revegetation along roads and pipelines in Alaska. Johnson
Airborne river-see thickness profiles. Arcone. S.A., et al., [1987, p.330-340] MP 2312	[1982, 55p.] CR 82-18 ISTVS workshop on tire performance under winter condi-	L.A., (1980, p.129-150) MP 135.
Ice jams and the winter climate near White River, SD. Bilel-	tions, 1923 (1925, 177p.) SR 85-15	Field cooling rates of asphalt concrete overlays at low temper atures. Eaton, R.A., et al., §1980, Hp.1 CR 80-30
lo, M.A., [1987, p 154-162] MP 2399 Study of dynamic ice breakup on the Connecticut River near	Pavement icing detector—final report Goldstein, N., et al., [1987, 26p. + append.] MP 2263	Guidebook to permafrost and its features, northern Alaska Brown, J., ed. (1983, 230p.) MP 160
Windsor, Vermont Ferrick, M.G., et al., [1917, p.16]- 1771 MP 2400	Thermal infrared survey of winter trails at Fort Wainwright, Collins, C.M., et al. [1990, 16p.] SR 98-17	Measurement and evaluation of tire performance under win ter conditions. Blaisdell, G L., (1985, p.198-228)
Ice atlas 1985-86 of five rivers of the USA. Gatto, L.W., et	Read maintenance	MP 234
al, [1987, 367p.] SR 87-20 lee conditions along the Ohio River, 1972-1985 Gatto,	Winter maintenance research needs Minsk, L.D., 1975, p.36-54; MP 950	Stabilization of fine-grained soil for road and airfield con struction. Danyluk, L.S., [1916, 37p.] SR 86-2
L.W., (1989, 162p.) SR 88-01 Dynamic ice breakup on the Connecticut River, VT Fer-	Haul Road performance and associated investigations in Alas-	Effects of freeze thaw eyeles on granular soils for pavements Cole, D.M., et al. (1926, 70p.) CR 86-0
rick, M.G., et al. (1988, 16p.) CR 88-01	ka Berg, R.L., (1980, p.53-100; MP 1251 Pothole primer; a public administrator's guide to understand-	Frost action on roads and airfields. Johnson, T.C., et al.
Ice conditions along the Allegheny and Monongahela Rivers. Gatto, L.W., [1988, 106p.] SR 88-06	ing and managing the pothole problem. Eaton, R.A., coord, (1981, 24p.) MP 1416	[1916, 45p] CR 86-11 Foundation technology in cold regions Quant, W.F.
Inventory of see problem sites and remedial see control struc- tures. Perham, R.E., [1938, 9p.] SR 88-07	Snow removal equipment Minsk, L.D., [1981, p.648-670]	[1987, p 305-310] MP 242: Freezing a temporary roadway for transport of a 3000 to
Development of a fiver ice pross. Tatinclaus, J.C., et al.	MP 1446 Snow and see control on railroads, highways and airports.	dragline Maishman, D. et al. (1988, p. 357-365)
(1988, 26p.) CR 88-69 Ice cover distribution in Vermont and New Hampshire Atlan-	Minsk, L.D., et al. (1981, p.671-706) MP 1447 Ginde to managing the pethole problem on roads Eaton,	MP 2371 Engineering geology studies on the National Petroleum Re
tic salmon rearing streams Calkins, D.J., et al. 11958, p.85-961 MP 2473	R A., ct al. (1981, 24p.) SR 81-21	serve in Alaska Kachadoorian, R., et al. (1988, p. 899- 922) MP 2519
Preliminary results of an experiment using a 16 ft x 50 ft long	Potheries the problem and solutions Eaton, R.A., 1982, p. 160-162; MP 1504	Method for rating unsurfaced roads Eaton, R.A., et al [1939, p.103-106] MP 2610
frazil collector line array Perham, R.E., [1988, p. 139- 156] MP 2474	Strategies for winter maintenance of payements and road-	State of the art of pavement response monitoring systems for
Preliminary study of scour under an ice jam Wuebben, J.L., {1988, p.177-192} MP 2475	ways Mmsk, L.D., et al. (1984, p. 155-167) MP 1966	roads and arrields (1939, 401p) SR 89-2. Rock drilling
Transverse velocities and see jamming potential in a river	Comparison of three compactors used in pothole repair Smelling, M.A., et al., [1984, 14p.] SR 84-31	Kinematics of axial rotation machines Mellor, M., [1976]
bend Zufelt, J.E., [1988, p.193-207] MP 2478 Development of a river sce-pross Part 2 Tatinelius, J.C.	Seasonal variations in pavement performance. Johnson,	45p ₃ CR 7640 Kinematics of continuous belt machines. Mellor, M
[1938, p.44-52] MP 2497 Laboratory study of transverse velocities and see jamming in	Snow and see prevention in the United States. Minsl, I.D.,	(1976, 24p.) CR 76-11 Transverse rotation machines for cutting and boring in perma
a mer bend Zufeit, J E., et al. (1988, p 189-197)	[1956, p. 37-42] MP 1874 Effects of cold environment on rapid runway repairs Abele,	from Mellor, M. (1977, 36p.) CR 77-19
MP 2501 Computer-generated graphics of river are conditions. Bilel-	G. (1926, p. 1-9) MP 2169	Design for culting machines in permations. Mellor, M. [1978, 24p.] CR 78-11
lo, M.A. et al. (1938, p. 211-219) MP 2509 Development of a dynamic see breakup control method for	Rating system for unsurfaced roads to be used in maintenance management. Eaton, R.A., et al., [1987, p.(2)51-(2)62]	Mechanics of cutting and bosing in permafrost Meilor, M [1980, 82p.; CR 80-2]
the Connecticut River near Windsor, Vermont Ferrick,	MP 2313 Rating unsurfaced roads Eaton, R.A., et al., [1937, 14p.]	Mechanics of cutting and bonng in permateust. Mellor, M.
M.G., et al. (1488, p. 221-233; MP 2510 Tee control in river harboes and fleeting areas Perham, R.h.,	SR 87-15	[193], 38p.; CR 81-20 Rock excavation
[1988, 7p.) SR 88-12 Deployment of floating bridges in sce-covered rivers. Mel-	Rating unsurfaced roads Eaton, R.A., et al. (1933, p.66- 69) MP 2541	havavating rock, see, and frozen ground by electromagnetic radiation. Hockstra, P., 1976, 17p.; CR 76-30
lor, M. et al. (1988, 38p.) 5R 88-20	Development of the unsurfaced toads rating methodology	Dynamics and energetics of parallel motion tools for cutting
Ice observations on the Allegheny and Monongahela rivers Bilello, M.A., et al., §1988, 43p.; SR 88-25	Cost effectiveness of proper pothole patiening Eaton, R.A.	and being Meller, M. [1977, 85p.] CR 77-07 Design for cutting machines in permatest. Meller, M.
Airborne radar survey of a brash see jam in the St. Clair River	[1988, p. 170-174] MP 2553 Use of low viscosits asphalts in cold regions. Janon, V.C.	,1975, 24pg CR 78-11
Water detection in coastal plains using belieopter-borne chort	1984 h_0/20 ² d_6561 ³	Rock mechanics Block motion from detonations of buried rear-surface explo-
pulse tadar - Arcone, S.A., et al. (1989, 25p.) CR 49-07	Method for rating unsurfaced roads Faton, R.A., et al., [1959, p.103-106] MP 2610	sive arrays - Blomn, \$1 , (1930, 62p.) - CR 36-26 Prediction of explosively driven relative displacements in
Effect of Toston dam on upstream see conditions Ashton, GD, 11989, 9p.1 SR 89-16	Method for rating unsurfaced roads. Faton, R.A., et al., [1959, p. 30-40]. MP 2533	recks Blemm, S.E., (1981, 137) CR 81-11
Framework for control of dynamic see breakup by myer regu-	Technology transfer - Eaton, R., (1990, p.25)	Alaska Good Friday earthquake of 1964 Swinzow, G K 21932, 16p 2 CR 82-01
lation Ferrick, M.G., et al., (1989, 14p.) CR 89-12. Framework for control of dynamic see breakup by river regul	Readbods MP 2721	Some recent developments in sibrating mire rock mechanic instrumentation. Dutta, P.K., [1985, 17p.]. SIP 1961
lation Ferrick, M.Cr., et al., [1959, p. *9.92]	Haus Road performance and associated investigations in Alas-	terification tests for a stiff incircuon stress senior. Con

Rock mechanics (cont.) Rock stress measurements by wire stressmeter at high temper-	Locating wet cellular plastic insulation in recently constructed roofs. Korhonen, C, et al. [1983, p.168-173]	Generation of runoff from subarctic snowpacks. Dunne, T., et al. (1976, P.677-685) MP 883
atures. Dutta, !: K., et al. [1987, p.43-58] MP 2447	MP 1729	Energy balance and runoff from a subarctic snowpack.
Recks	Transient heat flow and surface temperatures of a built-up roof Korhonen, C., (1983, 20p.) SR 83-22	Price, A.G., et al., [1976, 29p] CR 76-27
Mechanisms of crack growth in quartz. Martin, R.J., 111, et al., 11975, p.4837-48441 MP 855	Can wet roof insulation be dried out. Tobiasson, W., et al.	Modeling snow cover runoff meeting, Sep. 1978. Colbeck, S.C., ed. (1979, 432p.) SR 79-36
Resistance of elastic rock to the propagation of tensile cracks.	[1983, p.626-639] MP 1509	Snow accumulation, distribution, melt, and runoff. Colbeck,
Peck, L., et al. (1985, p.7827-7836) MP 2052 Microstructure and the resistance of rock to tensile fracture.	Comparison of aerial to on-the-roof infrared moisture surveys. Korhonen, C., et al. [1983, p.95-105] MP 1789	S C., et al. (1979, p.465-468) MP 1233 Watershed modeling in cold regions. Stokely, J L., (1980,
Peck, L., et al. (1985, p 11,533-11,546) MP 2157	U.S. Air Force roof condition index survey: Ft. Greely, Alas-	241p.; MP 1471
Condensing steam tunnel heat sinks. Lunardini, V.J.,	ka. Coutermarsh, B.A., [1984, 67p] SR 84-03 Probability models for annual extreme water-equivalent	Atmospheric pollutants in snow cover runoff. Colbeck, S.C., (1981, p.1-10) MP 1586
[1986, 299.] SR 86-24 Detection of coarse sediment movement using radio transmit-	ground snow Ellingwood, B, et al. (1984, p.1153-1159)	Atmospheric pollutants in snow cover runoff. Colbeck, S.C.
ters. Chacho, E.F., Jr., et al. (1989, p.367-373(B))	MP 1823	(1981, p.1383-1388) MP 1487
MP 2752	Roof moisture surveys: yesterday, today and tomorrow, Tobiasson, W., et al. (1985, p 438-443 + figs.)	Overland flow: an alternative for wastewater treatment. Martel, C.J., et al., [1982, p.181-184] MP 1506
Snow load design criteria for the United States. Tobiasson,	MP 2040	Hydrology and climatology of a drainage basin near Fair-
W., et al. [1976, p.70-72] MP 947	Condensation control in low-slope roofs. Tobasson, W., [1985, p.47-59] MP 2039	banks, Alaska. Haugen, R.K., et al, (1982, 34p) CR 82-26
Protected membrane roofs in cold regions. Aamot, H W C., et al., 1976, 27p.; CR 76-92	Aerial roof moisture surveys. Tobiasson, W., (1985, p 424-	Runoff from a small subarctic watershed, Alaska. Chacho,
Water absorption of insulation in protected membrane roofing	4251 MP 2022 Lessons learned from examination of membrane roofs in Alas-	E.F., et al. (1983, p.115-120) MP 1654 Permafrost. Benson, C., et al. (1986, p.99-106)
systems. Schaefer, D., (1976, 15p.) CR 76-38 CRREL roof moisture survey, Pezse AFB. Korhonen, C., et	ka. Tobiasson, W., et al. (1986, p.277-260)	MP 2156
al. (1977, 10p.) SR 77-02	MP 2003	Snow hydrology in the upper Yamuna basin, India. Malho- tra, R.V., et al., (1988, p.84-93) MP 2633
Methodology med in generation of snow load case histories.	Construction engineering community: materials and diagnos- tics. (1986, 54p) SR 86-01	tra, R.V., et al. (1988, p.84-93) MF 2633 Remoff forecasting
McLaughin, U., et al. (1977, p.163-174) MP 1143 Observation and analysis of protected membrane roofing sys-	Roof blister valve Korhonen, C., [1986, p.29-31]	Short-term forecasting of water tun-off from snow and ice.
tems. Schaefer, D., et al. (1977, 40p) CR 77-11	MP 2138 Airborne roof moisture surveys. Tobiasson, W., (1916,	Colbeck, S.C., (1977, p.571-588) MP 1067 Use of Landsat data for predicting snowmelt runoff in the
Roof leads resulting from rain-on-snow. Colbeck, S.C.,	p.45-47 ₁ MP 2139	upper Saint John River basin. Merry, C.J., et al. (1983).
[1977, 199.] CR 77-12 Installation of loose-laid inverted roof system at Fort Wain-	Protected membrane roofing systems. Tobiasson, W.,	p.519-533 ₁ MP 1694
wright, Alaska. Schaefer, D., (1977, 27p.) SR 77-18	[1986, p.49-50] MP 2140 Vents and vapor retarders for roofs. Tobiasson, W., [1986,	Forecasting of snowmelt runoff using water temperature data. Panghurn, T., (1987, p.108-113) MP 2398
Snow load data analysis, winter 1976-77. O'Rourke, M., [1977, 9p. + appends.] MP 2427	11p ₁ MP 2246	Snow cover and glacier variations. Colbeck, S.C., ed,
Hand-held infrared systems for detecting roof moisture.	Proposed code provisions for drifted snow loads. O'Rourke, M. et al. (1986, p.2080-2092) MP 2148	(1989, 111p ₃ MP 2672 Renways
Tobiasson, W., ct al. (1977, p.261-271) MP 1390	Roof Misters. Physical fitness building, Fort Lee, Virginia.	Fabric installation to reduce cracking on runways. Eaton,
Mid-winter installation of protected membrane roofs in Alas- ka. Aamot, H.W.C., [1977, 5p.] CR 77-21	Kothonen, C., et al. (1986, 15p.) Se 86-35	R.A., et al. (1981, 26p.) SR \$1-10
infrared detective: thermograms and roof moisture. Kor-	Infrared testing for leaks in new roofs. Korhonen, C., [1987, p.49-54] MP 2282	Effects of cold environment on rapid runway repairs. Abele, G., (1986, p.1-9) MP 2169
honen, C., et al. (1977, p.41-44) MP 961	Cold regions roof design. Tobasson, W., (1987, p.457-	Engineering geology studies on the National Petroleum Re-
Detection of moisture in construction materials. Mocey, R.M., et al. (1977, 9p.) CR 77-25	458; MP 2243 Blistering of built-up roof membranes: pressure measure-	serve in Alaska. Kachadoorian, R., et al, (1988, p.399- 922 ₁ MP 2519
Roof leads resulting from run on snow, Colbeck, S.C.,	ments. Korhonen, C., (1987, 22p.) SR 86-29	Hard-surface runways in Antarctica Mellor, M., (1988,
(1977, p.482-490) MP 982	Wetting of polystyrene and urethane roof insulations.	\$7p. ₁ SR \$8-13 Airfields in Arctic Alaska. Crocy, F.E., (1988, p.49-55 ₃
Roof moisture survey; ten State of New Hampshire buildings. Tobiasson, W., et al. (1977, 29p.) CR 77-31	Tobtasson, W., et al. (1987, p.108-119) MP 2337 Vents and vapor retarders for roofs. Tobiasson, W., (1987,	MP 2451
CRREL roof moisture survey, Building 208 Rock Island Arse-	p.\$0-90 ₃ MP 2352	Response of runway paverient to freeze thaw cycles. Allen,
nal. Korhonen, C., et al. (1977, 6p.) SR 77-43 Snow leads on structures. O'Rourke, M.J., (1978, p.418-	Wetting of polystyrene and urethane roof insulations, Tobasson, W., et al. [1988, p.421-430; MP 2011	W.L., et al. (1989, 31p.) SR 89-02 Performance of patement at Central Wisconsin Airport.
428 ₃ MP 1901	Wood-frame riofs and moesture. Tobasson, W., (1988,	Stark, J., et al. (1989, p.92-103) MP 2463
Recommendations for implementing roof moisture surveys in	p.33-37 ₁ MP 2340	Deep frost effects on a longitudinal edge drain. Allen, W.L., [1989, p.343-352] MP 2469
the U.S. Army, [1978, 8p.] SR 78-81 Detecting wet roof insulation with a hand-held infrared cam-	Method for conducting airborne infrared roof moisture surveys. Tobiassion W., [1988, p.50-61] MP 2436	Compacted-snow runwa, s. design and construction guide-
era. Korhonen, C., et al. (1578, p.A9-A15)	International Conference on Snow Engineering, 1st, July	lines for Antarctica. Russell-Head, D.S., et al. (1989, 68p.) SR 89-10
MP 1213 Roof construction under wintertime conditions, a case study	1988, (1989, 573p) SR 89-66 Changes coming in snow load design enterns. Tobussion, W.,	Porous portland cement concrete as an airport runway over-
Bennett, F.L., (1978, 34p) SR 78-24	(1989, p.413-418) MP 2612	lay Korhonen, C., et al. (1989, 20p.) SR 89-12
Research on roof moisture detection. Tobiasson, W., et al.	Roof design in cold regions. Tobiasson, W., (1989, p.46)	Airport pavement distress in cold regions Vinson, T.S., et al. (1989, 142p.) CR 89-10
[1978, 69.] SR 78-29 Looding on the Hartford Civic Center roof before collapse.	4721 MP 2613 Roof design in cold regions. Tobiasson, W., £1919, p.1029-	Improving snow roads and airstrips in Antarctica. Lee, S.M.,
Redfield, R., et al. (1979, 32p.) SR 79-09	1037 ₁ MP 2651	et al. (1989, 19p ₁ SR 89-22 Safety
Roof moisture survey -U.S. Military Academy Korhonen, C., et al, §1979, 8 refs.; SR 79-16	Reefer a management tool for maintaining built-up reefs. Bailey, D.M., et al., (1989, p.6-10) MP 2488	Foundations on permafrost, US and USSR design and prac-
Roof response to icing conditions. Lane, J W., et al. (1979,	Vapor retarders for membrane roofing systems. Tobiasson,	tice Fish, A.M., (1983, p. 3-24) MP 1602 Saint Clair River
40p.) CR 79-17	W. (1989, p.31-37) MP 2489	Water quality during winter river navigation seasons. Slet-
Roof monture survey. Kothonen, C, et al. (1950, 31p.) SR 80-14	ROOFER a management tool for maintaining built-up roofs, Bailey, D.M., et al., [1989, 4p.] MP 2576	ten, R.S., (1988, 56p.) SR 88-10
Roof leaks in cold regions, school at Cheval, Alaska	Rotary drilling	Airborne radar survey of a brash see jum in the St. Clair River, Daly, S.F., et al., (1989, 17p.) CR #9-02
Tobiasson, W., et al. (1980, 12p.) CR 98-H Roofs in cold regions. Marson's Store, Chremont, New	General considerations for drill system design Mellor, M., et al. (1976, p. 77-111) MP 856	Saint Lawrence River
Hampshire Tobasses, W. et al. (1980, 13n)	Ameniatics of axial rotation machines Mellor, M., (1976,	St. Lawrence River freeze-up forecast Foltyn, h.P., et al. [1986, p.467-481] MP 2120
SR 80-25	45pg CR 76-16	Soline soils
Moisture gain and its thermal consequence for common roof insulations. Tobiasson, W., et al. (1980, p.4-16)	Roughness coefficient Theory for scalar roughness and transfer coefficients over	NMR phase composition measurements on moist soils
MP 1361	snow and see Andreas, E.L., (1987, p.159-184)	Tice, A.R., et al. [1973, p.11-14] MP 1210 Improving electric grounding in frozen materials. Delancy.
Resets in cold regions Tobusson, W., [1980, 21p.] MP 1408	NP 2195 Rubber ice friction	A.J., et al., (1982), 12p.; SR #2-13
New 2 and 3 inch diameter CRRFL snow samplers. Bates,	Driving traction on ice with all-season and mud-and-snow	Frost heave of saline soils Chamberlain, F.J., (1983, p. 121- 126) MP 1655
R.E., et al. (1920, p. 199-200) MP 1430	radul tires Blassdell, G L., (1933, 22p) CR 83-27	liferts of salt on unfrozen water content in silt, Lanthou,
Venting of built-up roofing systems Tobiasson, W., [1981, p.16-21] MP 1498	fee traction of tires. Blandell, G.L., et al., (1986, 117). SR 86-19	China Tice, AR, et al. 1984, 18p 1 CR 84-16
Roof moisture surveys Tobiasson, W., et al. (1981, 18p.)	Rubber snow friction	Shear strength in the zone of freezing in saline soils. Chamberlain, E.J., [1935], p 366-574; MP 1879
SR 81-31 Roof moisture surveys Tobeasson, W., (1932, p. 163-166;	Shallow snow performance of wheeled vehicles Harrison, W.L., (1976, p. 589-614) MP 1130	life is of soluble salts on the unfrozen water content in silt
MP 1505	Predicting wheeled vehicle motion resistance in shallow	Tice, A.R., et al., (1985, p. 99-109) MP 1933 Uniforen water contents of signaturetic soil materials And-
Moisture detection in roofs with cellular plastic insulation.	same Blandell, G L., (1981, 18p.) SR 81-30	ctson, D.M., ct al. [1989, p. 343-366] MP 2476
Korthonen, C., et al. (1992, 22p.) SR 82-07. Uniform snow loads on structures. O Routle, M.J., et al.	CRRFI instrumented vehicle for cold regions mobility measurements. Blaisdell, G.L., [1982, 11p.] MP 1818	Salinity Salinity
(1982, p.2781-2798) MP 1574	Measurement of snow surfaces and tire performance evalua-	Salinity variations in sea see Cost, G.F.N., et al. (1974), p. 109-1221 MP 1023
Infrared inspection of new roofs - Koshonen, C., 1192, 14p.; SR 82-33	tion Blaisdell, G.L., et al. (1982, "p.) MP 1516. Driving traction on see with all-season and mud-and-snow.	Oreochemistry of subsea permafront at Prudhoe Bay, Alaska
Analysis of roof snow load case studies, uniform loads O'	radial tires. Blaisdell, G.L., [1981, 22p.] CR 83-27	Page, F.W., et al. (1978, "Op.) SR 78-14. Sinteting and compaction of snow containing liquid water.
Rourke, M., et al. (1983), 2974 CR 83-01	Runoff	Collect, S.C., ct al., [12"2, p. 13 12] MP 1190
Roof moisture surveys current state of the technology Tobiasson, W., [1933, p.24-31] MP 1628	Snow accumulation for arcite freshwater supplies Slaughter, CW, et al. [1975, p.218-224] 31P 860	Compaction of wet snow on highways Collect, S.C., 1979, p.14-17; MP 1234
Ground snow loads for structural design Filingwood, B. et	Effects of radiation penetration on snowmelt runoff hydro-	Massibalance aspects of Weddell Sea packing. Ackles, S.F.,
al, (192), p 950-964; MP 1734 Bisters in built-up toofs due to cold weathe — Aothonen, C.	graphs Colbert, S.C., [1976, p. 73-82] MP 948	[1979 L 1911504] VIL 1384
ct al. (1983, 12p.) SR 83-21	files is of radiation penetration on snowmelt runoff hydro- graphs Cobeck, S.C., (1978, 2p.) CR 76-11	Physical oceanography of the seasonal sea see tone McPhee, M.G., [1980, p.93-132] MP 1294
		· · · · · · · · · · · · · · · · · · ·

Low temperature phase changes in most, briny clays. Anderson, D.M., et al. [1980, p.139-144] MP 1330	Three-wavelength scintillation measurement of turbulent heat fluxes. Andreas, E.L., [1990, p.74-77] MP 2696	Finite element formulation of a sea ice dust model. Sodhi. D.S., et al. (1977, p.67-76) MP 1165
Arctic Ocean temperature, salinity and density, March-May	Scotia Sea	Dynamics of near-shore ice Kovacs, A., et al. (1977,
1979. McPhee, M.G., £1981, 20p 1 SR 81-05 Mechanical properties of multi-year pressure ridge samples.	Weddell-Scotia Sea MIZ, October 1984. Crasey, F.D., et al. [1986, p.3920-3924] MP 1536	p 411-424 ₁ MP 1076 Model simulation of near shore ice drift, deformation and
Richter-Menge, J.A., (1985, p. 244-251) MP 1936 lolt fee	SEA ICE	thickness. Hibler, W.D., III, §1978, p.33-443 MP 1010
Optical properties of salt ice. Lane, J.W., (1975, p.363-	Snow and ice on the earth's surface Mellor, M., (1964, 163p) M II-CI	Radar anisotropy of sea ice. Kovaca, A., et al. (1978, p.171-
3723 MP 854 Structure and dielectric properties at 4.8 and 9.5 GHz of	Mechanical properties of sea ice. Weeks, W.F., et al., 1967, 80p 1 M II-C3	201; MP 1111 Radar profile of a multi-year pressure ridge fragment.
saline ice. Arcone, S.A., et al. (1986, p 14,281-14,303) MP 2182	Sea ice	Koracs, A., (1978, p.59-62) MP 1126
DC resistivity measurements of model saline ice sheets. At-	Investigation of ice islands in Babbage Bight. Kovacs, A., et al., [197], 46 leaves; MP 1381	Preferred crystal orientations in Arctic Ocean fast ice. Weeks, W.F., et al. (1978, 24p.) CR 78-13
cone, S.A., [1987, p.845-849] MP 2308 Field studies of brackish ice to compare with satellite data.	Conductivity and surface impedance of sea ice. McNeill, D et al., 1971, 19p. plus diagrams; MP 1071	Primary productivity in sea ice of the Weddell region. Ack- ley, S.F., et al., [1978, 17p.] CR 78-19
Weeks, W.F., et al. (1989, p.1318-1333) MP 2763	Ice forces on vertical piles. Nevel, D.E., et al. (1972, p.104-	Sea ice pressure ridges in the Beaufort Sea Wright, & D , et
initing Use of de-icing salt—possible environmental impact. Minsk,	114) MP 1024 Mesoscale deformation of sea ice from satellite imagery	al. [1978, p 249-271] MP 1132 fee arching and the drift of pack ice through channels. Sod-
L.D., (1973, p.1-2) MP 1037	Anderson, D.M., et al. (1973, 2p.) MP 1120	hi, D.S., et al. (1978, p 415-432) MP 1136
Noncorregive methods of see control. Minsk, L.D., £1979, p.133-1623 MP 1265	Classification and variation of sea ice ridging in the Arctic basin Hibler, W.D., III, et al., [1974, p 127-146]	Sea ice and ice algae relationships in the Weddell Sea. Ack- ley, S.F., et al. (1978, p.70-71) MP 1203
Optimizing deicing chemical application rates. Minsk, L.D., [1982, 559] CR 82-18	MP 1022 Salimity variations in sea ice. Cox. G.F.N. et al. (1974)	Dynamics of near-shore ice Kovacs, A., et al., [1978, p.11- 22] MP 1205
Salt action on concrete. Sayward, J.M., [1984, 69p.] SR 84-25	p.109-122 ₃ MP 1023	Sea ice north of Alaska. Kovaes, A., (1978, p.7-12)
Chemical solutions to the chemical problem Minsk, L.D.,	ERTS mapping of Arctic and subarctic environments. And- erson, D.M., et al., (1974, 128p.) MP 1047	MP 1252 Radar anisotropy of sea ice. Kovacs, A., et al. (1978,
(1985, p.238-244) MP 2224 Semplers	Results of the US contribution to the Joint US/USSR Bering	p.6037-6046 ₁ MP 1139
CRREL 2-inch frazil ice sampler. Rand, J.H., (1982, 8p.)	Sea Experiment. Campbell, W.J., et al. (1974, 1970.) MP 1032	Dynamics of near-shore ice. Kovacs, A., et al. (1978, p.230-233) MP 1619
SR 82-09 Liquid sampler. Rand, J.H., (1982, 4 col.) MP 2334	Remote sensing program required for the AIDJEX model. Weeks, W.F., et al. (1974, p.22-44) MP 1040	Standing crop of algae in the sea see of the Weddell Sea region. Ackley, S.F., et al. (1979, p.269-281) MP 1242
Cryogenic sampling of frazil see deposits. Chacho, E.F., Jr.,	Statistical variations in Arctic sea ice ridging and deformation	Some results from a linear-viscous model of the Arctic ice
et al. (1989, 6p.) SR 89-28 Sampling	rates. Hibler, W.D., III, (1975, p.31-316) MP 850 Snow and ice. Colbeck, S.C., et al. (1975, p.435-441, 475-	cover. Hibler, W.D., III, et al. (1979, p. 293-304) MP 1241
Evaluation of disposable membrane filter units for sorptive	487 ₃ MP 844	Dynamic thermodynamic sea see model. Hibler, W.D., III.
losses and sample contamination. Walsh, M.E., et al. (1988, p.45-52) MP 2328	Remote sensing plan for the AIDJEX main experiment, Weeks, W.F., et al. (1975, p.21-48) MP 862	(1979, p.\$15-846) MP 1247 Surface-based scatterometer results of Arctic sea ice. On-
iends Greating six and sand at low temperatures. Johnson, R.,	Islands of grounded ice. Kowacs, A., et al. (1975, p.213- 216) MP 852	stott, R.G., et al. (1979, p.78-85) MP 1266 Multi-year pressure ridges in the Canadian Beaufort Sea.
(1979, p.937-950) MP 1078	Third International Symposium on Ice Problems, 1975,	Wright, B., et al. (1979, p. 107-126) MP 1229
Configuration of ice in frozen media. Colbeck, S.C., (1982, p.116-123) MP 1512	Frankenstein, G.E., ed., (1975, 627p.) MP 845 Remote measurement of sea ice drift. Hibler, W.D., III. et	lee pile-up and ride-up on Arctic and soliarcic braches Kovaes, A., et al. (1979, p.127-146) 55P 1230
Tertiary creep model for frozen sands (discussion). Fish,	al, (1975, p.541-554) MP 849	Buckling analysis of wedge-shaped floating ice sheets. Sed
Acoustically induced ground motion in sand under winter	Height variation along sea ice pressure ridges. Hibler, W.D., III. et al. [1975, p. 191-199] MP 848	hi, D.S., (1979, p.797-\$10) MP 1232 Turbulent heat flux from Arctic leads. Andreas, E.L., et al.
conditions. Peck, L., (1989, p.37-54) MP 2626 innitory engineering	Arctic environment and the Arctic surface effect vehicle. Sterrett, K.F., (1976, 28p.) CR 76-01	(1979, p.57-91 ₁ MP 1346
Waste management in the north. Rice, E., et al. 11974,	Sea ice engineering. Assur, A., [1976, p.231-234] MP 986	Anisotropic properties of sea ice. Kovacs, A., et al., (1979, p.5749-5759) MP 1250
p.14-21; MP 1048 Aquaculture systems for wastewater treatment, an engineer-	Sea ice drift and deformation from LANDSAT imagery His	Crystal alignments in the fast see of Arctic Alaska Weeks, W.F., et al. [1979, 21p.] CR 79-22
ing assessment. Reed, S.C., et al. (1980, 127p.) MP 1422	bler, W.D., III, et al. (1976, p. 115-135) MP 1059 Islands of grounded sea ice. Koracs, A., et al. (1976, 24p.)	Dynamics of near-shore see Korzes, A. et al. 1979,
Aquaculture systems for wastewater treatment. Reed, S.C.,	CR 76-64	p.181-207; MP 1291 Oil pooling under sea see. Kovaes, A., (1979, p.310-323)
et al. (1990, p.1-12) MP 1423 Nutrient film technique for wastewater treatment. Bouroun,	Thickness and roughness variations of arctic multiyear sea ice. Ackley, S.F., et al. (1976, 25p.) CR 76-18	MP 1289 Anisotropic properties of sea ice in the 50-150 MHz range
JR., et al. (1982, 159.) SR 82-04 Corps of Engineers land treatment of wastewater research	Techniques for studying sea ice drift and deformation at sites far from land using LANDSAT imagery Hibler, W.D.	Kovacs, A., et al. (1979, p.324-353) MP 1620
program: an annotated bibliography Parker, L.V., et al.	III, et al. (1974, p.595-609) MP 866	Ross Ice Shelf bottom see structure Zotikov, I A., et al. (1979, p.65-66) MP 1330
[1983, 82p.] SR 83-09 Land treatment research and development program. Islan-	Antarctic sea ice dynamics and its possible climatic effects. Ackley, S.F., et al., [1976, p.53-76] MP 1378	Drifting busy measurements on Weddell Sea pack ice. Ack-
dar, I K., et al. (1983, 144p.) CR 83-20 Accumulation, characterization, and stabilization of studges	Misgivings on isostatic imbalance as a mechanism for sea ice	ley, S.F., [1979, p.106-108] MP 1339 Crystal alignments in the fast see of Arctic Alaska. Weeks
for cold regions Ingoons. Schneiter, R.W., et al. (1984,	cracking. Ackley, S.F., et al., [1976, p.25-94] MP 1379	W.F., et al. (1930, p. 1137-1146) MP 1277 Documentation for a two-level dynamic thermodynamic ser
40p.; SR 84-08 Nitrogen removal in wastewater ponds. Reed, S C., §1934,	Grounded see along the Alaskan Beaufort Sea coast Kovaes, A. 11976, 21p.; CR 76-32	see model. Hiller, W.D., III, (1980, 35p.) SR 30-00
26pt CR 84-13 Shasta waterless system as a remote site sanitation facility	Some characteristics of grounded floebergs near Prudhoe Bay,	Maximum thickness and subsequent decay of lake, river and fast sea see in Canada and Alaska Bilello, M.A., (1980,
Martel, C.J., [1987, 24p.] SR 87-16	Alaska Kovacs, A., et al. (1976, p.169-172) MP 1118	160 ₇₋₁ CR 30-00
Seturation Difficulties of measuring the water saturation and porosity of	Grounded floebergs near Prudhoe Bay, Alaska Kowacs, A. et al., 1976, 10p.; CR 76-34	International Workshop on the Seasonal Sea Ice Jone, Mon- teres, California, Feb. 26-Mar 1, 1979. Anderson, B.G.
snow Colbeck, S.C., (1978, p.189-201) MP 1124	Operational report 1976 USACRREL-USGS subsea perma-	ed, (1980, 357p) MF 1293 Physical occanography of the seasonal sea see rone
Water movement in a land treatment system of wastewater by overland flow. Nakano, Y, et al. [1979, p.185-206]	frost program Beaufort Sea, Alaska Sellmann, P.V., et al., 1976, 20p.; SR 76-12	McPhee, M.G., (1980, p.93-132) MP 129-
MP 1285 Undersaturation in thaned permafrost at the beginning of	Dynamics of near-shore see Weeks, W.F., et al. (1976, p. 267-275) MP 922	Shore see pile-up and ride-up field observations, models theoretical analyses. Kosacs, A., et al., (1980, p.209-
freezeback Ayonnde, O.A., [1990, p.317-321] MP 2582	Sea ice properties and geometry. Weeks, W.F., (1976,	245; MP 129: Numerical modeling of sea see in the seasonal sea see cone
Saws	p 137-171 ₁ MP 918 Dynamics of near-shore see Kovaes, A. et al. 1977,	Histor, W.D., III., (1980, p. 299-356) MP 1290
Development of large ice saws Garfield, D.E., et al., (1976, 14p.) CR 76-47	p 106-112 ₁ MP 924	Physical properties of sea see and undersee current orienta- tion. Kovacs, A., et al. (1980, p.109-153). MP 132.
Factors affecting rates of see cutting with a chain saw. Cou-	Defineation and engineering characteristics of permafrost beneath the Beaufort Sea Selimann, P.V., et al. 1157.	Polarization studies in sea see Arcone S.A. et al. (1980).
termarsh, B.A., (1919, 14p.) SR 89-24 icandinavia	p 234-237 ₃ MP 927 Seasonal variations in apparent sea see viscosity on the gen-	p 225-245j MF 1326 Modeling of anisotropic electromagnetic reflection from sei
Utility distribution systems in Sweden, Finland, Norway and	physical scale Hibler, W.D., III, et al. (1977, p. 87.90) MP 900	see Golden, K.M., et al. (1980), p. 247-294; MP 132:
England Aamed, H.W.C., et al., (1976, 121p.) SR 76-16	Dynamics of near-shore ice. Kovacs, A. et al. (1977).	Dynamics of snow and see masses. Colbect, S.C., ed
icanolog electron microscopy Microstructure of frozen soils examined by SFM - Kumai,	p 151-163; MP 1073 Sea see thickness profiling and under-see oil entrapment	(1950, 465p) MP 1297 Sea see growth, drift, and decay Hibler W.D. III, (1950,
M., (1988, p.390-395) MP 2361	Kesacs, A., (1977, p.547,550) MP 940	p 141/20% MP 129
icattering Snow-Twn/Smoke Week VI field experiment plan Red-	Visual observations of finaling see from Skylab — Campbell, W.J., et al., (1977, p. 353-179) — — — — — — — — — — — — — — — — — — —	Nonsteady see drift in the Strait of Belle Isle Solhi, D.S. et al., (1980, p. 177-188) MP 1364
field, R K, et al. [1984, 85p] SR 84-19	lee atching and the drift of pack see through restricted chan-	Continuum vea see model for a global climate model. Ling CH, et al. (1980, p.18° 196). MP 162.
Analysis of acoustical features of laborators grown sea see Stanton, T.K., et al. [1986, p. [486-]494] NIP 2222	Bratil tensile strength tests on seasee a data report. Kosacs	Sea see anisotropy, electromagnetic properties and strength
Effects of water and ice layers on the scattering properties of diffuse reflectors. Jezek, k.C., et al., (1987, p.514).	A , et al. (1977, 1973) SR 77-28 Viscous wind-driven circulation of Arctic sea ice Hibler,	Kovacs, V. et al. (1980, 18p.) CR 80-21 Modeling of anisotropic electromagnetic reflection from se-
5147 ₁ MP 2301	W.D., III, et al., [1977, p. 95-[13]; MP 983	see Golden R.M., et al. (1980) 15p.; CR 80-2.
icintillation Two-wavelength method of measuring gath-averaged turbu-	Decay patterns of land-fast sea see in Canada and Alaska Bilello, M.A., [1977], p.1-10] MP 1161	 Estimation of heat and mass fluxes over Arctic leads An- dreas 1.1 (1980 p.205° 2061) MP 1410
lent surface heat fluxes Andreas, I-1 , 1989 p :50.	Nearthore see motion near Printhoe Bas. Alaska. Tucker, W. H., et al., (1977, p. 2 last). MP 1162	Sea we studies in the Wedde't Sea aboard 1 SC GC Polar Sea Achiev, S.F., et al., 21880, p.84-86; MP 1431
292 ₁ MP Zelfi	er er an green, parrer er er er er er	neart, re. ti at itams beginni HE (4)!

See ice (cont.)	Morphology and ecology of distoms in sea ice from the Wed-	Evaluation of the theological properties of columnae ridge sea
Modeling a variable thickness sea ice cover. Hibler, W.D.,	dell Sea. Clarke, D.R., et al. (1984, 41p.) CR 84-05	sce. Brown, R L., et al. (1916, p.55-66) MP 2177
III, (1999), p.1943-1973 ₃ MP 1424	Sea ice and biological activity in the Antarctic. Clarke, D.B.,	Growth, structure, and properties of sea ice. Weeks, W.F.,
Cheenoflegelletes from the Weddell Sex. Buck, K.R.,	et al. (1984, p.2087-2095) MP 1701	et al. (1916, p.9-164) MP 2209
(1961, p.47-54) MP 1453	Army research could reduce dangers posed by sea ice. Tuck-	Mechanical behavior of sea see. Melior, M., (1986, p. 165-
Sea-ice atmosphere interactions in the Weddell Sea using	ct, W.B., (1964, p.20-24) MP 2168	231 ₂ MP 2210
drifting buoys. Ackley, S.F., (1981, p.177-191)	Mechanical properties of multi-year sea ice. Phase I. Test	Sea see salenty and porosity changes during storage. Con-
MP 1427	results. Cos., G F.N., et al., 1984, 105p.; CR 84-09	GFN_et al. (1916, p.)71-375 MP 2246
Hyperbolic reflections on Besulort Sea seismic records.	East Greenland Sea ice variability in large-scale model sincu-	fee and soon opics in the polar occass, Pall Perovick,
Neare, K.G., et al. (1981, 16p.) CR 81-02	lations. Walsh, J.E., et al., 1984, p.9-14; MP 1779	DK, et al. (1994, p. 277-241; MP 2255
Review of thermal properties of snow, see and sea ice. Yes,	Analysis of linear sea ice models with an ice margin. Lep-	lee and some optics in the polar occuss, Ft.2. Grendell, T.C.,
Y,-C, (1961, 27p.) CR 81-10	pticata, M., (1964, p.31-36) MP 1782	ct al. (1914, p.242-251) MP 2254
Preliminary results of ice modeling in the East Greenland	Mechanical properties of multi-year sea see Testing tech-	Optical properties of sea see structure. Gov. A.J., (1986,
area. Tucker, W.B., et al. (1981, p.867-878) MP 1458	niques. Mellor, M., et al. (1984, 1994) CR 84-08	p.264-271 ₁ MP 2257
	Ocean circulation: its effect on seasonal sea-ice simulations.	Respires and transfer coefficients over soon and sea ict.
Pooling of oil under sea icc. Kovacs, A., et al., §1981, p.912- 9221 MF 1459	Hilder, W.D., III, et al. (1984, p.489-492) MP 1700	Andreas, E.L., (1916, 197) CR 86-09
	Electromagnetic properties of sea ice. Morey, R.M., et al.	Electromagnetic properties of sea ice. Koraca, A., et al.,
Sea ice piling at Fairway Rock, Bering Strait, Alaska.	(1964, p.53-75) MP 1776	(1914, p.57-13) ₃ MP 2197
Kevacs, A., et al., (1981, p.985-1000) MP 1460	Offshore oil in the Alaskan Arctic. Weeks, W.F., et al.	Bells translet coefficients for heat and momentum over leads
Morphology of sea ice presoure ridge sails. Tucker, W.B., et	(1984, p.)71-378; MP 1743	and pulyayas. Andreas, E.L., et al. (1984, p.1875-188); MP 2187
al. (1961, p.1-12) MP 1465	Harizontal salinity variations in sea ice. Tucker, W.B., et al.	Microwane defective, structural and salestic properties of sea
Sea ice rubble formations off the NE Bering Sea and Norton Sound. Kovaes, A., (1981, p.1348-1363) MP 1527	(1984, p.6505-6514) MP 1761	see Accesse, S.A., et al., [1986, p.832-839] MP 2188
	Mechanical properties of sea seet a status report. Weeks,	
Modeling of anisotropic electromagnetic reflections from sea	WF, et al. (1984, p.135-198) MP 1906	Analysis of acoustical features of informacy grown sea see. Stanton, T.K., et al., (1980, p. 1484-1494) MP 2222
ice. Golden, K.M., et al. (1981, p.8107-8116; MP 1469	Structure of first-year pressure ridge sails in the Prother Bay	Structure and dielectric properties at 4.8 and 9.5 GHz of
Sea ice: the potential of remote sensing. Weeks, W.F.,	region. Tucker, W.B., et al. (1984, p.115-135) MP 1837	salme ice Acone, S.A., et al., [1984, p.14.281-14.30];
(1961, p.39-46) MP 1466	Static determination of Young's modulus in sea ice. Richter-	MP 2182
Datortion of model subsurface radar pulses in complex dec-	Menge, J.A., (1984, p.283-286) MP 1789	Triangl testing of first-year sea see Richter-Meage, J.A., et
lectrics. Arcone, S.A., (1981, p.855-864) MP 1472	MIZEX \$3 mesoscale sea ice dynamics: initial analysis. H:	al. (1956, 417-) CR 96-16
Multi-year pressure ridges in the Canadian Bezefort Sea.	Mer, W.D., 111, et al., (1984, p.19-28) MP 1811	Professions sensitives of the formation and milling of season
Wright, B., et al. (1981, p.125-145) MP 1514		ponger. Weeks, W.F., et al. 1996, p 259-266;
fee pile-up and ride-up on arctic and subarctic beaches.	Crystalline structure of urea ice shorts. Gow, AJ, (1984, 48p.) CR 84-24	MP 2218
Keracs, A., et al. (1961, p.247-273) MP 1536	Metotesie autoce-ocean interaction experiments. Johan-	Confined compressors strength of bottoetal first-year seasor
Sea ice rubble formations in the Bering Sea and Florton	acsen, O.M., ed. (1984, 1769.) SR 84-29	samples Richter-Menge, I.A., (1917, p. 197-207)
Sound, Aleska. Koracs, A., (1981, 23p.) SR 81-34	MIZEX 84 mesoscale sea ice dynamics: post operations re-	MP 2193
Physical and structural characteristics of sea ice in McMurdo	port. Hiller, W.D., III, et al, (1984, p.64-67)	Advances in sea fee mechanics in the USA Soffic, D.S., et
Sound. Gow, A.J., et al., (1981, p.94-95) MP 1542	MP 1257	21, (1927, p.37-49) 34P 2308
Rader detection of sea ice and current alinement under the	Ses ace properties. Tucker, W.B., et al. (1984, p.82-83)	Sex see structure and mechanical properties. Richter-
Ross let Shelf. Morey, R.M., et al. (1981, p.96-97)	MP 2136	Merge, J.A., et al. (1957, 30p.) CR 87-03
MP 1543	Discussion: Electromagnetic properties of sea see by P.M.	Season crystal structure and salinay, Hebren Fared, Labor-
Growth, structure, and properties of sea ice. Weeks, W.F.,	Morey, A. Kovacs and G.F.N. Cox. Accour. S.A., 1984.	dec Gen. A.J., (1957, 15p.) CR 87-86
et al. (1982, 130p.) M 82-01	p.93-941 MP 1821	Seance miseringations during the Winter Weddell Sea Project.
Ablation sensors of nectic and neterctic sen ice. Andreas,	Authors' response to discussion on: Electromagnetic peoper-	Action, S.F., et al., (1917, p.11-19) MP 2091
E.L., et al. (1962, p.440-447) MP 1517	ties of sea ice. Morey, R.M., et al. (1984, p.95-97)	Physical peoperties of sea see discharged from Fram Strait.
Sea ice drag lows and boundary layer during rapid melting.	MP 1822	Gon, A.J., et al., (1937, p.436-439) MP 2304
McPhee, M.G., (1982, 17p.) CR 82-06	Temile strength of multi-year pressure ridge sea see samples.	Comment on "Atmospheric boundary layer modification in
Using sea ice to measure vertical heat flux in the ocean.	Con. G F.N., et al. (1985, p. 184-193) MP 1884	the marginal see tome" by T.J. Beamett, Jr. and K. Hunkins.
McPhee, M.G., et al. (1982, p.2071-2074) MP 1521	Structure, salinity and density of multi-year sea see pressure	Andreas, E.L., (1917, p.3965-3969) MP 2396
On modeling the Weddell Sea pack ice. Hiller, W.D., III,	ridges. Rickter-Meage, J.A., et al. [1985, p.194-198]	Electromagnesic property trends in sea see, Part L. Kosney,
et al. (1982, p.125-130) MP 1509	MP 1257	A. ct al. (1917, 4%) CR \$7-66
The state of the s		
Application of a numerical sea ice model to the East Green-	Numerical modeling of sea see dynamics and see thickness.	Physical properties of summer ses see in the Fram Struct.
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1982, 406.] CR 82-16	Hibler, W.D., III., (1985, 50p.) CR 85-85	Physical properties of summer ses see in the Fram Strint. Tucker, W.B., et al., [1927, p.6787-4500] MP 2300
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., (1982, 40).) CR 82-16 Equations for determining the gas and brine volumes in sea	Hilder, W.D., III. (1915, 50p.) CR 85-85 Numerical simulation of Northern Heisinghere sea see varia-	Physical properties of summer ses see in the Fram Seriet. Tucker, W.B., et al., [1917, p.6787-4507] MP 2300 Physical properties of extension see in Great Bay, New Hamp-
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1982, 40p.) CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G F.N., et al., [1982, 11p.)	Höler, W.D., III. §1985, 50p.; CR 85-65 Numerical simulation of Northern Heinisphere sea see varia- hility, 1951-1980 Walsh, J.E., et al. §1985, p.4847-	Physical properties of summer ses are in the Fram Struct. Tucker, W.B., et al. [1917, p.6737-4803; MP 2200 Physical properties of estimation see in Great Bay, New Hamp- share Meese, D.A., et al. [1917, p.833-340]
Application of a numerical sea ice model to the East Green- land area. Tucker, W.R., [1982, 40p.] CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.] CR 82-30	Hibler, W.D., III. (1985, 50p.) CR 85-05 Numerical sumulation of Northern Hemisphere sea see varia- hibrs, 1951-1980 Walsh, J.E., et al., (1985, p.4847- 4865) The Computation of Northern Physics (1985) (19	Physical properties of summer ses ice in the Fram Struct. Tucker, W.B., et al. [1917, p.6737-480]; MP 2200 Physical properties of estimation (ce in Greal Ray, New Hampshare Messe, D.A., et al. [1917, p.833-840] MP 2251
Application of a numerical sea ice model to the East Green- land area. Tucker, Wil. [1982, 40p.; CR 82-16 Equations for determining the gas and brine vulumes in sea ice samples. Cos. G F.N., et al. [1982, 11p.; CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs.	Hilder, W.D., III, [1985, 50p.] CR 85-05 Numerical simulation of Northern Heinisphere sea ace variables, 1951-1980 Walsh, J.E., et al., [1985, p.4847-4845] Energy exchange over antisetic sea ace in the speing. As-	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1947, p.6737-6807]. 30F 2380 Physical properties of extensive seein Great Ray, New Hampshire. Meese, D.A., et al. [1947, p.853-840]. MP 2281 Mechanical properties of multi-year seases. Richter-Menge.
Application of a numerical sea ice model to the East Green- land area. Tucker, W.R. [1982, 40p.; CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.; CR 82-30 Bering Stract sea ice and the Fairway Rock icefoot. A., et al., [1982, 40p.; CR 82-31	Hibler, W.D., III. (1945, 509). CR 85-65 Nuncrical sunstains of Northern Hemisphere sea net varia- hibry, 1951-1980. Walsh, J.E., et al., (1985), p.4847- 4845; Nuncrical States of the Spring An- dress, E.L., et al., (1985), p.7199-7212; MP 1889.	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1947, p.6737-4803]. MP 2200 Physical properties of estimation con-flowing New Hampshare. Meese, D.A., et al. [1957, p.833-840]. MP 2251 Mechanical properties of molto-year seasor. Richter-Meage, J.A., et al. [1957, p.121-153]. MP 2420
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1982, 40 _{9.3}] CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G F.N., et al., [1982, 11 _{9.3}] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 40 _{9.3}] CR 82-31 On the differences in ablation seasons of Arctic and Antarctic	Hilder, W.D., 111. [1935, 509.] CR 85-85 Numerical sumulation of Northern Hemisphere sea to varia- hility, 1951-1980 Walsh, J.E., et al., [1935, p.4847- 4845] 21P 1882 Energy exchange over antaretic sea see in the speng. An- dreas, E.L., et al. [1935, p.7199-7212] MP 1889 Compressive strength of multi-year sea see. Koyacs, A.	Physical properties of summer ses are in the Fram Struct. Torker, W.B., et al. [1917, p.6737-4803]. MP 2200 Physical properties of estimation see in Great Bay, New Hampshire. Meese, D.A., et al., [1987, p.833-840]. MP 2251 Mechanical properties of militayean seases. Richer-Menge, J.A., et al., [1987, p.121-153]. MP 2428. Measurement of characteristic length of floating see about.
Application of a numerical sea ice model to the East Green- land area. Tucker, Wil. [1982, 40p.) CR 82-16 Equations for determining the gas and brine vultumes in sea ice samples. Cox. G F.N., et al. [1982, 11p.) CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1982, 40p.) On the differences in ablation seasons of Arctic and Autoretic sea ice. Andreas, E.L., et al. [1982, 9p.) CR 82-33	Hiller, W.D., III. [1935, 50p.] CR. 85-85. Numerical sumulation of Northern Hemisphere sea see saria- hilter, 1951-1950. Wishli, J.E., et al., [1955, p.4847- 4865]. Eaergy exchange over antarctic sea see in the sporte. Au- dreas, E.L., et al., [1985, p.7199-7212]. MP 1889. Compressive strength of multi-year sea see [1955, p.116-127]. MP 1991.	Physical properties of summer ses ice in the Fram Struct. Torker, W.B., et al. [1917, p.6737-4807]. MP 2200 Physical properties of extention term Great Ray, New Hampshire. Meese, D.A., et al. [1987, p.833-840]. MP 2251 Mechanical properties of multi-year seases. Richter-Menge, J.A., et al. [1987, p.121-157]. MP 2420 Measurement of characteristic length of floating tee shorts. Sodia, D.S., [1987, n.p. (Ch.7b).
Application of a numerical sea ice model to the East Green- land area. Tucker, W.R. [1982, 40p.) CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.) CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs., A., et al., [1982, 40p.) CR 82-31 On the differences in ablation seasons of Arctic and Astarctic sea ice. Andreas, E.L., et al., [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea	Hibler, W.D., III. [1945, 509.] CR 85-65 Nuncrical suntation of Northern Hemisphere sea net varia- hibity, 1951-1980. Washi, J.E., et al. [1985, p.4847- 4845] 21P 1082 Energy exchange over antarctic sea see in the spring. An- dreas, E.L., et al. [1985, p.7199-7212] MP 1089 Compressive strength of multi-year sea see Kosacs, A., [1945, p.116-127] MP 1901 Electromagnetic properties of multi-year sea see Morey.	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1917, p.6737-4803). MP 2200 Physical properties of extention term Great Bay, New Hampshire. Meese, D.A., et al. [1937, p.833-840). MP 2251 Mechanical properties of multi-year seasor. Richter-Meage, J.A., et al. [1937, p.121-153]. MP 2428 Measurement of characteritic length of floating see sheets. Sodia, D.S., [1937, np. (Ch. 7). MP 2400 Disprosite secondary model. Histor, W.D., III, et al. [1937.
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1992, 490,3] CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G F.N., et al. [1992, 11p.] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1992, 40p.] On the differences in ablation seasons of Arctic and Autaretic sea ice. Andreas, E.L., et al. [1992, 9p.] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] SR 82-28	Hilder, W.D., III., [1935, 50p.] CR 85-65 Numerical sumulation of Northern Hemisphere sea net variability. 1951-1980 Walsh, J.E., et al., [1955, p.4847-4845] Energy exchange over antaretic sea see in the spen. Andreas, E.L., et al., [1955, p.7199-7212] MP 1889 Compressive strength of multi-year sea see [1955, p.116-127] MP 1901 Electromagnetic properties of multi-year sea see Mercy. R.M., et al., [1955, p.151-167] MP 1902	Physical properties of summer ses lice in the Fram Struct. Tocker, W.B., et al., [1937, p.8737-4804); SIP 2380 Physical properties of ententies teen Great Bay, New Humpshire. Meese, D.A., et al., [1937, p.833-804). Mr. Chancel properties of milityear seases. Bicker-Menge, J.A., et al., [1937, p.121-153; MP 2281 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, n.p. (Ch.7). Dargootte see-seean model. Hilber, W.D., III., et al., [1937, p.937-1015]. MP 2288
Application of a numerical sea ice model to the East Green- land area. Tacker, Wil. [1982, 40p.) CR 82-16 Equations for determining the gas and brine vultumes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.) CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 40p.) On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1982, 7p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.) Physical, chemical and biological properties of writer sea ice	Hilder, W.D., III. [1935, 50p.] CR. 85-85. Numerical soundation of Noethern Hemisphere sea see same hinter, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp. 1882-1882, p.4845]. State of the spenig. Address, E.L., et al., [1985, p.7199-7212]. MP. 1889. Compressive strength of multi-year sea see Korses, A., [1935, p.116-127]. MP. 1991. Electromagnetic properties of multi-year sea see Mercy, R.M., et al., [1935, p.151-167]. MP. 1992. Physical properties of sea see in the Greenland Sea. Tucker,	Physical properties of summer ses ice in the Fram Struct. Torker, W.B., et al. [1917, p.6737-4803]. MP 2280 Physical properties of extention term Great Ray, New Hampshire. Meese, D.A., et al. [1987, p.833-840]. MP 2251 Mechanical properties of multi-year seases. Richer-Menge, J.A., et al. [1987, p.121-153]. MP 2428 Measurement of characteristic length of floating see sheets. Sodit, D.S., [1987, np (Ch.7b). MP 2400 Digionite secondarion model. Hitter, W.D., III, et al., [1987, p.917-1015]. MP 2230 Medicing the electromagnetic property trends in sea ice, Part
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1992, 490,3] CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G F.N., et al. [1992, 11p.] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1992, 40p.] On the differences in ablation seasons of Arctic and Autaretic sea ice. Andreas, E.L., et al. [1992, 9p.] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] SR 82-28	Hilder, W. D., 11L, [1945, 509.] CR. 85-65 Nuncrical sundation of Northern Hemisphere sea net variability, 1951-1980. Washi, J. E., et al., [1985, p.4847-4445]. Energy enchange over antarctic sea nee in the speng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Koracs, A., [1945, p.116-127]. MP 1901 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1985, p.151-167]. MP 1902 Physical properties of sea see in the Greenland Sea. Tucker, W. B., et al., [1985, p.177-183].	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1917, p.6737-4803]. MP 2200 Physical properties of estimation con Great Bay, New Hampshire. Meese, D.A., et al. [1937, p.833-840]. MP 2251 Mechanical properties of multi-year seasor. Richter-Meage, J.A., et al. [1937, p.121-153]. MP 2428 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, np. (Ch. 7). MP 2400 Diagnosius recoverax model. Histor, W.D., III, et al. [1937, p.937-1015]. MP 2300 Modeling the electromagnetic property tends in sea ice, Part 1. Kowaci, A., et al. [1937, p.207-215]. MP 2330
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1992, 490,3] CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cox. G F.N., et al. [1982, 11p.] CR 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1982, 40p.] On the differences in ablation seasons of Arctic and Astarctic sea ice. Andreas, E.L., et al. [1982, 9p.] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.] SR 82-28 Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D B., et al. [1982, p. 107- 109]	Hilder, W.D., III. [1935, 50p.] CR. 85-85. Numerical soundation of Noethern Hemisphere sea see same hinter, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp. 1882-1882, p.4845]. State of the spenig. Address, E.L., et al., [1985, p.7199-7212]. MP. 1889. Compressive strength of multi-year sea see Korses, A., [1935, p.116-127]. MP. 1991. Electromagnetic properties of multi-year sea see Mercy, R.M., et al., [1935, p.151-167]. MP. 1992. Physical properties of sea see in the Greenland Sea. Tucker,	Physical properties of summer ses ice in the Fram Struct. Torker, W.B., et al. [1917, p.6737-4803]. MP 2280 Physical properties of extention term Great Ray, New Hampshire. Meese, D.A., et al. [1987, p.833-840]. MP 2251 Mechanical properties of multi-year seases. Richer-Menge, J.A., et al. [1987, p.121-153]. MP 2428 Measurement of characteristic length of floating see sheets. Sodit, D.S., [1987, np (Ch.7b). MP 2400 Digionite secondarion model. Hitter, W.D., III, et al., [1987, p.917-1015]. MP 2230 Medicing the electromagnetic property trends in sea ice, Part
Application of a numerical sea ice model to the East Green- land area. Tucker, W.R., [1982, 40p.) CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.) CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 40p.) CR 82-31 On the differences in ablation seasons of Arctic and Astarctic sea ice. Andreas, E.L., et al., [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.) SR 82-28 Physical, chemical and biological properties of water sea ice the Weddell Sea. Clarke, D.B., et al., [1982, p. 107-	Hilder, W.D., III. [1935, 50p.] CR 85-85 Numerical sumulation of Noethern Hemisphere sea see sance sanchister, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. PUP 1882 Energy enchange over natisetic sea see in the spenig. Audreas, E.L., et al., [1935, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Koracs, A., [1935, p.114-127]. MP 1991 Electromagnetic properties of auditi-year sea see Morey, R.M., et al., [1935, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.177-138]. MP 1993 Ice electrical properties. Gom, A.J., [1935, p.75-3.]. MP 1910	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of extensive seein Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-840]. MP 2251 Mechanical properties of multi-year seases. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2428 Measurement of characteristic length of financing see sheets. Sodia, D.S., [1937, in.p. (Ch.7)]. MP 2428 Disposition seesoccan model. Hibber, W.D., Ill., et al. [1937, p. 97-1015]. MP 2338 Modeling the electromagnetic property strade in sea ice, Part 1. Konney, A., et al. [1937, p. 907-125]. MP 2330 Ice the length of stradens across the Adiastic sector of the
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1992, 490,) CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 9p.] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] Rysical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107- 109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1610	Hilder, W.D., III. [1935, 509.] CR 85-85 Nunctical smatterin of Northern Hemisphere sea net variability, 1951-1980. Walsh, J.E., et al., [1985, p.4847-4845]. PHP 1882 Energy eachange over antarctic sea see in the speng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Kosacs, A., [1955, p.116-127]. MP 1981 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1985, p.151-147]. MP 1982 Physical properties of sea see in the Greenland Sea. Tracker, W.R., et al., [1985, p.177-183]. MP 1983 Ice electrical properties. Gow, A.J., [1985, p.76-32]. MP 1980 Declectric properties at 4.75 GHz of salme see stabs. Account.	Physical properties of summer ses lice in the Fram Seriet. Tocker, W.B., et al., [1937, p.8737-4804); MP 2300 Physical properties of ententies even Great Bay, New Humpshire. Meese, D.A., et al., [1937, p.833-804); MP 2251 Mechanical properties of milityies seasee. Bicker-Menge, J.A., et al., [1937, p.121-153; MP 2428 Measurement of characteristic length of finding see sheets. Sodia, D.S., [1937, n.p. (Ch.7); MP 2400 Diagnosis see-section model. Helier, W.D., III, et al., [1937, p. 97-1015]. MP 2400 Medicing the electromagnesis property trends in sea sice, Part I. Konsel, A., et al., [1937, p. 97-7255]. MP 2300 Rec thickness distribution nerioss the Atlantic sector of the Antactic Ocean in midwinter. Wachsmit, P., et al., [1937, p. 14, 1931, S.S.].
Application of a numerical sea ice model to the East Green- land area. Tacker, W.R. [1982, 40p.) CR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.) CR 82-30 Bering Straot sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 40p.) CR 82-31 On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.) SR 82-28 Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p.107- 109) M. 1992, p.113-1155 MP 1610 Comment on Water drag coefficient of first-year sea ice' by M. P. Langichen. Andreas, E.L., et al., [1931, p.779-782]	Hilder, W.D., III. [1935, 50p.] CR. 85-85 Nuncrical sumulation of Noethern Hemisphere sea ex sami- hilty, 1951-1980. Washl, J.E., et al., [1935, p.4847- 4845]. PIP 1882 Energy exchange over notaectic sea toe in the spenig. An- dreas, E.L., et al., [1935, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Korsacs, A., (1945, p.116-127). MP 1981 Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1935, p.151-167]. MP 1982 Physical properties of sea nee in the Greenland Sea. Tucker, W.B., et al., [1935, p.177-188]. MP 1983 Ice electrical properties. Gom, A.J., [1935, p.76-2]. MP 1910 Defective properties at 4.75 GHz of salme ice slabs. Accome., S.A., et al., [1935, p.83-86]. MP 1911 Laboratory studies of acoustic scattering from the underside	Physical properties of summer ses ice in the Fram Sense. Torker, W.B., et al. [1917, p.6737-4803]. MP 2200 Physical properties of extentine tee on Great Ray, New Hampshire. Meese, D.A., et al., [1937, p.833-840]. MP 2251 Mechanical properties of multi-year seasee. Richter-Menge, J.A., et al., [1937, p.121-153]. MP 2400 Measurement of characteristic length of flowing see sheets. Sodla, D.S., [1937, n.p. (Ch.7b). MP 2400 Diagnostic see-secan model. Hitler, W.D., III, et al., [1947, p.917-1015]. MP 2400 Medding the electromagnetic property trends in sea ice, Part 1. Kowaci, A., et al., [1937, p.207-215]. MP 2300 Ice thechness distribution serious the Adiantie sector of the Antareto Ocean modouter.
Application of a numerical sea ice model to the East Green- lond area. Techer, W.B., [1992, 490,3] CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] CR 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 409,3] On the differences in ablation seasons of Arctic and Anteretic sea ice. Andreas, E.L., et al., [1992, 96,3] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 276,3] Physical, chemical and biological properties of water sea ice 10 the Weddell Sea. Clarke, D.B., et al., [1992, p.107- 107) MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1610 Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langieben. Andreas, E.L., et al., [1931, p.779-792,3] MP 1577	Hiller, W.D., III. [1935, 50p.] CR. 85-85. Sumerical sumulation of Noethern Hemosphere sea see variability. 1951-1950. Washt, J.E., et al., [1935, p.48-7.4865]. PtP 1882. Energy eachange over antactic sea see in the sport, Anderss, E.L., et al., [1935, p.7199-7212]. MP 1899. Compressive strength of mini-year sea see. Kovack, A., [1935, p.116-127]. MP 1901. Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1935, p.151-167]. MP 1902. Physical properties of sea see in the Greenland Sea. Tricker, W.R., et al., [1935, p.151-147]. MP 1903. Re. Electrical properties. Gom, A.J., [1935, p.76-32]. MP 1910. Dielectric properties at 4.75 GHz of salme see slabs. Account. S.A., et al., [1935, p.83-84]. Laboratory studies of acounties scattering from the underside of sea see. Jerek, K.C., et al., [1935, p.73-15].	Physical properties of summer ses lice in the Fram Seriet. Tocker, W.B., et al., [1937, p.6737-68037]. MP 2300 Physical properties of ententies teen Great Bay, New Hampshire. Meese, D.A., et al., [1937, p.833-860]. Mcchanical properties of multi-year seases. Michael-Meage, J.A., et al., [1937, p.121-153]. MP 2281 Measurement of characteristic length of finishing see sheets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2400 Disposite secoscian model. Hilber, W.D. III, et al., [1937, p. 937-1015]. MP 228 Medicing the electromagnetic property trends in sea lice, Part I. Konses, A. et al., [1937, p. 207-215]. MP 2300 Ice theckness distribution across the Adamic sector of the Antarctic Ocean in modeling. Walliams, F., et al., [1937, p. 15, 15, 14, 52]. Sea see theckness and sub-see bathsmetry. Rosacs, A., et al., [1937, dog.]. CR 87-23 Mechanical properties of multi-year sea see. Richter-Meage.
Application of a numerical sea ice model to the East Green- land area. Tecker, Wil. [1982, 40p.) CR 82-16 Equations for determining the gas and brine vultames in sea ice samples. Cos., G.F.N., et al., [1982, 11p.) CR 82-30 Bering Straot sea ice and the Fairway Rock icefoot. Kovacc, A., et al., [1982, 40p.) CR 82-30 On the differences in ablotion seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Wests, W.F., [1982, 27p.) SR 82-23 Physical, chemical and biological properties of writer sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p. 107- 109) Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115] MP 1609 Comments on Water drag coefficient of first-year sea ice by M.P. Langichen. Andreas, E.L., et al., [1983, p. 79-782), M.P. 1577 Numerical simulation of the Weddell Sea pack ice. 1650er.	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see saria- hiltr., 1951-1990. Wishli, J.E., et al., [1955, p.48-7- 4865]. PP 1882 Eastgy eachange over antactic sea see in the speng. An- dreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Reseax, A., (1995, p.116-127). MP 1991 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1995, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1995, p.177-188]. MP 1993 Ice electrical properties of Son, A.J., [1995, p.76-92]. MP 1910 Declective properties at 4.75 GHz of salme see stabs. Accomp. S.A., et al., [1995, p.83-84]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1995, p.87-91] MP 1912	Physical properties of summer ses ice m the Fram Seriet. Torker, W.B., et al. [1937, p.6737-4807]. MP 2280 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1987, p.833-840]. Mechanical properties of multi-year seasee. Richers-Meage, J.A., et al. [1987, p.121-157]. MP 2281 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1987, p. 121-157]. MP 2280 Dispositio seroscean model. Hilder, W.D., III, et al., [1987, p. 937-1015]. MP 2280 Modeling the electromagnetic property strade in sea ice, Part 1. Kowaci, A., et al., [1987, p. 207-235]. MP 2380 Lee thekinesis distributions nerous the Atlantic sector of the Atlantic Ocean in midwinter. Wadhamo, P., et al., [1987, p. 14, 535-14, 552]. Sea see thekinesis and sub-see bathsimetry. Kowaci, A., et al., [1987, p. 14, 455-14, 549]. Mechanical properties of multi-year sea see. Richer-Meage, J.A., et al., [1987, 7)
Application of a numerical sea ice model to the East Green- land area. Tecker, W.B., [1992, 490,3] GR 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G F.N., et al. [1992, 119,3] CR 82-30 Bering Stract sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1992, 400,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al. [1992, 293] CR 82-31 Physical properties of the ice cover of the Greenland Sas Wests, W.F., [1992, 279,3] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D B., et al. [1992, p. 107- 109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, p. 113-115] MP 1610 Comment on Water drag coefficient of first-year sea ice by MP. Langichen. Andreas. E.L., et al. [1993, p. 729-739, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Illi, et al., [1993, p. 237-2387] MP 1592	Hilder, W. D., III., [1945, 50p.] Vinierical soundation of Noethern Heimisphere sea net sami- hilty, 1951-1980. Washi, J. E., et al., [1955, p.4847- 4845] Energy exchange over notaectic sea see in the spenig. An- deeas, E.L., et al., [1955, p.7199-7212]. MP 1889. Compressive strength of multi-year sea see Korack, A., (1945, p.116-127) Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1955, p.151-167]. MP 1891. Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1955, p.151-167]. MP 1893. [Re et al., [1955, p.177-188]. MP 1893. Ite electrical properties. Gom, A.J., [1935, p.76-32]. MP 1910. Dielectric properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1955, p.37-36]. MP 1911. Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1955, p.37-91]. MP 1912. Pressure ridge and sea see properties Greenland Sea.	Physical properties of summer ses ice in the Fram Sense. Tocker, W.B., et al. [1917, p.6737-4803]. MP 2280 Physical properties of extension core in Great Ray, New Hamp- shire. Meese, D.A., et al. [1937, p.833-840]. MP 2251 Mechanical properties of multi-year seasee. Richer-Meage, J.A., et al. [1937, p.121-153]. MP 2420 Measurement of characteristic length of floating sice sheets. Sodla, D.S., [1937, n.p. (Ch.7h). MP 2400 Diagnostic see-secan model. Hitler, W.D., III, et al., [1947, p.917-1015]. MP 2400 Medeling the electromagnetic property trends in sea ice, Part. 1. Kowaci, A., et al., [1937, p.207-215]. MP 2330 Ice thickness distribution serious the Adiantic sects of the Antiactic Organ in moleoniter. Wachisms, F., et al., [1937, p.14,535-14,552]. Sea see thickness and sub-see baths metry. [1937, 269]. MP 2334 Mechanical properties of molitoyent sea ice. Richter-Menge, J.A., et al., [1938, 7.7p.] Utika SAR facility an ordate. Weller, G., et al., [1948,
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1992, 490,3] CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cox. G F.N., et al., [1982, 113,3] CR 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 403,3] On the differences in ablation seasons of Arctic and Autarctic sea ice. Andreas, E.L., et al., [1982, 98,3] Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 278,3] Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D B., et al., [1982, p. 107- 109, Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115, MP 1610 Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langicken. Andreas, E.L., et al., [1983, p. 729-783, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilber, W.D., III, et al., [1983, p. 2873-2887, MP 1592 Alsala's Beaufort Sea coest ice ride-up and pile-up features	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Washt, J.E., et al., [1935, p.48-7.4865]. PtP 1882 Energy exchange over antactic sea see in the speng. Andreas, E.L., et al., [1935, p.7199-7212]. MP 1889 Compressive strength of mini-year sea see. Rostacs, A., [1935, p.116-127]. MP 1981 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1935, p.151-167]. MP 1982 Physical properties of sea see in the Greenland Sea. Tracker, W.R., et al., [1935, p.151-167]. MP 1983 Ice electrical properties. Gow, A.J., [1935, p.76-32]. MP 1910 Dielectric properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1935, p.83-36]. MP 1911 Laboratory strukers of acoustic scattering from the underside of sea see. Jerck, K.C., et al., [1935, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tracker, W.R., et al., [1935, p.214-22]. MP 1915	Physical properties of summer ses lice in the Fram Seriet. Tocker, W.B., et al. [1937, p.6737-68037]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-840]. MP 2251 Mechanical properties of multi-year seases. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2252 Measurement of characteristic length of financing see sheets. Sodia, D.S., [1937, n.p. (Ch.7b)
Application of a numerical sea ice model to the East Green- land area. Tacker, Mr. [1982, 40p.) CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cos., G.F.N., et al., [1982, 11p.) CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Kovacc, A., et al., [1982, 40p.) On the differences in ablotion seasons of Arctic and Anterior. CR 82-31 On the differences in ablotion seasons of Arctic and Anterior. Andreas, E.L., et al., [1982, 7p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Physical, chemical and biological properties of writer sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p. 107- 109.] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 133-115] MP 1609 Comments on Water drag coefficient of first-year sea ice' by M.P. Langleben. Andreas, E.L., et al., [1983, p. 79-782), MP 1577 Numerical simulation of the Weddell Sea pack ice. 16Nor., W.D., III, et al., [1983, p. 3873-2887] Alaska's Besufort Sea coast ice ride-up and pile-pic features Kovacc, A., [1983, 51p.) CR 83-89	Hilder, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same shifts, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp 1882 Eastgy enchange over antacetic sea see in the spenig. Audreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Korsacs, A., [1995, p.116-127]. MP 1991 Electromagnetic properties of antiti-year sea see Morey, R.M., et al., [1995, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1995, p.177-188]. MP 1993 Ice electrical properties. Gom, A.J., [1995, p.76-92]. MP 1910 Dielectric properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1995, p.83-86]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1995, p. 27-91]. Pressure ridge and sea see properties Greenland Sea. Tucker, MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, MP 1915 Numerical simulation of sea see induced gouges on the shelves.	Physical properties of summer ses ice m the Fram Seriet. Torker, W.B., et al. [1937, p.6737-4803); MP 2280 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-840]. Mechanical properties of multi-year seasee. Richter-Meage, J.A., et al. [1937, p.121-153]. MP 2281 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, n.p. (Ch.7b). MP 2280 Dispositio scooscean model. Hittler, W.D., III, et al., [1937, p. 937-1015]. MP 2280 Modeling the electromagnetic property trends in sea see, Part 1. Kowaci, A., et al., [1937, p. 207-235]. MP 2380 Lee theckness distributions serious the Atlantic sector of the Atlantic Ocean in moderate: Wadhamo, P., et al., [1937, p. 12, 435-12, 53]; Sea see theckness and sub-see bathsimetry. Kowaci, A., et al., [1937, p. 12, 435-12, 53]; Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1937, p. 12, 435-12]. Let al., [1937, 207]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31]. Mechanical properties of molloyeur sease. Richter-Meage, J.A., et al., [1938, p. 123-31].
Application of a numerical sea ice model to the East Green- lond area. Tucker, W.R., [1992, 490,3] Gr. 82-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] CR. 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 409,5] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 99,5] CR. 82-30 Physical properties of the ice cover of the Greenland Sea Westa, W.F., [1992, 279,5] Rysical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107- 109; Almospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, p. 113-115] MP. Langleben. Andreas, E.L., et al., [1993, p. 79-732, MP. 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill., et al., [1993, p. 2373-2387] MP. 1592 Alaska's Beaufort Sea coast ice ride-up and pole-up features. Kovaci, A., (1993, 5), p. 2873-2887. CR. 83-49 Properties of Sea ice in the coastal reces of the polar occases	Hilder, W.D., III. [1945, 50p.] Vinierical simulation of Noethern Heimispheric sea net sami- hilty, 1951-1980. Washi, J.E., et al., [1955, p.4847- 4445] Energy enchange over antarctic sea nee in the speing. An- dees, E.L., et al., [1955, p.7199-7212]. MP 1882. Energy enchange over antarctic sea nee in the speing. An- dees, E.L., et al., [1955, p.7199-7212]. MP 1889. Compressive strength of multi-year sea see. Korsack, A., (1945, p.116-127). MP 1981. Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1955, p.151-167]. MP 1982. Physical properties of sea see in the Greenland Sea. Tinder, W.B., et al., [1955, p.177-185]. MP 1983. Ite electrical properties. Gom, A.J., [1985, p.76-32]. MP 1980. Dielectric properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1955, p.83-36]. MP 1910. Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1955, p.87-91]. MP 1912. Pressure ridge and sea see properties Greenland Sea. Turker, W.B., et al., [1955, p.214-123]. Numerical simulation of sea see induced gonges on the shelves of the podar oceans. Weeks, W.F., et al., [1955, p.259.]	Physical properties of summer ses lice in the Fram Serial. Tocker, W.B., et al. [1937, p.6737-68037] MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860] Mcchanical properties of multi-year seases. Michael-Meage, J.A., et al. [1937, p.121-153] MP 2231 Mechanical properties of multi-year seases. Richer-Meage, J.A., et al. [1937, p.121-153] MP 2400 May Despois seconcian model. Hilber, W.D. III, et al. [1937, p.937-1015] MP 2230 Medding the electromagnetic property trends in sea lice, Part. I. Konses, A. et al. [1937, p.207-215] MP 2330 Ice theckness distribution serious the Atlantic sector of the Antacetic Ocean in modelinite. Walkams, F., et al. [1937, p.15,5514,552] MP 2330 Sea see thickness and sub-see bathsymetry. Rosacs, A., et al. [1937, d.0] Wechanical properties of molto-year sea see. Richter-Meage, J.A., et al. [1933, 178] Urchanical properties of molto-year sea see. Richter-Meage, J.A., et al. [1933, 178] Mrisha SAR facility an applite. Wetter, G., et al. [1948, p.27-31] Authorize measurement of sea see thickness and subsee bathsymetry. Nonacs, A., et al. [1935, p.211-120]
Application of a numerical sea ice model to the East Green-land area. Techer, Will, [1982, 40p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1982, 11p.) CR 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 40p.) On the deferences in ablation seasons of Arctic and Astretic sea ice. Andreas, E.L., et al., [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.) Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p. 107, 109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115] MP 1640 Comment on Water drag coefficient of first-year sea ice by M.P. Langichen. Andreas, E.L., et al., [1983, p. 779-782) MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibler, W.D., III, et al., [1983, p. 873-2837] MP 1592 Alaska's Resulent Sea coast ice rede-up and pile-up features Kovacs, A., [1983, 51p.) Properties of sea ice in the coastal zenes of the polar occass Weeks, W.F., et al., [1983, p. 25-61] MP 1660	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see saries annihity, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp 1882 Eactgy exchange over antactic sea see in the sporng. Americas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Resear, A., [1935, p.118-127]. MP 1981 Electromagnetic properties of statictypear sea see. Morey, R.M., et al., [1935, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1995, p.177-188]. MP 1993 Ice electrical properties. Gow, A.J., [1985, p.76-32]. MP 1990 Declective properties at 4.75 GHz of salme ice stabs. Accord. S.A., et al., [1985, p.83-84]. MP 1991 Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1985, p.87-91]. MP 1992 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.214-223]. MP 1992 Numerical simulation of sea see undured gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1985, p.259. MP 1998.	Physical properties of summer ses ice m the Fram Seriet. Torker, W.B., et al. [1937, p.6737-6807]. Physical properties of estimative teem Great Ray, New Hampshire. Messer, D.A., et al. [1937, p.833-860]. Mechanical properties of multi-year seasee. J.A., et al. [1937, p. 121-153]. Mer J. M. M. J. M. M. J. M. M. J. M.
Application of a numerical sea ice model to the East Green- land area. Tacker, W.B., [1982, 40p.) Equations for determining the gas and brine vubumes in sea ice samples. Cox. G.F.N., et al., [1982, 11p.] CR. 82-30 Bering Struct sea ice and the Fairway Rock icefoot. Koracs. A., et al., [1982, 40p.) On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1982, 9p.) CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107- 109) Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1982, p.113-115] MP. Langieben. Andreas. E.L., et al., [1983, p.79-739, MP. 1577 Numerical simulation of the Weddell Sea pack ice. Hilber, W.D., Illi, et al., [1983, p.28-73-2837] MP. 1592 Alaska's Beaufart Sea coasts ice ride-up and pole-up features Koyacs, A., [1983, 51p.] Properties of Sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1983, p.25-61] Surface meteorology US 'USSR Weddell Polymya Expedition.	Hilder, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea ex sami- hilty, 1951-1980. Wishly, J.E., et al., [1935, p.4847- 4845] 21P 1882 Energy enchange over noticetic sea see in the spenig. An- dreas, E.L., et al., [1935, p.7199-7212] MP 1889 Compressive strength of multi-year sea see Koracs, A., (1935, p.114-127) MP 1981 Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1935, p.151-167] MP 1982 Physical properties of sea see in the Greenland Sea. Tucker, W.B., et al., [1935, p.157-188] MP 1983 Ice electrical properties. Gow, A.J., [1935, p.768-2] MP 1910 Dielectric properties at 4.75 GHz of salme ice slabs. Accorac, S.A., et al., [1935, p.83-86] MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1935, p.37-91] Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-223] Numerical simulation of sea see induced gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.236- 2165] Ice melection activity of anisactis marine microoregamins.	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1917, p.6737-4803); MP 2280 Physical properties of extentine teem Great Ray, New Hampshire. Meese, D.A., et al. [1987, p.833-840]. Mechanical properties of multi-year seasee. Richter-Meage, J.A., et al. [1987, p.121-153]. MP 2430 Measurement of characteristic length of floating es sheets. Sodia, D.S., [1987, p. 121-154]. MP 2400 Dispositio recoveran model. Hitler, W.D., III, et al. [1987, p. 997-1015]. MP 2400 Dispositio recoveran model. Hitler, W.D., III, et al. [1987, p. 997-1015]. MP 2400 Dispositio recoveran model. Hitler, W.D., III, et al. [1987, p. 997-1015]. MP 2400 Modeling the efectionnagnetic property trends in sea see, Part 1. Kowaci, A., et al. [1987, p. 207-235]. MP 2400 Ice thickness distributions serous the Affantic sector of the Affanciac Ocean in moderater. Washisms, P., et al. [1987, p. 14, 935-18, 552]. Sea see thickness and sub-see bathsimetry. Kowaci, A., et al. [1987, p. 17-31]. Mechanical properties of multi-year sea ice. Richter-Meage, J.A., et al. [1988, p. 17-31]. CR 2005 MP 2400 Authorise measurement of sea see thickness and inforce bathsymetry. Kowaci, A., et al. [1988, p. 111-120]. MP 2405 Facutiomizantia, measurements of a second-year sea see fine.
Application of a numerical sea ice model to the East Green-land area. Tucker, W.B., [1992, 40p.) Equations for determining the gas and brine vubumes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.) On the differences in ablation seasons of Arctic and Autorities as ice. Andreas, E.L., et al., [1992, 2p.) Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] SR 82-28 Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109.] Almospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1610 Comment on Water drag coefficient of first-pear sea ice by M.P. Langleben. Andreas, E.L., et al., [1993, p.779-782] NP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill. et al., [1993, p.329-3287] MP 1592 Alaska's Beaufort Sea coast ice ride-up and pole-up features Koracs, A., [1993, 51p.] Properties of sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1993, p.25-41] Surface meteorology U.S. U.SSR Weddell Polynya Espedinon, 1991. Andreas, E.L., et al., [1993, 13p.] SR 83-14	Hiller, W.D., III. [1935, 50p.] CR. 85-85. Sumerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Washt, J.E., et al., [1935, p.48-7.4865]. PtP 1882. Energy eachange over antactic sea see in the sport, Andreas, E.L., et al., [1935, p.7199-7212]. MP 1899. Compressive strength of mini-year sea see. Kovack, A., [1935, p.116-127]. MP 1909. Electromagnetic properties of mini-year sea see. Morey, R.M., et al., [1935, p.151-167]. MP 1902. Physical properties of sea see in the Greenland Sea. Tricker, W.R., et al., [1935, p.151-167]. MP 1903. Re Electric properties at 4.75 GHz of salme ice slabs. Account. SA., et al., [1935, p.33-36]. MP 1911. Laboratory strukers of acounties scattering from the underside of sea see. Jerek, K.C., et al., [1935, p.37-91]. MP 1912. Pressure ridge and sea see properties Greenland Sea. Tricker, W.R., et al., [1935, p.214-223]. MP 1915. Numerical simulation of sea see induced gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.235-265]. MP 1938. Ite michaelism activity of antactic marine microargamins. Parker, L.V., et al., [1935, p.214-215]. MP 2217.	Physical properties of summer ses lice in the Fram Seriet. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of ententies teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of individual seases. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2252 Mechanical properties of individual seases. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2260 MP 2600, D.S., [1937, n.p. (Ch.7)]. MP 2600 Disposition seconcian model. Hilbert, W.D. III, et al. [1937, p. 937-1015]. MP 2230 Modeling the electromagnetic property strade in sea lee, Part. J. Kowaca, A., et al. [1937, p. 937-215]. MP 2330 Ice thickness distribution necross the Adamic sector of the Antarctic Organ in molecular: Wadhams, F., et al. [1937, p. 10, 453-14, 51]. Sea see thickness and sub-see bathsimetry. Kowaca, A., et al. [1937, 20p; CR 37-23]. MP 2340 Mechanical properties of molicipan sea new Richter-Menge, J.A., et al. [1938, 17p; CR 300-25]. MP 2360 Airborn measurement of sea see thickness and sub-see bathsymetry. Kowaca, A., et al. [1938, p. 17-31]. MP 2300 Airborn measurement of sea see thickness and sub-se bathsymetry. Kowaca, A., et al. [1938, p. 111-120]. MP 2345 Factionian prices in measurements of a necond-post and see fine. Kowaca, A., et al. [1938, p. 121-136]. MP 2345 Factionian prices in measurements of a necond-post as a see fine. Kowaca, A., et al. [1938, p. 121-136]. MP 2346
Application of a numerical sea ice model to the East Green-land area. Tucker, Wil. [1982, 40p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al. [1982, 11p.) CR 82-30 Bering Straot sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1982, 40p.) On the differences in ablation seasons of Arctic and Autorities etc. Andreas, E.L., et al. [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.) Physical, chemical and biological properties of writer sea ice in the Weddell Sea. Clarke, D.B., et al. [1982, p. 107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115] MP 1640 Comment on 'Water drag coefficient of first-year sea ice by M.P. Langieben. Andreas, E.L., et al. [1983, p. 279-782), M.P. 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., III, et al. [1983, p. 2873-2837] MP 1592 Alaska's Besufort Sea coast ice ride-up and pole-up features Kovacs, A., [1983, 51p.] Properties of sea ice in the coastal recess of the polar occase Weeks, W.F., et al. [1983, p. 25-61] MP 1640 Surface meteorology US 'USSR Weddell Polynya Expedition, 1981. Andreas, E.L., et al. [1993, p. 25-61] Mechanical behavior of sea ice. Mellor, M. [1983, 105p.] Mechangla behavior of sea ice. Mellor, M. [1983, 105p.] Mechangla behavior of sea ice. Mellor, M. [1983, 105p.]	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same shifts, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp 1882 Eastgy eachange over antactic sea see in the speng. Address, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Easter, A., [1985, p.116-127]. MP 1981 Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1935, p.151-167]. MP 1982 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1985, p.157-188]. MP 1983 Ice electrical properties of Sea see in the Greenland Sea. Tucker, M.R., et al., [1985, p.177-188]. MP 1910 Declettic properties at 4.75 GHz of salme ice slabs. Accomp. S.A., et al., [1985, p.83-86]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1985, p.83-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.214-223]. MP 1939 Numerical simulation of sea see induced gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1985, p.235-285]. MP 1938 Ice mideation activity of antactic manne microorgamins. Parker, L.V., et al., [1985, p.124-128]. MP 2117 Electromagnetic measurements of multi-year sea see ming	Physical properties of summer ses ice m the Fram Seriet. Torker, W.B., et al. [1937, p.6737-4807]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meeter, D.A., et al. [1987, p.833-860]. Mechanical properties of multi-year seasee. Richert-Menge, J.A., et al. [1987, p. 121-151]. MP 2351 Mechanical properties of multi-year seasee. Richert-Menge, J.A., et al. [1987, p. 121-151]. MP 2400 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1987, n.p. (CA.71). MP 2400 Dispositic secoscan model. Hibler, W.D., III, et al., [1987, p. 937-1015]. MP 2400 Modeling the electromagnetic property strude in sea ice, Part 1. Kowaci, A., et al. [1987, p. 207-235]. MP 2400 Ice theckness distributions across the Adlastic sector of the Antactic Ocean in modiumter. Wadhama, P., et al., [1987, p. 107-235]. MP 2400 Mechanical properties of multi-year sease. Richter-Menge, J.A., et al. [1983, J.P.) Mekhanical properties of multi-year sease. Richter-Menge, J.A., et al. [1983, p. 17-13]. MP 2400 Authorne measurement of sea see thickness and subrice bath-yearis. Komaci, A., et al. [1988, p. 17-134]. MP 2405 Fectioningments measurements of a second-year sea see fise. Komaci, A., et al. [1988, p. 17-1146]. MP 2406 Marrie-computer-based image-openersing system. Premisch, Meeter-Menger, Meeter-Menger, Meeter-Menger, Meeter-Menger, MP 2406 Marrie-computer-based image-openersing system. Premisch.
Application of a numerical sea ice model to the East Green- land area. Tecker, W.B., [1992, 490,3] Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 400,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 39,3] Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 279,3] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107- 109,3 Ammospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, 313-115, MP 1610] Comment on Water drag coefficient of first-year sea ice by M.P. Langichen. Andreas. E.L., et al., [1993, p. 739-732, MP 1577] Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill., et al., [1993, p. 2373-2387] Ammospheric so sea ice in the coastal renes of the polar occass Weeks, W.F., et al., [1993, p. 25-61] Surface meteorology TSS 'USSR Weddell Polynya Expedition, 1981. Andreas. E.L., et al., [1993, 139, 38, 83-14] Mechanical behavior of sea ice. Mellor, M., [1993, 105, p. 38, 83-14] Mechanical behavior of sea ice.	Hiller, W.D., III. [1945, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea ex samilability, 1951-1980. Washh, J.E., et al., [1955, p.4847-4845]. Energy exchange over notaectic sea see in the spenig. Address, E.L., et al., [1955, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Korsack, A., [1945, p.116-127]. MP 1891 Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1955, p.151-167]. MP 1892 Physical properties of sea see in the Greenland Sea. Tucker, W.B., et al., [1955, p.151-167]. MP 1903 Ice electrical properties. Gom, A.J., [1935, p.76-32]. MP 1910 Dielectric properties at 4.75 GHz of salme see slabs. Accome, S.A., et al., [1935, p.83-86]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1955, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-125]. Numerical simulation of sea see induced gonges on the shelies of the polar oceans. Weeks, W.F., et al., [1935, p.250-265]. Ice meleation activity of antaectic matrix matrix morrosegamums. Parker, L.V., et al., [1935, p.124-125]. Electromagnetic measurements of multi-year sea, see sung impulse rolats. Koncer, A., et al., [1935, 26p.;	Physical properties of summer ses lice in the Fram Struct. Tocker, W.B., et al., [1937, p.8737-4800]; MP 2300 Physical properties of ententine tee on Great Ray, New Humpshire. Meese, D.A., et al., [1937, p.833-800] Mechanical properties of milityrat seases. Richer-Menge, J.A., et al., [1937, p.121-153]; MP 2251 Mechanical properties of milityrat seases. Richer-Menge, J.A., et al., [1937, p.121-153]; MP 2408 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2208 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2408 Diagnosis see-secan model. Histor, W.D. III, et al., [1937, p. 937-1015]. MP 2408 Medding the electromagnetic property trends in sea see, Part 1. Kowaca, A., et al., [1937, p. 207-235]. MP 2308 Ice thickness distribution nerious the Atlantic sector of the Antactic Ocean in milestonic Walkania, P., et al., [1937, p. 14, 93-14, 500]. Mechanical properties of milityrat sea see. Richter-Menge, J.A., et al., [1933, J.7]. Mechanical properties of milityrat sea see. Richter-Menge, J.A., et al., [1933, J.7]. MP 2308 MP 2308 MP 2308 Facutomagnetis measurements of a second-year sea see fise, koraca, A., et al., [1938, p. 121-134]. MP 2306 Minitary Memory Market Memory and MP 2306 MP 2308 MP 2308 MP 2308 MP 2308
Application of a numerical sea ice model to the East Green-land area. Techer, W.R., [1992, 40p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.) On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1992, 2p.) Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] Rysical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1610 Comment on Water drag coefficient of first-year sea ice by M.P. Langieben. Andreas, E.L., et al., [1913, p.729-782, M.P. 1592.] Alaska's Beaufort Sea coast ice ride-up and pole-up features Kovacs, A., [1993, 51p.] Properties of sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1993, p.25-41] Surface meteorology US: USSR Weddell Polynya Espedition, 1991. Andreas, E.L., et al., [1993, 33-1] Mechanical behavior of sea ice. Mellor, M., [1993, 105p.] M.B-1 Sea ice model in wind forcing fields. Tucker, W.B., [1993,]	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see saries annihity, 1951-1980. Wishly, J.E., et al., [1935, p.48-7, 48-65]. PP 1882 Eastgy exchange over antactic sea see in the sporng. Americas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see [1955, p.118-127]. MP 1889 Compressive strength of multi-year sea see [1955, p.118-127]. MP 1980 Electromagnetic properties of multi-year sea see [1955, p.151-167]. MP 1982 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1985, p.151-167]. MP 1983 Ice electrical properties. Gow, A.J., [1985, p.76-32]. MP 1980 Deflective properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1985, p.83-84]. MP 1981 Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1985, p.87-91]. MP 1982 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.218-12]. MP 1985. p. 218-25]. MP 1985. P. 218-25]. MP 1988 Ice michation activity of antactic marine microorgamms. Parker, L.V., et al., [1985, p. 218-128]. MP 2217 Electromagnetic measurements of multi-year sea see using impute radar. Kowaci, A., et al., [1985, 2097]. CR 85-13	Physical properties of summer ses ice in the Fram Seriet. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of esteamine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2261 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2260 Measurement of characteristic length of financing see sheets. Sodia, D.S., [1937, n.p. (Ch.7b). MP 2360 Dispositio secoscian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2360 Medeling the electromagnetic property strends in sea see, Part. 1. Kowaca, A., et al. [1937, p. 937-1015]. MP 2360 Ice thickness distribution nerious the Adiastic sector of the Antarctic Organ in moderation. Wadhama, P., et al., [1937, p. 15/35-14,555]. MP 2360 Ice thickness distribution nerious the Adiastic sector of the Antarctic Organ in moderation. Wadhama, P., et al., [1937, p. 15/35-14,555]. MP 2360 Sea see thickness and sub-see baths metry. Rosaca, A., et al., [1937, p. 15/35-14,555]. MP 2360 Mechanical properties of multi-year sea are. Richter-Menge, J.A., et al., [1935, 2.7p.]. MP 2360 Mechanical properties of sea see thickness and subsee bathsynthy. Konaca, A., et al., [1938, p. 121-136]. MP 2365 Partitioning parties measurements of a second-year sea see fine, Konaca, A., et al., [1938, p. 121-136]. MP 2365 Micro-computer-based emagneyewersung system. Personch, D. et al., [1933, p. 229-1252]. MP 2365 Ice stress measurements aromal offshore structures. John-
Application of a numerical sea ice model to the East Green- land area. Techer, W.R. [1982, 40p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al. [1982, 11p.) CR 82-16 Bering Straot sea ice and the Fairway Rock icefoot. Koracs, A., et al. [1982, 40p.) On the defferences in ablation seasons of Arctic and Autorities ean ice. Andreas, E.L., et al. [1982, 9p.) CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.) Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al. [1982, p. 107- 109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115] Comment on Water drag coefficient of first-year sea ice by M.P. Langieben. Andreas, E.L., et al. [1983, p. 739-732, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibler, W.D., III, et al. [1983, p. 2873-2837] MP 1592 Alaska's Resufert Sea coast ice indecup and pale-up features Kovacs, A., [1983, 51p.] Properties of sea ice in the coastal reces of the polar occass Weeks, W.F., et al. [1983, p. 25-41] MP 1640 Surface meteorology US (USSR Weddell Polynya Espedition, 1981. Andreas, E.L., et al. [1993, 12p.] Sea ice model in wind forcing fields. Tucker, W.B., [1983, 178-116] Sea ice model in wind forcing fields. Tucker, W.B., [1983, 178-116]	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same same shifty, 1951-1990. Wishly, J.E., et al., [1935, p.48-7, 48-65]. PUP 1802 Eastgy enchange over antactic sea see in the spenig. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1809 Compressive strength of multi-year sea see Korsack, A., [1935, p.116-127]. MP 1901 Electromagnetic properties of antiti-year sea see Morey, R.M., et al., [1935, p.151-167]. MP 1902 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.177-188]. MP 1903 Ice electrical properties, Gow., A.J., [1935, p.76-32]. MP 1910 Dielectric properties at 4.75 GHz of salme see slabs. Accomp., S.A., et al., [1935, p.83-86]. MP 1911 Laboratory studoes of acoustic scattering from the underside of sea see. Jerch., K.C., et al., [1935, p.37-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1935 Numerical simulation of sea see induced gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.235-265]. MP 1938 Ice medeation activity of antactis marine microorganium. Parker, L.V., et al., [1935, p.126-125]. MP 1938 Ice medeation activity of antactis marine microorganium. Parker, L.V., et al., [1935, p.126-125]. MP 2217 Electromagnetic measurements of multi-year sea acc ming imputse radar. Kovacs, A., et al., [1935, 269.] CR. 85-13 Mechanical properties of multi-year sea see. Phase 2. Text.	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1917, p.6737-4804); MP 2300 Physical properties of ententine teem Great Ray, New Hampshire Meese, D.A., et al. [1917, p.833-864). Mechanical properties of multi-year seasee. Richers-Menge, J.A., et al. [1917, p. 121-151]. MP 2301 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1917, n.p. (CA.71). MP 2400 Disposits secoscial model. Hitter, W.D., III, et al. [1917, p. 917-1015]. MP 2318 Modeling the electromagnetic property stends in sea ice, Part I. Kowaci, A., et al. [1917, p. 207-235]. MP 2318 (et the faces of distinctions necess the Adiatite sector of the Antarctic Ocean in modelinies. Wadhamo, P., et al. [1917, p. 15,435-14,552]. MP 2318 (et the faces of distinctions necess the Adiatite sector of the Antarctic Ocean in modelinies. Wadhamo, P., et al. [1917, p. 15,435-14,552]. MP 2318 (et al. [1917, 450]). CR 87-23 (et al. [1917, 450]). CR 87-23 (et al. [1917, 450]). CR 89-5 (et al. [1918, p. 111-120]). MP 2306 Authorite measurement of sea see thickness and subsee bath-ymetry. Kowaci, A., et al. [1918, p. 121-134]. MP 2305 Esectionizapietic measurements of a second-year sea see Goe. Kowaci, A., et al. [1918, p. 121-135]. MP 2305 (et tress measurements around offshore structures. Johnson, J.B., [1918, p. 145-5]. MP 2305
Application of a numerical sea ice model to the East Green- land area. Techer, W.R., [1992, 490,3] Gra 2-16 Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 409,5] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1992, 99,5] Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 279,3] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107- 109,3 MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115,3] MP 1610 Comment on Water drag coefficient of first-pear sea ice by MP. Langieben. Andreas, E.L., et al., [1993, p.729-732, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill., et al., [1993, p.329-1287, MP 1597 Alaska's Beaufort Sea coast ice ride-up and pole-up features Kovaci, A., (1993, 519,1) Properties of sea ice in the coastal reness of the polar occass Weeks, W.F., et al., [1993, p.25-41] Surface meteorology US 'USSR Weddell Polymya Expedition, 1991. Andreas, E.L., et al., [1993, 139,1 SR 83-14 Mechanical behavior of sea ice. Mellor, M., [1993, 1059,1 M 83-11 Sea ice model in wind forcing fields. Tucker, W.B., [1993, 119,1 Comparison of different sea level pressure analysis fields in	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Wishly, J.E., et al., [1935, p.48-7. 4865] Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Wishly, J.E., et al., [1935, p.48-7. 4865] Numerical sea see in the sport. American American Sea. Li., et al., [1935, p.7199-7212] MP 1889. Compressive strength of mini-year sea see. Kovack, A., (1935, p.118-127) MP 1891. Electromagnetic properties of mini-year sea see. Morey, R.M., et al., [1945, p.151-147] MP 1902. R.M. et al., [1945, p.151-147] MP 1903. Re electrical properties. Gon, A.J., [1935, p.76-32] MP 1910. Dielectric properties at 4.75 GHz of salme see slabs. Account. S.A., et al., [1935, p.83-36] MP 1911. Laboratory studies of acountie scattering from the underside of sea see. Jerek, K.C., et al., [1935, p.37-91] Pressure ridge and sea see prospectives Greenland Sea. Tocker, W.B., et al., [1935, p.214-22] MP 1935. Numerical simulation of sea see induced gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.295-265] MP 1938. [1935, p.214-227] Electromagnetic incassirements of mini-year sea see ming imputse radar. Kovaci, A., et al., [1935, 207] Mechanical properties of mini-year sea. see ming imputse radar. Kovaci, A., et al., [1935, 257] Mechanical properties of mini-year sea. see. Trees, 128-138. Mechanical properties of mini-year sea. see. Trees, 128-138.	Physical properties of summer ses lice in the Fram Seriet. Tocker, W.B., et al., [1937, p.8737-880]; MP 2300 Physical properties of ententine teem Great Ray, New Humpshire. Meese, D.A., et al., [1937, p.833-860]. MP 2251 Mechanical properties of milityrar seases. Richer-Menge, J.A., et al., [1937, p.121-153]. MP 2261 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2262 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2260 Diagnosius necoscian model. Hilber, W.D. III, et al., [1937, p. 937-1015]. MP 2260 Medicing the electromagnesis property trends in sea lice, Part 1. Konses, A., et al., [1937, p. 907-125]. MP 2260 Let theckness distribution necosis the Adlantic sector of the Antactic Ocean in modesinist. Wadlamit, Sector of the Antactic Ocean in modesinist. Wadlamit, P., et al., [1937, p. 15,5514,552]. MP 2260 Let theckness and sub-see bathwings. Rosaca, A., et al., [1933, 178]. Mechanical properties of moditivent neare. Richter-Menge, J.A., et al., [1933, 178]. MP 2360 Authorize measurement of sea see theckness and sub-see harbymers. Memars, A., et al., [1938, p. 111-126]. MP 2360 Dictional printing measurements of an accord-year sea nee fise, Rosaca, A., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing system. Personich, D.K., et al., [1938, p. 121-136]. MP 2366 Matricomagnics-based image-processing syst
Application of a numerical sea ice model to the East Green- land area. Techer, W.B., [1992, 4903] CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1982, 1183] Bering Strant sea ice and the Fairway Rock icefoot. Korace, A., et al., [1982, 4083] On the deferences in ablation seasons of Arctic and Autoritic sea ice. Andreas, E.L., et al., [1992, 983] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 2783] Physical, chemical and biological properties of writer sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p. 107- 1093] MP 1640 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115] MP 1640 Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langlehen. Andreas, E.L., et al., [1983, p. 779-782) MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilber, W.D., Ill., et al., [1983, p. 2873-2887] MP 1592 Alssla's Beaufart Sea coast ice ride-up and pile-up features Kovacs, A., [1983, 513] Properties of Sea ice in the coastal recess of the poder occase Weeks, W.F., et al., [1983, p. 25-41] MP 1660 Surface meteorology US (USSR Weddell Polymya Expedition, 1981. Andreas, E.L., et al., [1983, J.], S.R.83-16 Mechanical behavior of sea ice. Mellor, M., [1983, 105p.] Sea ice model in mind forcing fields. Tucker, W.B., [1983, p. 118-117 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same shifty, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. 21P 1882 Eastgy exchange over antasetic sea see in the speng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Sees, A., [1935, p.116-127]. MP 1981 Electromagnetic properties of multi-year sea see. Morey., R.M., et al., [1935, p.151-167]. MP 1982 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1995, p.151-167]. MP 1983 Ice electrical properties, Gow, A.J., [1985, p.76-32]. MP 1980 Declective properties at 4.75 GHz of salme see slabs. Account, S.A., et al., [1985, p.83-84]. MP 1981 Laboratory studies of acoustic scattering from the underside of sea see. Jerck, K.C., et al., [1985, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.214-223]. MP 1935 Numerical simulation of sea see induced goinges on the shelves of the podar oceans. Weeks, W.F., et al., [1985, p.259-265]. MP 1938 Ice micleation activity of antasetis maintee microorgamins. Parker, L.V., et al., [1985, p.124-125]. MP 217 Electromagnetic measurements of multi-year sea are ming impute radar. Kowacs, A., et al., [1985, 219-27]. CR. 85-13 Mechanical properties of multi-year sea see. Phase 2. Test results. Cos., G.F.N., et al., [1985, 81p.]. CR. 85-16 Field totals of the kinetic fruction coefficient of sea see. Taxis.	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of extentine teem Great Ray, New Hampshire. Meeter, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2351 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2360 Measurement of characteristic length of floating see sleen, Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2360 Dispositio see-scean model. Hilder, W.D., Ill., et al. [1937, p. 937-1015]. MP 2360 Medeing the effectionnapsetis property trends in sea ice, Part 1. Konaci, A., et al. [1937, p. 207-235]. MP 2360 (et the classes distributions serious the Adiastic sector of the Antactic Ocean in modiumter. Wadhami, P., et al., [1937, p. 14, 535-14, 552]. MP 2360 (et the classes distributions serious the Adiastic sector of the Antactic Ocean in modiumter. Wadhami, P., et al., [1937, p. 14, 535-14, 552]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Ocean in modiumter. Wadhami, P., et al., [1937, p. 14, 535-14, 552]. MP 2365 (et al., [1938, p. 17-13]). MP 2365 (et al., [1938, p. 1835, p. 11-130). MP 2365 Partitionnapsition measurements of a second-periodic see files, Konaci, A., et al., [1938, p. 216-22]. MP 2365 (et al., [1931, p. 246-22]). MP 2365 (et al., [1931, p. 246-22]). MP 2361 Oceanion measurements around offshore structure. Johnson, J.B., [1931, p. 246-22]. MP 2361 Oceanion and offshore structures. Johnson, J.B., [1931, p. 246-22]. MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson, J.B., [1931, p. 246-24]. MP 2365 (et al., [1931, p. 246-24]). MP 2365 (et al., [1931, p. 246-247]). MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson, J.B., [1931, p. 246-247]. MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson, J.B., [1931, p. 246-247]. MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson
Application of a numerical sea ice model to the East Green- land area. Tecker, W.B., [1992, 490,3] Equations for determining the gas and brine vubumes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs. A., et al., [1992, 400,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 29,3] Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 270,3] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107- 109, Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, 2113-115] MP 1649 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, 2113-115] MP 1610 Comment on Water drag coefficient of first-year sea ice by MP. Langichen. Andreas, E.L., et al., [1993, p.79-732, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Illi, et al., [1993, p.23-73] MP 1592 Alaska's Beaufort Sea coast ice ride-up and pale-up features Kowacs, A., [1993, 5,151,1] Properties of sea ice in the coastal renes of the polar occans Weeks, W.F., et al., [1993, p.25-61] MP 1600 Surface meteorology US 'USSR Weddell Polynya Espedition, 1981. Andreas, E.L., et al., [1993, JSp.] SR 83-16 Mechanical behavior of sea ice. Mellor, M., [1993, 1054, 116,1] Comparison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1933, 1034, 1008] MP 1737	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp 1882 Eastgy eachange over antactic sea see in the speng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Sees, p. 1882, p	Physical properties of summer ses lice in the Fram Struct. Tocker, W.B., et al., [1937, p.8737-4800]; MP 2300 Physical properties of ententine teem Great Ray, New Humpshire. Meese, D.A., et al., [1937, p.833-800] Mechanical properties of milityrat scauce. Richer-Menge, J.A., et al., [1937, p.121-153]; MP 2251 Mechanical properties of milityrat scauce. Richer-Menge, J.A., et al., [1937, p.121-153]; MP 2408 Measurement of characteristic length of fushing see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2408 Measurement of characteristic length of fushing see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2408 Measurement of characteristic length of fushing see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2408 Measurement of characteristic length of fushing see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2408 Mediang the electromagnetic property trends in sea ice. Part 1. Kowaca, A., et al., [1937, p. 207-215]. MP 2408 Rechanical properties of militaristic Radiantic sector of the Antactic Ocean in midwinter. Wadhama, P., et al., [1933, j.
Application of a numerical sea ice model to the East Green- land area. Techer, W.B., [1992, 4903] CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1982, 1183] Bering Strant sea ice and the Fairway Rock icefoot. Korace, A., et al., [1982, 4083] On the deferences in ablation seasons of Arctic and Autoritic sea ice. Andreas, E.L., et al., [1992, 983] CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 2783] Physical, chemical and biological properties of writer sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p. 107- 1093] MP 1640 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115] MP 1640 Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langlehen. Andreas, E.L., et al., [1983, p. 779-782) MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilber, W.D., Ill., et al., [1983, p. 2873-2887] MP 1592 Alssla's Beaufart Sea coast ice ride-up and pile-up features Kovacs, A., [1983, 513] Properties of Sea ice in the coastal recess of the poder occase Weeks, W.F., et al., [1983, p. 25-41] MP 1660 Surface meteorology US (USSR Weddell Polymya Expedition, 1981. Andreas, E.L., et al., [1983, J.], S.R.83-16 Mechanical behavior of sea ice. Mellor, M., [1983, 105p.] Sea ice model in mind forcing fields. Tucker, W.B., [1983, p. 118-117 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see saries annihity, 1951-1980. Wishly, J.E., et al., [1935, p.48-7. 4865]. Ptp 1882. Eastgy exchange over antactic sea see in the speng. Amdreas, E.L., et al., [1985, p.7199-7212]. MP 1889. Compressive strength of mith-year sea see. Revises, A. (1935, p.116-127). MP 1891. Electromagnetic properties of mith-year sea see. Morey, R.M., et al., [1935, p.151-167]. MP 1902. Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1985, p.151-167]. MP 1903. Ite electrical properties. Gom, A.J., [1985, p.76-32]. MP 1910. Dielectitic properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1935, p.83-36]. MP 1911. Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1985, p.79-1]. MP 1912. Pressure ridge and sea see peoperties Greenland Sea. Tucker, W.R., et al., [1935, p.214-123]. MP 1935. Numerical simulation of sea see unduced gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.235-265]. MP 1938. Ite micrastion activity of antacetis maxime microorgamins. Parker, L.V., et al., [1935, p.126-128]. MP 2217. Electromagnetic measurements of midis-year sea see using impulse radar. Kosvac, A., et al., [1935, 269]. CR. 85-13. Mcchassical properties of midis-year sea see. Plane 2. Ten-crisis. Con., G.F.N., et al., [1935, 319]. CR. 85-13. Field tests of the histone friction coefficient of sea see. Tanactius, J.C., et al., [1935, 269]. CR. 85-17. Role of plastic see interaction on mategnal see zone disnames.	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of extentine teem Great Ray, New Hampshire. Meeter, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2351 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2360 Measurement of characteristic length of floating see sleen, Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2360 Dispositio see-scean model. Hilder, W.D., Ill., et al. [1937, p. 937-1015]. MP 2360 Medeing the effectionnapsetis property trends in sea ice, Part 1. Konaci, A., et al. [1937, p. 207-235]. MP 2360 (et the classes distributions serious the Adiastic sector of the Antactic Ocean in modiumter. Wadhami, P., et al., [1937, p. 14, 535-14, 552]. MP 2360 (et the classes distributions serious the Adiastic sector of the Antactic Ocean in modiumter. Wadhami, P., et al., [1937, p. 14, 535-14, 552]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Ocean in modiumter. Wadhami, P., et al., [1937, p. 14, 535-14, 552]. MP 2365 (et al., [1938, p. 17-13]). MP 2365 (et al., [1938, p. 1835, p. 11-130). MP 2365 Partitionnapsition measurements of a second-periodic see files, Konaci, A., et al., [1938, p. 216-22]. MP 2365 (et al., [1931, p. 246-22]). MP 2365 (et al., [1931, p. 246-22]). MP 2361 Oceanion measurements around offshore structure. Johnson, J.B., [1931, p. 246-22]. MP 2361 Oceanion and offshore structures. Johnson, J.B., [1931, p. 246-22]. MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson, J.B., [1931, p. 246-24]. MP 2365 (et al., [1931, p. 246-24]). MP 2365 (et al., [1931, p. 246-247]). MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson, J.B., [1931, p. 246-247]. MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson, J.B., [1931, p. 246-247]. MP 2361 Oceanion of the physical properties of sease. Instructure, Johnson
Application of a numerical sea ice model to the East Green- lond area. Techer, W.R., [1992, 40p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR. 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.) On the differences in ablation seasons of Arctic and Anteretic sea ice. Andreas, E.L., et al., [1992, 9p.) CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.) Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107- 107) MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1619 Comment on Water drag coefficient of first-year sea ice' by M.F. Langieben. Andreas, E.L., et al., [1931, p.729-782, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilver, W.D., Ill., et al., [1993, p.2873-2887] Alaska's Beaufart Sea coast ice ride-up and pole-up features Kowaci, A., [1993, 51p.] Properties of sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1993, p.25-41] Surface meteorology US: USSR Weddell Polynya Especition, 1991. Andreas, E.L., et al., [1993, 33-4] Mechanical behavior of sea ice. Mellor, M., [1993, 105p.] Sea ice model in wind forcing fields. Tucker, W.B., [1993, 11p.] Comparison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1993, p.1034.] Equations for determining gas and beye volumes in sea see	Hiller, W.D., III. [1935, 50p.] CR 85-85 Numerical sumulation of Noethern Hemisphere sea see same same shifty, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. Ptp 1882 Eastgy enchange over antacetic sea see in the spenng. Audreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Korses, A., [1935, p.116-127]. MP 1981 Electromagnetic properties of anotheryear sea see Morey, R.M., et al., [1935, p.151-167]. MP 1982 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.177-188]. MP 1983 Ice electrical properties. Gom, A.J., [1935, p.76-32]. MP 1910 Dielectric properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1935, p.83-86]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1935, p.37-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1935 Numerical simulation of sea see induced gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.235-265]. MP 1938 Ice michation activity of antacetic marine microorganisms. Parker, L.V., et al., [1935, p.126-123]. MP 2217 Electromagnetic measurements of multi-year sea see. Phys. 2. Test results. Con., G.F.N., et al., [1935, 51p.]. CR 85-13 Mechanical properties of multi-year sea see. Phys. 2. Test results. Con., G.F.N., et al., [1935, 51p.]. CR 85-14 Field tests of the horeac friction coefficient of sea see. Tatus. clans., J.C., et al., [1935, 20p.]. CR 85-17	Physical properties of summer ses ice in the Fram Seriet. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2262 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2260 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, in p. (Ch.7b). MP 2000 Dispositio secoscian model: Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model: Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model: Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 I. Konsen, A., et al. [1937, p. 937-105]. MP 2260 I. Konsen, A., et al. [1937, p. 937-105]. MP 2260 Disposition destroyments of multi-year sease. Richter-Menge, J.A., et al. [1935, J.7p]. CR 30-02 Mechanical properties of multi-year sease. Richter-Menge, J.A., et al. [1935, J.7p]. MP 2360 Statis SAR faculty an update. Weller, G., et al. [1936, p. 27-31]. MP 2365 Partition apparent measurements of a see indehensia and induce beth-years. Konsen, A., et al. [1938, p. 211-115]. MP 2365 Mesting and the destroyments are seed of the sease of the faculty and properties of sease of the faculty and p. 2000 MP 2365 Mesting and the destroyments of sease of the faculty and p. 2000 MP 2365 MP 2366 MP 2366 MP 2366 MP 2366 MP 2366 MP
Application of a numerical sea ice model to the East Greenland area. Techer, W.R., [1982, 36), 1 CR 82-16 Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1982, 11], 1 CR 82-30 Bering Straot sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 46), 1 CR 82-30 On the deferences in ablation seasons of Arctic and Astarctic sea ice. Andreas, E.L., et al., [1992, 96). CR 82-33 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27]6, 1 SR 82-32 Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107, 109]. Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1982, p. 113-115]. MP 1640 Sea. Andreas, E.L., [1982, p. 113-115]. MP 1640 Sea. Andreas, E.L., [1982, p. 113-115]. MP 1640 Sea. Andreas, E.L., [1982, p. 123-115]. MP 1640 Sea. Andreas, E.L., [1982, p. 123-123]. MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilber, W.D., III, et al., [1983, p. 2573-2837]. MP 1572 Alsala's Resulent Sea coast ice rede-up and pile-up features Kovacs, A., [1983, 51], p. 2873-2837]. MP 1560 Surface meteorology US/USSR Weddell Polymya Espediton, 1981. Andreas, E.L., et al., [1983, 32]. SR 83-17 Genancial behavior of sea ice. Mellor, M., [1983, 105p]. MR 35-11 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 1034-1008]. MP 1737 Equations for determining gas and beyor volumes in eac see. Cot., G.F.N., et al., [1983, p. 100-116]. MP 2055	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same same shifty, 1951-1990. Wishly, J.E., et al., [1935, p.48-7-48-65]. PPP 1802 Eastgy eachange over antacetic sea see in the spenig. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1809 Compressive strength of multi-year sea see Kersex, A., [1935, p.116-127]. MP 1901 Electromagnetic properties of multi-year sea see Meey, R.M., et al., [1935, p.151-167]. MP 1902 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.151-167]. MP 1903 Ice electrical properties of Gon, A.J., [1935, p.76-32]. MP 1910 Declectric properties at 4.75 GHz of salme see slabs. Account, S.A., et al., [1935, p.83-64]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1935, p. 37-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-223]. MP 1935 Numerical simulation of sea see induced gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.236-265]. MP 1938 Ice micleation activity of antacetic marine microorgamins. Parker, L.V., et al., [1935, p.126-128]. MP 1938 Mechanical properties of multi-year sea see. Phis e. 2. Fest results. Con., G.F.N., et al., [1935, 31p.]. CR 85-13 Mechanical properties of multi-year sea see. Phis e. 2. Fest results. Con., G.F.N., et al., [1935, 31p.]. CR 85-13 Mechanical properties of multi-year sea see. Phis e. 2. Fest results. Con., G.F.N., et al., [1935, 31p.]. CR 85-17 Role of plastic see interaction in marginal see rore dinamics. Leppkania, M., et al., [1935, p.113-39-11], 1009.	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of estimative teem Great Ray, New Humpshire. Meeter, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2351 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2360 Measurement of characteristic length of finding see sheets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2360 Dispositio see-secan model. Hilder, W.D., Ill., et al. [1937, p. 207-215]. MP 2360 Medeing the electromagnetic property trends in sea ice, Part 1. Konaci, A., et al. [1937, p. 207-215]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Orean in moderance: Wadhams, P., et al., [1937, p. 207-215]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Orean in moderance: Wadhams, P., et al., [1937, p. 207-215]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Orean in moderance: Wadhams, P., et al., [1937, p. 207-215]. MP 2360 (et al., [1938, p. 279-2]). MP 2365 (et al., [1938, p. 280-202). MP 2365 Partitioning princip and optice. Weller, G., et al., [1938, p. 236-202]. MP 2365 (et al., [193
Application of a numerical sea ice model to the East Green- land area. Tucker, W.R., [1992, 40p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR. 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.] On the differences in ablation seasons of Arctic and Astarctic sea ice. Andreas, E.L., et al., [1992, 9p.] CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107- 104) Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langichen. Andreas, E.L., et al., [1931, p.279-792, MP 1507 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill., et al., [1993, p.2873-2887] Alsaka's Beaufart Sea coast ice ride-up and pile-up features Kowacs, A., [1993, 51p.] Properties of sea ice in the coastal zeness of the polar occasis Weeks, W.F., et al., [1993, p.25-41] Mechanical behavior of sea ice. Mellor, M., [1993, 105p.] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.198-119]. Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice model in wind forcing fields. Tucker, W.B., [1993, p.1054- 108] Sea ice M. Sea ice wind in the sa	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Wishly, J.E., et al., [1935, p.48-7. 4865] Energy enchange over antactic sea see in the sports. Anderss, E.L., et al., [1935, p.7199-7212] MP 1889 Compressive strength of mini-year sea see. Kovack, A., (1935, p.116-127) MP 1899 Compressive strength of mini-year sea see. Morey, MP 1989 Electromagnetic properties of midi-year sea see. Morey, R.M., et al., [1935, p.151-147] MP 1982 Electromagnetic properties of midi-year sea see. Morey, R.M., et al., [1945, p.151-147] MP 1982 Re L. et al., [1945, p.151-147] MP 1983 Re L. et al., [1945, p.177-138] MP 1983 Re L. et al., [1945, p.177-138] MP 1993 Re Lectrical properties at 4.75 GHz of salme ice slabs. Account. S.A., et al., [1945, p.33-34] Laboratory studies of acounties scattering from the underside of sea see. Jerek, K.C., et al., [1945, p.37-91] Pressure ridge and sea see prospectives Greenland Sea. Tucker, W.B., et al., [1945, p.214-22] Numerical simulation of sea see unduced gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1945, p.219-25] Lettromagnetic measurements of midi-year sea see sumg impute radar. Kovaci, A., et al., [1945, 207] Electromagnetic measurements of midi-year sea see ming impute radar. Kovaci, A., et al., [1945, 207] Reckassical properties of militopear sea see. Tataction, J.C., et al., [1945, p.31-25] Reck of plastic see interaction in marginal see zone dynamics. Lepphranta, M., et al., [1935, p.11, 1999) MP 1844	Physical properties of summer ses lice in the Fram Seriet. Tocker, W.B., et al., [1937, p.8737-4800]; MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al., [1937, p.833-800]. MP 2251 Mechanical properties of milityrar seases. Richer-Meage, J.A., et al., [1937, p.121-153]. MP 2252 Measurement of characteristic length of finding see sheets. Sodia, D.S., [1937, in p. (Ch.7)]. MP 2260 Diagnosius necoscian model. Hilbert, W.D. III, et al., [1937, p. 937-1015]. MP 2260 MP
Application of a numerical sea ice model to the East Green- lond area. Techer, W.B., [1992, 490,3] Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 409,5] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 98,7] Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 279,3] Physical chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107-109,4] Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., (1992, p. 113-115) MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., (1992, p. 113-115) MP 1618 Comment on Water drag coefficient of first-pear sea ice by MP. Langleben. Andreas, E.L., et al., [1993, p. 79-732, MP 1597. Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., III., et al., [1993, p. 23-73-2837] MP 1597 Alaska's Beaufort Sea coast ice ride-up and pile-up features. Kovacs, A., (1993, 519.) Properties of sea ice in the coastal recess of the polar occaes Weeks, W.F., et al., [1993, p. 25-41] Surface meteorology TCS 'USCS Weddell Polynya Expedition, 1981. Andreas, E.L., et al., [1993, 329.] SR 83-14 Mechanical behavior of sea ice. Mellor, M., [1993, 105p., M. 83-17 Companison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1993, 1034, 1098]. Equations for determining gas and brine volumes in sea ice. Cot., G.F.N., et al., [1983, p. 266-316.] MP 1737 Equations for determining gas and brine volumes in sea ice. Cot., G.F.N., et al., [1983, p. 266-316.] MP 1737 Equations for determining gas and brine volumes in sea ice.	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same shifty, 1951-1990. Wishly, J.E., et al., [1935, p.4847-4845]. PP 1882 Eastgy exchange over antactic sea see in the sporng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Resear, A., [1935, p.116-127]. MP 1899 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1935, p.151-187]. MP 1992 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1995, p.151-187]. MP 1993 Ice electrical properties. Gow, A.J., [1985, p.76-32]. MP 1990 Declective properties at 4.75 GHz of salme ice slabs. Account, S.A., et al., [1995, p.83-84]. MP 1910 Declective properties at 4.75 GHz of salme ice slabs. Account, S.A., et al., [1995, p.83-84]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1935, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-223]. MP 1935 Numerical simulation of sea see induced goinges on the shelves of the polar occans. Weeks, W.F., et al., [1935, p.259-255]. MP 1938 Ice micleation activity of antacetis manne microorgamins. Parker, L.V., et al., [1935, p.126-125]. MP 2217 Electromagnetic measurements of multi-year sea see ming impulse radar. Nowac, A., et al., [1935, 1935, 259-217]. CR. 85-13 Mechanical properties of multi-year sea see. Plane 2. Test results. Cost, G.F.N., et al., [1935, 193]. CR. 85-13 Mechanical properties of multi-year sea see. Plane 2. Test results. Cost, G.F.N., et al., [1935, 193]. CR. 85-13 Mechanical properties of multi-year sea see. Plane 2. Test results. Cost, G.F.N., et al., [1935, 193]. CR. 85-17 Robe of planties are intentation on margnal see roote disnames Lepphranta, M., et al., [1935, p.11, 193-11, 1939]. MP 1544 Impulse radar sounding of level finit-year sea see from an	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of estimative teem Great Ray, New Humpshire. Meeter, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2351 Mechanical properties of multi-year seasee. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2360 Measurement of characteristic length of finding see sheets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2360 Dispositio see-secan model. Hilder, W.D., Ill., et al. [1937, p. 207-215]. MP 2360 Medeing the electromagnetic property trends in sea ice, Part 1. Konaci, A., et al. [1937, p. 207-215]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Orean in moderance: Wadhams, P., et al., [1937, p. 207-215]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Orean in moderance: Wadhams, P., et al., [1937, p. 207-215]. MP 2360 (et the classes distributions across the Adiastic sector of the Antactic Orean in moderance: Wadhams, P., et al., [1937, p. 207-215]. MP 2360 (et al., [1938, p. 279-2]). MP 2365 (et al., [1938, p. 280-202). MP 2365 Partitioning princip and optice. Weller, G., et al., [1938, p. 236-202]. MP 2365 (et al., [193
Application of a numerical sea ice model to the East Green- land area. Tucker, W.B., [1982, 40p.) Equations for determining the gas and brine vubumes in sea ice samples. Cox. G.F.N., et al., [1982, 11p.] CR. 82-30 Bering Struct sea ice and the Fairway Rock icefoot. Koracs. A., et al., [1982, 40p.) On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1982, 2p.] CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p.107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1982, p.113-115] MP. Hongieben. Andreas. E.L., et al., [1981, p.779-732] MP. Langieben. Andreas. E.L., et al., [1981, p.779-732] Alaska's Beaufart Sea coasts ice ride-up and pole-up features Koracs. A., [1983, p.25-41] Properties of Sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1983, p.25-41] Surface meteorology US-1288 Weddell Polymya Expedition, 1981. Andreas. E.L., et al., [1981, p.25-41] Surface meteorology US-1288 Weddell Polymya Expedition, 1981. Andreas. E.L., et al., [1983, p.25-41] Surface meteorology US-1288 Weddell Polymya Expedition, 1981. Andreas. E.L., et al., [1983, p.25-41] Surface meteorology Control of Sea see. Mellor, M., (1983, p.198, 11p.) CR. 83-10 CR. 83-11 CR. 83-12 CR. 83-13 MP 1737 Equations for determining gas and brive volumes in sea see Cox., G.F.N., et al., [1983, p.106-116] MP 2055 Thermol expansion of Ross Sea pack see. Govern, J.W., et al., 942-6323 Surface roughness of Ross Sea pack see. Govern, J.W., et al., 942-6323 Surface roughness of Ross Sea pack see. Govern, J.W., et al., 942-6323	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same shifts, 1951-1980. Wishly, J.E., et al., [1935, p.4847-4845]. Eastgy eachange over antactic sea see in the speng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Research, 1955, p.116-127. MP 1899 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1955, p.151-167]. MP 1991 Electromagnetic properties of multi-year sea see. Morey, R.M., et al., [1955, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1955, p.177-188]. MP 1993 Ice electrical properties, Gow, A.J., [1985, p.76-52]. MP 1910 Declettre properties at 4.75 GHz of salme see slabs. Accomp. S.A., et al., [1985, p.83-84]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1955, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.214-225]. MP 1912 Numerical simulation of sea see induced gonges on the shelves of the podar occam. Weeks, W.F., et al., [1985, p.239, 256]. MP 1938 Ice mideation activity of antacetic marine microorgamins. Parker, L.V., et al., [1985, p.124-125]. MP 217 Electromagnetic measurements of multi-year sea see ming impulse radar. Kowacs, A., et al., [1985, 219]. CR. 85-13 Mechanical properties of multi-year sea see. Plane 2. Ten results. Coa., G.F.N., et al., [1985, 197]. CR. 85-17 Role of plastie see interaction in margnaal see roote disnames. Lepokanita, M., et al., [1985, p.173-11, 1989.]. MP 1544 Impulse radar sounding of level first-year sea see. Fina. E. CR. 85-17 Role of plastie see interaction in margnaal see roote disnames seelbreaker. Martinson, C.R., [1985, p.179]. SR. 85-21 Electromagnetic measurements of sea see. Konacs, A., et al., [1986, p.179]. SR. 85-21 Electromagnetic measurements of sea see. Konacs, A., et al., [1986, p.179]. SR. 85-21	Physical properties of summer ses ice in the Fram Seriet. Torker, W.B., et al. [1917, p.6737-6807]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meeter, D.A., et al. [1917, p.833-840]. MP 2251 Mechanical properties of multi-year seasee. Richert-Menge, J.A., et al. [1917, p.121-151]. MP 2251 Mechanical properties of multi-year seasee. Richert-Menge, J.A., et al. [1917, p.121-151]. MP 2260 Measurement of characteristic length of floating see sheets. Sodin, D.S., [1917, n.p. (CA.71). MP 2260 Disgrouts recoverax model. Helder, W.D., III, et al., [1917, p. 937-1015]. MP 2280 Modeling the effectionnagnetis property strude in sea ice, Part 1. Kowaci, A., et al. [1917, p. 207-235]. MP 2280 Mechanical foregreations across the Adiastic sector of the Antactic Ocean in madminter. Wadhama, P., et al., [1917, p. 14, 435-14, 552]. MP 2380 Mechanical properties of multi-year sease. Richter-Menge, J.A., et al., [1918, p. 17-21]. MP 2300 Mechanical properties of multi-year sease. Richter-Menge, J.A., et al., [1918, p. 17-21]. MP 2300 MP 2305 MP 2306 Milital SAR facility as update. Weffer, G., et al., [1918, p. 17-21]. MP 2305 MP 2306 Milital properties measurements of a second-year sease fine. Konaci, A., et al., [1918, p. 121-136]. MP 2305 MP 2305 Milital properties of major-processing system. Pressic, D.K., et al., [1918, p. 121-136]. MP 2305 Milital regions in a task. Gerchell, T.C., et al., [1918, p. 1837, 1849]. MP 2305 Milital copients passive micromatic observation of salme we grown in a task. Gerchell, T.C., et al., [1918, p. 1837, 1849]. Confined compressive sitenagth of multi-year recision of salme we grown in a task. Gerchell, T.C., et al., [1918, p. 285-101]. MP 2305 MP 2305 Medical compressive sitenagth of multi-year recision of salme we grown in a task. Gerchell, T.C., et al., [1918, p. 285-101]. MP 2305 Medical compressive sitenagth of multi-year recision of salme we grown in a task. Gerchell, T.C., et al., [1918, p. 285-101]. MP 2305
Application of a numerical sea ice model to the East Green- lond area. Tucker, W.R., [1992, 40p.) Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1992, 11p.] CR. 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.) On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1992, 2p.) Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] Physical, chemical and biological properties of winter sea ice in the Woddell Sea. Clarke, D.B., et al., [1992, p.107- 109.] Almospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] Comment on Water drag coefficient of first-pear sea ice by M.P. Langieben. Andreas, E.L., et al., [1993, p.779-732.] Alaska's Beaufort Sea coast ice ride-up and pole-up features. Koracs, A., [1993, 51p.] Properties of sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1993, p.25-41] Surface meteorology U.S. (USSR Weddell Polymya Expedience 1991. Andreas, E.L., et al., [1993, 15p.] Sea ice model in wind forcing fields. Tucker, W.B., [1993, 11p.] Comparison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1993, 105p.] M.P. 130- Equations for determining gas and brise volumes in sea sec Cot., G.F.N., et al., [1931, p.300-316] M.P. 1746 Surface roughness of Ross Sea pack sec. Govern, M.P. 1746 Surface roughness of Ross Sea pack sec. Govern, M.P. 1746 Surface roughness of Ross Sea pack sec. Govern, M.P. 1746 Surface roughness of Ross Sea pack sec. Govern, M.P. 1746 M	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same variability. 1951-1990. Wishly, J.E., et al., [1935, p.48-7-48-65]. Eastgy enchange over antacetic sea see in the spenig. Address, E.L., et al., [1935, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Korsacs, A., [1935, p.116-127]. MP 1891 Electromagnetic properties of anotheryear sea see Morey, R.M., et al., [1935, p.151-167]. MP 1902 Electromagnetic properties of anotheryear sea see Morey, R.M., et al., [1935, p.177-138]. MP 1903 Ice electrical properties. Gom, A.J., [1935, p.76-32]. MP 1910 Dielectric properties at 4.75 GHz of salme see slabs. Accord., S.A., et al., [1935, p.83-36]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1935, p.37-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-223]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-223]. MP 1915 Numerical numulation of sea see induced gouges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.23-265]. Ice medication activity of antacets marine microorgamins. Parker, L.V., et al., [1935, p.124-123]. MC (R.S-13) Mcchassical properties of multi-year sea see. Phase 2. Test results. Con., G.F.N., et al., [1935, 25p.]. CR. 85-13 Mcchassical properties of multi-year sea see. Phase 2. Test results. Con., G.F.N., et al., [1935, p.114-129]. MP 1844 Impulse radar sounding of level finity-year sea see from an seelection. Metal., et al., [1935, p.114-129]. MP 1844 Impulse radar sounding of level finity-year sea see from an seelectaler. Martinon, C.R., [1935, p.114-129]. Electromagnetic measurements of sea see. Kowaca, A., et al., [1936, p.87-9]. Electromagnetic measurements of sea see. Kowaca, A., et al., [1936, p.87-9]. Electromagnetic measurements of sea see. Kowaca, A., et al., [1936, p.97-9]. Electromagnetic measurements of sea see. Kowaca, A.,	Physical properties of summer ses lice in the Fram Sense. Tocker, W.B., et al. [1937, p.8737-880]; MP 2300 Physical properties of ententine teem Great Ray, New Humpshire. Meese, D.A., et al. [1937, p.833-860]; MP 2251 Mechanical properties of milityrar seases. Richer-Menge, J.A., et al. [1937, p.121-153]; MP 2262 Messurement of characteristic length of findings see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2200 MP 2400 Diagnosius seconcean model. Histor, W.D. III, et al. [1937, p. 937-1015]. MP 2200 MP 2400 Diagnosius seconcean model. Histor, W.D. III, et al. [1937, p. 937-1015]. MP 2210 Medeining the electromagnetic property trends in sea ice. Part 1. Kowaca, A., et al. [1937, p. 207-215]. MP 2210 Mechanical group and subsect bathsimetry. Rosaca, A., et al. [1937, p. 207-215]. MP 2210 Mechanical group reties of milityrar sea see. Richter-Menge, J.A., et al. [1933, 278]. MP 2300 CR 87-23 Mechanical group reties of milityrar sea see. Richter-Menge, J.A., et al. [1933, 278]. MP 2300 CR 87-23 MP 2301 Authorize measurement of sea see thickness and subsec bathsymetry. Rosaca, A., et al. [1938, p. 121-136]. MP 2300 Authorize measurement of sea see thickness and subsec fact, honors, A., et al. [1938, p. 121-136]. MP 2300 MP 2300 Diagnosis, J.R. al. [1938, p. 121-136]. MP 2300 M
Application of a numerical sea ice model to the East Green-land area. Techer, W.B., [1992, 40p.) Equations for determining the gas and brine vubumes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR 82-30 Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.) On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas, E.L., et al., [1992, 2p.) Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p.] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] Comment on Water drag coefficient of first-year sea ice by M.P. Langieben. Andreas, E.L., et al., [1913, p.729-782, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilver, W.D., Ill., et al., [1913, p.237-3:287] Alaska's Beaufort Sea coast ice rede-up and pole-up features Koracs, A., [1993, 51p.] Surface meteorology US 'USSR Weddell Polynya Expedition, 1991. Andreas, E.L., et al., [1993, 33p.] Sea ice model in wind forcing fields. Tucker, W.B., [1993, 11p.] Comparison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1993, 105a.] MP 1371 Equations for determining gas and brive volumes in sea sec Cos., G.F.N., (1983, p.1034.) MP 1386 Surface regelmand Sea. Tucker, W.B., [1983, p.1034.) MP 1395 Leptinous capacition of saline ice. Cos., G.F.N., (1983, p.425-432) MP 1464 Mechanical properties of sea in the Arctic seas. Weeks, W.F., et al., [1984, p.235-259] Bellettemangietic properties of sea see. Morey, R.M., et al., [1984, p.235-259] Electromagnetic properties of sea see. Morey, R.M., et al., [1984, p.235-259]	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see same shifty, 1951-1980. Wishly, J.E., et al., [1935, p.48-7-48-65]. PPP 1882 Eastgy enchange over antasetic sea see in the sporng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see. Revisex, A., [1935, p.116-127]. MP 1889 Compressive strength of multi-year sea see. Revisex, A., [1935, p.116-127]. MP 1989 Electromagnetic properties of standaryear sea see. Morey, R.M., et al., [1985, p.151-167]. MP 1982 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1985, p.177-188]. MP 1983 Ice electrical properties. Gow, A.J., [1985, p.76-32]. MP 1980 Declective properties at 4.75 GHz of salme ice slabs. Accome, S.A., et al., [1985, p.83-84]. MP 1981 Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1985, p.79-1]. MP 1982 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.214-123]. MP 1985. Numerical simulation of sea see undured gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1985, p.2195, p.219-265]. MP 1988 Ice micleation activity of aniarctis marine microorganisms. Parker, L.V., et al., [1985, p.218-128]. MP 2217 Electromagnetic measurements of multi-year sea see using impulse radar. Kowacs, A., et al., [1985, 269]. CR 85-13 Mcchaincal properties of multi-year sea see. Fluis 2. Test crossits. Cos., G.F.N., et al., [1985, 269]. CR 85-13 Mcchaincal properties of multi-year sea see. Fluis 2. Test class. J.C., et al., [1985, p.218-11,909]. Mp 1844 Impulse radar sounding of level first-year sea see from an seebreaker. Martimison, C.R., [1985, p.218-11,909]. MP 1844 Impulse radar sounding of level first-year sea see from an seebreaker. Martimison, C.R., [1985, p.218-2]. SR 85-21 Electromagnetic measurements of sea see. London, A., et al., [1986, p.2193, p.21-102]. MP 2020 Physical properties of the sea see over a Weeks, W.F., [1986, p.21-102]. MP 2047	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2263 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2260 Measurement of characteristic length of fisating see sheets. Sodia, D.S., [1937, n.p. (Ch.7b). MP 2260 Dispositio secoscian model. Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model. Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model. Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Medeling the electromagnetic property strucks in sea sice, Part. I. Kowaca, A. et al. [1937, p. 937-1015]. MP 2260 I. Kowaca, A. et al. [1937, p. 937-105]. MP 2360 Get theckness distribution necross the Adamstic sector of the Antarctic Ocean in modelinite. Walkama, F., et al. [1937, p. 10, 153-16, 55]. MP 2360 Sea see thickness and subsoce bathsimetry. Kowaca, A., et al. [1937, 2007]. MP 2360 Mechanical properties of multi-year sea acc. Richter-Menge, J.A., et al. [1938, 7.7p]. Mechanical properties of multi-year sea acc. Richter-Menge, J.A., et al. [1938, 2.7p]. A. et al. [1938, 2.7p]. MP 2360 All thermomenation measurements of a second-petit sea see fine, Kowaca, A., et al. [1938, p. 111-1150]. MP 2360 MP 2360 MP 2361, Determine of the plantacteristic of a second-petit sea see fine, Kowaca, A., et al. [1938, p. 121-1154]. MP 2360 MP 2361, Determine of the plantacteristic of a second-petit sea see fine, Kowaca, A., et al. [1938, p. 121-1154]. MP 2361 Metalonical temperature measurements of a second-petit sea see fine, Kowaca, A., et al. [1938, p. 121-1154]. MP 2361 MP 2361 Metalonical properties of seasor seasor seasor summation of seasor seaso
Application of a numerical sea ice model to the East Green- land area. Tacker, W.B., [1992, 4963] Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1982, 1183] Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 4083] On the deferences in ablation seasons of Arctic and Astarctic sea ice. Andreas. E.L., et al., [1992, 983] CR 82-39 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 2783] Physical, chemical and biological properties of wmiter sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p. 107, 109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1982, p. 131-115] MP 1649 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1982, p. 131-115] MP 1649 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1982, p. 131-115] MP 1649 Ammerical simulation of the Weddell Sea pack ice. Hilver, W.D., III., et al., [1983, p. 2873-2887] Alsala's Beaufart Sea coast ice ride-up and pile-up features Kowacs, A., [1983, 513] Properties of Sea ice in the coastal recess of the podar occasis Weeks, W.F., et al., [1983, p. 25-41] MP 1649 Surface meteorology U.S. (USSR Weddell Polymya Expedition, 1981. Andreas, E.L., et al., [1983, J. 37) Sea ice model in wind forcing fields. Tucker, W.B., [1983, p. 1054, 1183] Ilp.; CR 83-17 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-11 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-11 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-11 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-11 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p. 103-11 Comparison of defferent sea lev	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1990. Wishly, J.E., et al., [1935, p.4347-4465]. Eactgy eachange over antactic sea see in the speng. Adeas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Sees, p. 116-127. Gempeciative strength of multi-year sea see Meery, R.M., et al., [1935, p.151-167]. Physical properties of sea see in the Greenland Sea. Meery, R.M., et al., [1935, p.151-167]. MP 1903 Ice electrical properties of Sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.177-188]. In Properties of Sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.177-188]. MP 1910 Delectric properties at 4.75 GHz of salme see slabs. Accomp. S.A., et al., [1935, p.83-84]. Labocatory studies of acoustic scattering from the underside of sea see. Terch, K.C., et al., [1935, p.87-91]. Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1935, p.214-223]. MP 1912 Pressure ridge and sea see properties Greenland Sea. MP 1931 Ice meleation activity of antactic marine memoroorgamins. Parker, L.V., et al., [1935, p.124-125]. MP 1932 Ice meleation activity of antactic marine memoroorgamins. Parker, L.V., et al., [1935, p.124-125]. Mechasical properties of multi-year sea see. Plane 2. Text results. Coa., G.F. V., et al., [1935, p.139]. CR 85-13 Mechasical properties of multi-year sea see. Plane 2. Text results. Coa., G.F. V., et al., [1935, p.139]. Redeficities of the histories frustion coefficient of sea see. Plane 2. Text results. Coa., G.F. V., et al.,	Physical properties of summer ses lice in the Fram Struct. Tocker, W.B., et al., [1937, p.8737-880]; MP 2300 Physical properties of estimative teem Great Bay, New Humpshire. Meese, D.A., et al., [1937, p.833-880]. Mechanical properties of milityrae seases. Bicker-Menge, J.A., et al., [1937, p.121-153]; MP 2231 Mechanical properties of milityrae seases. Bicker-Menge, J.A., et al., [1937, p.121-153]; MP 2240 Measurement of characteristic length of floating see sheets. Sodia, D.S., [1937, in p. (Ch.7). Diagnosis see-sease model: Hibler, W.D. III, et al., [1937, p. 937-1015]. MP 2240 Medeing the electromagnetic property strucks in sea sice, Part I. Kowaca, A., et al., [1937, p. 207-235]. MP 2230 Mechanical properties of al., [1937, p. 207-235]. MP 2230 Mechanical properties of milityrae sea see. Richter-Menge, J.A., et al., [1933, J.7]. Mechanical properties of milityrae sea see. Richter-Menge, J.A., et al., [1933, J.7]. Misha SAR facility an spoker. Weller, G., et al., [1938, p. 27-23] Authorne measurement of sea see thickness and subsee hathymitis. Am 2300 MP 2305 Pactiomagnetis measurements of sea see thickness and subsee hathymitis. Am 23, [1938, p. 211-136]. MP 2300 MP 2305 Pactiomagnetis measurements of a second-year sea see fise, konaca, A., et al., [1938, p. 211-136]. MP 2305 MP 2305 Me 2308, p. 210-210. MP 2308 Mishafeepothes passive misternase observation of salme see grown in a tank. Greekel, I.C., et al., [1938, p. 1837, p. 1837, p. 1837, p. 1837, p. 1838, p. 1837, p. 1839, p. 1837, p. 1839, p. 1837, p. 1839, p. 1837, p. 1839,
Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1992, 490,3] Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 9p.] CR 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 27p,3] Rysical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., (1992, p. 113-115) MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., (1992, p. 113-115) MP 1610 Comment on Water drag coefficient of first-pear sea ice by M.P. Langichen. Andreas. E.L., et al., [1993, p. 729-732) Alaska's Beaufort Sea coast ice ride-up and pole-up features. Novaes, A., (1993, 51p.) Properties of sea ice in the coastal recess of the polar occass Weeks, W.F., et al., [1993, p. 25-41] Surface medictin wind forcing fields. Tucker, W.B., [1983, 119, 119] Sea ice model in wind forcing fields. Tucker, W.B., [1983, 1034, 1034] Beautons for determining gas and brose volumes in sea see Cot., G.F.N., et al., [1983, p. 206-316] MP 1737 Equations for determining gas and brose volumes in sea see Cot., G.F.N., et al., [1983, p. 206-316] MP 1736 Surface coughness of Ross Sea pack see. Govon, J.W., et al., [1983, p. 123-124] Mechanical properties of see in the Arctic seas. Weeks, W.F., et al., [1983, p. 206-316] MP 1736 Surface coughness of Ross Sea pack see. Govon, J.W., et al., (1984, 32p.) West antarctic sea see. Ackley, S.F., [1984, p. 88-82.] West antarctic sea see. Ackley, S.F., [1984, p. 88-82.] West antarctic sea see. Ackley, S.F., [1984, p. 88-82.]	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Wishly, J.E., et al., [1935, p.48-7. 4865] Energy enchange over antactic sea see in the spong. Anderss, E.L., et al., [1935, p.7199-7212] MP 1889 Compressive strength of mini-year sea see. Kovack, A., [1935, p.116-127] MP 1899 Compressive strength of mini-year sea see. Morey, MP 1891 Electromagnetic properties of molito-year sea see. Morey, R.M., et al., [1935, p.151-167] MP 1902 Physical properties of sea see in the Greenland Sea. Tricker, W.B., et al., [1935, p.151-167] MP 1903 Red Ecetrical properties. Gom, A.J., [1935, p.76-32], MP 1910 Dielectric properties at 4.75 GHz of salme ice slabs. Accome. SA., et al., [1935, p.33-36] Dielectric properties at 4.75 GHz of salme ice slabs. Accome. SA., et al., [1935, p.33-36] Laboratory studies of acoustic scattering from the underside of sea see. Jerek, K.C., et al., [1935, p.37-91] Pressure ridge and sea see properties Greenland Sea. Tricker, W.B., et al., [1935, p.214-22] NP 1912 Pressure ridge and sea see properties Greenland Sea. Tricker, W.B., et al., [1935, p.214-22] NP 1912 Pressure ridge and sea see properties Greenland Sea. Tricker, W.B., et al., [1935, p.214-22] NP 1912 Pressure ridge and sea see properties Greenland Sea. MP 1938 Ice michatisma activity of antactis, marine innerosamium, Pather, L.V., et al., [1935, p.124-125] MC patheric incasurements of molity-year sea see using impute radar. Kovaca, A., et al., [1935, 267] Reckanical properties of molity-year sea see. Tam., et al., [1935, al., p. 21-21-21] Reck of platite see interaction in marignal see zone dynamius. Lepykania, M., et al., [1935, p. p. 11, 394-11, 2009] MP 1544 Impute cadar sounding of level first-year sea see from an sechecial of Maritimon, C.R., [1935, p. p. 38, 85-1] Electromagnetic measurements of sea see. Novaca, A., et al., [1936, p. 97-105] Physical properties of the sea see cover. Merks. W. J., [1936, p. 97-105] We dedell-Scotus Sea MI/, O	Physical properties of summer ses lice in the Fram Struct. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of ententine teem Great Ray, New Humpshire. Meese, D.A., et al. [1937, p.833-680]. Mechanical properties of milityrar seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2231 Mechanical properties of milityrar seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2248 Measurement of characteristic length of finding see sheets. Softa, D.S., [1937, in.p. (Ch.7)]. MP 2300 Dargonius necoscian model. Hilber, W.D. III, et al. [1937, p. 937-1015]. MP 2300 Medding the electromagnesis property trends in sea lice, Part 1. Konses, A., et al. [1937, p. 207-215]. MP 2330 Ice theckness distribution serious the Admine sector of the Antacetic Ocean in modesinite. Walkami, P., et al. [1937, p. 16,535-14,552]. MP 2330 Ice theckness distribution serious the Admine sector of the Antacetic Ocean in modesinite. Walkami, P., et al. [1937, p. 16,531-14,55]. MP 2340 Ice theckness distribution serious the Admine sector of the Antacetic Ocean in modesinite. Walkami, P., et al. [1937, p. 16,531-15]. MP 2340 Ice theckness distribution serious the action. Richter-Menge, J.A., et al. [1933, J.7]. CR 88-65 Islain S.A.R. facility as suplite. Weller, G., et al. [1938, p. 27-31]. MP 2300 Islain S.A.R. facility as suplitie. Weller, G., et al. [1938, p. 27-31]. MP 2300 MP 2301 Bectifemagnetic measurements of sea see theckness and subsec bathymer. Johnson, J.R., [1933, p. 15,56]. MP 2305 Ice stress measurements around offshore structures. Johnson, J.R., [1933, p. 15,56]. MP 2305 Institute of the phistic properties of sea see. Tocker, W.R., [1938, p. 13,56]. MP 2305 Person in a tank. Geresled, T.C., et al. [1938, p. 1837, 1839]. Confined compensor is strength of multi-seat pressure ridge sea see sea s
Application of a numerical sea ice model to the East Green-land area. Techer, W.R., [1992, 40p.) Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 11p.] CR. 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 40p.) On the differences in ablation seasons of Arctic and Anteretic sea ice. Andreas, E.L., et al., [1992, pp.) CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Physical, chemical and biological properties of water sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109] Atmospheric boundary layer measurements in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas, E.L., [1992, p.113-115] Comment on Water drag coefficient of first-year sea ice by M.P. Langicken. Andreas, E.L., et al., [1913.], p.729-782.) MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilber, W.D., Ill., et al., [1993, p.251-3287] Alaska's Branfart Sea coast ice ride-up and pile-up features Kowaci, A., [1993, 51p.] Properties of sea ice in the coastal recess of the polar occases Weeks, W.F., et al., [1993, p.25-41] Surface meteorology US: USSR Weddell Polynya Expedition, 1991. Andreas, E.L., et al., [1993, 33-4] Mechanical behavior of sea ice. Mellor, M., [1993, 105p.] Comparison of different sea level pressure analysis fields in the East Greenland Sea. Turker, W.B., [1993, p.1034.] 1083 Surface model in wind forcing fields. Tucker, W.B., [1993, p.1034.] 1084 Surface roughness of Ross Sea pack ice. Govorn, J.W., et al., [1994, p.23-25-29] Hermal expansion of saline ice. Cox., G.F.N., [1995, p.425-432] MP 1746 Mechanical properties of see in the Arctic seas. Weeks, W.F., et al., [1994, p.23-25-29] West antarctic sea ice. Ackley, S.F., [1984, p.82-85, MP 1786	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1990. Wishly, J.E., et al., [1935, p.48-7.48-85]. Eactgy exchange over antactic sea see in the speng. Andreas, E.L., et al., [1985, p.7199-7212]. MP 1889 Comprensive strength of multi-year sea see. Reseax, A., [1935, p.118-127]. MP 1899 Comprensive strength of multi-year sea see. Reseax, A., [1935, p.118-127]. MP 1991 Electromagnetic properties of multi-year sea see. Morey., R.M., et al., [1995, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1995, p.177-188]. MP 1993 Ice electrical properties. Gow, A.J., [1985, p.76-82]. MP 1910 Declective properties at 4.75 GHz of salme ice slabs. Account, S.A., et al., [1985, p.83-84]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerck, K.C., et al., [1985, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al., [1985, p.181-127]. MP 1912 Numerical simulation of sea see induced goinges on the shelicus of the podar occans. Weeks, W.F., et al., [1985, p.259-256]. MP 1938 Ice micleation activity of antacetis manne microorgamins. Parker, L.V., et al., [1985, p.159-125]. MP 217 Electromagnetic measurements of multi-year sea see ming impulse radar. Kowacs, A., et al., [1985, 25p.]. CR. 85-13 Mechanical properties of multi-year sea see. Plans 2. Test results. Cost, G.F.N., et al., [1985, 51p.]. CR. 85-13 Mechanical properties of multi-year sea see. Plans 2. Test results. Cost, G.F.N., et al., [1985, p.11, 209-1]. NP 1944 Impulse radar sounding of level first-year sea see. Form an seebreaker. Martinison, CR., [1985, p.21]. NR 85-21 Red edictionagnetic measurements of sea see. Lonacs, A. et al., [1985, p.20, 1926.]. NP 1940, p. 12-10.] Physical properties of the sea see cover. Weeks, W. p., [1986, p. 12-10.] Physical properties of the sea see cover. Weeks, W. p., [1986, p. 12-10.] NP 1940. NR 20-20 Physical properties of the sea see c	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860]. MP 2251 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2261 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-157]. MP 2260 Measurement of characteristic length of financing see sheets. Sodia, D.S., [1937, in.p. (Ch.7b). MP 2260 Dispositio secoscian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2260 Dispositio secoscian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2260 Ice theckness destribution necessis the Adiastic sector of the Aniactic Ocean in modesinier. Walking, P., et al., [1937, p. 15, 15, 12, 15]. MP 2260 Sea see this clinics and subsect baths metry. Roster, A., et al., [1937, p. 15, 15, 12, 12]. MP 2360 United Society of the sease this clinics and subsect fields and subsect of the Aniactic properties of multi-year sea as a fluider bathsymphy. Roster, A., et al., [1938, p. 111-120]. MP 2360 Partition angularishased miscoprocessing system. Personch, D. A., et al., [1933, p. 245-252]. MP 2365 United compressions as season of the best stimulation of an all the season. J.B., [1933, p. 15, 15]. MP 2365 Ministreporties passive miscomists observation of salme see grown in a tank. Greekel, T.C., et al., [1938, p. 1837, 1369]. MP 2369 Confined compressive strength of multi-seas resource researce grown in a tank. Greekel, T.C., et al., [1938, p. 1837, 1369]. MP 2369 Confined compressive strength of multi-seas season. Tenter, W.B., [1938, p. 123, p. 12
Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1992, 490,3] Equations for determining the gas and brine volumes in sea ice samples. Cox. G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs. A., et al., [1992, 400,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 29,3] CR 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 270,3] Physical, chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p. 107-109] Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., (1992, p. 113-115) MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., (1992, p. 113-115) MP 1610 Comment on Water drag coefficient of first-year sea ice by M.P. Langichen. Andreas. E.L., et al., [1993, p. 729-729, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Illi, et al., [1993, p. 23-72-2387] MP 1592 Alaska's Beaufest Sea coast ice ride-up and pole-up features Kowaca, A., (1993, 5.15); Properties of sea ice in the coastal roces of the polar occasis Weeks, W.F., et al., [1993, p. 25-41] MP 1600 Surface meteorology US 'USSR Weddell Polynya Expedition, 1981. Andreas, E.L., et al., [1993, J. 25-1] Mechanical behavior of sea ice. Mellor, M., [1993, 1054, 118); Cm 83-110 Cm 83-117 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1931, 1054, 1069, 119] Ly C.R. 83-117 Comparison of defferent sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1931, 1054, 1069, 119] MP 1737 Equations for determining gas and brine volumes in sea see. Cox., G.F.N., et al., [1934, p. 25-51] MP 1748 MP 1749 Boutace coughness of Ross Sea pack ice. Gov. G.F.N., et al., [1932, p. 103-114] Mechanical properties of ice in the Arctic seas. Week, W.F., et al., [1934, p. 25-259] West antarctic sea ice. Ackl	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1990. Wishly, J.E., et al., [1935, p.48-45]. Eactgy eachange over antacctic sea see in the speng. Adeas, E.L., et al., [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Kersex, A., [1935, p.116-127]. Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1935, p.151-167]. Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.151-167]. MP 1903 Ice electrical properties of Sea see in the Greenland Sea. Tucker, W.R., et al., [1935, p.177-188]. Declective properties at 4.75 GHz of salme see slabs. Account, S.A., et al., [1935, p.83-84]. Declective properties at 4.75 GHz of salme see slabs. Account, S.A., et al., [1935, p.83-84]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al., [1935, p.37-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.B., et al., [1935, p.214-223]. MP 1913 Numerical simulation of sea see induced gonges on the shelves of the podar oceans. Weeks, W.F., et al., [1935, p.23-26]. MP 1930 Ice mideation activity of antacetic manne microorgamins. Parker, L.V., et al., [1935, p. 124-125]. Mcchanical properties of milito-year sea see. Plane 2. Test results. Coa., G.F.N., et al., [1935, 379]. CR 85-13 Mcchanical properties of milito-year sea see. Plane 2. Test results. Coa., G.F.N., et al., [1935, 379]. Red of plastic see interaction in mangmals see root enamies Lepokania, M., et al., [1935, p. 11, 139-11, 1905]. Impute cadar sounding of level first-year sea see from an sechecaler. Martimion, C.R., [1935, 97]. NIP 280 Physical properties of the sea see cover. Weeks, W.F., [1936, p. 17-107]. Wedded:Scotus Sea MIZ, October 1934. Craser, F.D., et al., [1936, p. 17-107]. MP 1534 Crystal structure of Fram Strait sea see. Good. A.J., et al., [1936, p. 170-221].	Physical properties of summer ses lice in the Fram Serie. Tocker, W.B., et al., [1937, p.8737-880]; MP 2300 Physical properties of ententine teem Great Ray, New Humpshire. Meese, D.A., et al., [1937, p.833-880]. MP 2251 Mechanical properties of milityrat scauce. Richer-Menge, J.A., et al., [1937, p.121-153]. MP 2251 Mechanical properties of milityrat scauce. Richer-Menge, J.A., et al., [1937, p.121-153]. MP 2261 Measurement of characteristic length of findings see sheets. Sodia, D.S., [1937, in p. (Ch.7). MP 2200 Diagnosis see-sceam model. Hibler, W.D. III, et al., [1937, p. 97-1015]. MP 2210 Medicing the electromagnetic property strends in sea ice. Part 1. Kowaca, A., et al., [1937, p. 207-235]. MP 2230 Rechanical properties of military trends in sea ice. Part 1. Kowaca, A., et al., [1937, p. 207-235]. MP 2230 Rechanical properties of military as an electromagnetic respective of military as an electromagnetic properties of military as an electromagnetic properties of military as an explain. Research, A., et al., [1933, 173]. MP 2300 Authorize measurement of sea see thickness and subsec backgreat. G., et al., [1938, p. 213-214]. MP 2300 Authorize measurement of sea see thickness and subsec backgreat. Romaca, A., et al., [1938, p. 213-135]. MP 2300 Professor, B. p. [1933, p. 213-235]. MP 2305 Professor, B. p. [1933, p. 213-235]. MP 2305 Rectain an analysis of a second-year sea see fine. Romaca, A., et al., [1938, p. 213-235]. MP 2305 Professor, B. p. [1933, p. 213-235]. MP 2305 Professor may a tank. Greened, T.C., et al., [1938, p. 233-235]. MP 2305 Professor properties of season. Tocker, W.R., [1933, p. 233-235]. MP 2305 Professor properties of sundenimed first season extracted sea see ground as a tank. Greened, T.C., et al., [1938, p. 1335]. Professor, B. p. [1933, p. 233-235]. MP 2305 Professor properties of sundenimed first season extracted sea see ground as tank. Greened, T.C., et al., [1933, p. 1335]. Professor properties of sundenimed first season. Rukher-Menge, 18, [1938, p. 1345]. Professor properties o
Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1992, 490,3] Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 400,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 90,4] CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 270,3] Physical chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109,4] Almospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, p.113-115,4] Comment on Water drag coefficient of first-pear sea ice by M.P. Langieben. Andreas, E.L., et al., [1993, p.729-732, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill., et al., [1993, p.129-123, MP 1597 Alaska's Beaufert Sea coast ice ride-up and pole-up features. Koracs, A., [1993, p.129-123, MP 1597 Properties of sea ice in the coastal renes of the polar occass Weeks, W.F., et al., [1993, p.25-41, MP 1504 Surface meteorology U.S. (USSR Weddell Polymya Expediction, 1991. Andreas, E.L., et al., [1993, 1973. SR 83-14 Mechanical behavior of sea ice. Mellor, M., [1933, 1053, MP 1504] Sea ice model in wind forcing fields. Tucker, W.B., [1933, 1153, 1153] Equations for determining gas and brive volumes in sea ice. Cot., G.F. N., et al., [1933, p.106-116], MP 1737 Equations for determining gas and brive volumes in sea ice. Cot., G.F. N., et al., [1933, p.106-116], MP 1737 Equations for determining gas and brive volumes in sea ice. Cot., G.F. N., et al., [1934, p.1034, MP 1744, Mechanical properties of saline ice. Cot., G.F. N., [1933, p.1034, p.1034	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Wishly, J.E., et al., [1935, p.48-7.4865]. 21P 1882 Eacrge eachange over antactic sea see in the speng. Andreas, E.L., et al., [1935, p.7199-7212]. MP 1889 Compressive strength of mini-year sea see Keracs, A., [1935, p.116-127]. MP 1899 Compressive strength of mini-year sea see Keracs, A., [1935, p.116-127]. MP 1902 Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1935, p.151-167]. MP 1902 Physical properties of sea see in the Greenland Sea. Tracker, W.R., et al., [1935, p.151-167]. MP 1903 Ice electrical properties. Gow, A.J., [1935, p.76-32]. MP 1910 Dielectine properties at 4.75 GHz of salme sice slabs. Accome. SA., et al., [1935, p.31-36]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerck, K.C., et al., [1935, p.73-31]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tracker, W.R., et al., [1935, p.214-123]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tracker, W.R., et al., [1935, p.214-123]. MP 1935 Numerical simulation of sea see induced gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.215-25]. MP 1938 Ice michasion activity of antacetic marine microorganiums. Parker, L.V., et al., [1935, p.126-125]. MP 1938 Ice michasion activity of antacetic marine microorganiums. Parker, L.V., et al., [1935, p.126-125]. MP 1938 Ice michasion activity of antacetic marine microorganiums. Parker, L.V., et al., [1935, p.13-125]. MP 2217 Electromagnetic measurements of midi-year sea see. Plane 2. Ten. et al., [1935, p.13, p.15,	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-680]. MP 2251 Mechanical properties of multi-year seaser. Richer-Meage, J.A., et al. [1937, p.121-153]. MP 2252 Mechanical properties of multi-year seaser. Richer-Meage, J.A., et al. [1937, p.121-153]. MP 2260 Measurement of characteristic length of financing see steets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2260 Dispositio secoscian model. Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Medeling the electromagnetic property strude in sea ice, Part. T. Kowaca, A. et al. [1937, p. 937-215]. MP 2260 (et theckness distribution across the Adiantic sector of the Antactic Ocean in moleuniter. Walkami, F., et al. [1937, 470]. CR 37-23 MP 2360 (et theckness distribution across the Adiantic sector of the Antactic Ocean in moleuniter. Walkami, F., et al. [1937, 470]. CR 37-23 MP 2360 (et al. [1931, 173]). CR 37-23 MP 2360 (et al. [1931, 173]). MP 2360 Mechanical properties of multi-year sea see. Richter-Meage, J.A., et al. [1933, 173]. MP 2360 MP 2360 MP 2361 MP 2360
Application of a numerical sea ice model to the East Green- land area. Techer, W.B., [1992, 36p.) Equations for determining the gas and brine vubunes in sea ice samples. Cox. G.F.N., et al., [1982, 11p.] CR. 82-30 Bering Strant sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1982, 40p.] On the differences in ablation seasons of Arctic and Astretic sea ice. Andreas. E.L., et al., [1982, 9p.] CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1982, 27p.] Physical, chemical and biological properties of wmiter sea ice in the Weddell Sea. Clarke, D.B., et al., [1982, p.107.] MP 1609 Atmospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1982, p.113-115] Comment on "Water drag coefficient of first-year sea ice' by M.P. Langichen. Andreas, E.L., et al., [1931, p.729-78.] MP 1577 Numerical simulation of the Weddell Sea pack ice. Hilbert, W.D., III., et al., [1983, p.2873-2887] Alaska's Beaufart Sea coast ice ride-up and pile-up features Kowacs, A., [1983, 51p.] Properties of sea ice in the coastal recess of the polar occasis Weeks, W.F., et al., [1983, p.25-41] MP 1604 Surface meteorology U.S. (USSR Weddell Polyma Expedition, 1981. Andreas, E.L., et al., [1983, J.73). S.R 83-11 Mechanical behavior of sea ice. Mellor, M., [1983, 1054, 11p.] Comparison of different sea level pressure analysis fields in the East Greenland Sea. Tucker, W.B., [1983, p.1034, 1008] Sea ice model in wind forcing fields. Tucker, W.B., [1983, p.1034, 1008] Sea ice model in wind forcing fields. Tucker, W.B., [1983, p.1034, 1008] Sea ice model in pure of sea ice. Mellor, M., [1983, p.1034, 1008] Sea ice model in pure of sea ice. Mellor, M., [1983, p.1034, 1008] Sea ice model in pure of sea ice. Mellor, M., [1983, p.1034, 1008] Sea ice model in pure of sea ice. Mellor, M., [1983, p.1034, 1008] Sea ice model in pure of sea ice. Mellor, M., [1983, p.1034, 1008] Sea ice model in pure of sea ice. Mellor, M., [1983, p.1034, 1008] Sea ice model in pure of sea ice. M	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1990. Wishly, J.E., et al. [1935, p.48-45]. Eactgy exchange over antactic sea see in the speng. Andreas, E.L., et al. [1985, p.7199-7212]. MP 1889 Compressive strength of multi-year sea see Sees, A. [1935, p.116-127]. MP 1899 Compressive strength of multi-year sea see Mercy, R.M., et al. [1955, p.151-167]. MP 1991 Electromagnetic properties of multi-year sea see Mercy, R.M., et al. [1955, p.151-167]. MP 1992 Physical properties of sea see in the Greenland Sea. Tucker, W.R., et al. [1995, p.177-188]. MP 1993 Ice electrical properties of Sen, A.J., [1985, p.76-52]. MP 1910 Declettre properties at 4.75 GHz of salme ice slabs. Accomp. S.A., et al. [1985, p.83-84]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerch, K.C., et al. [1985, p.87-91]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tucker, W.R., et al. [1985, p.214-223]. MP 1912 Numerical sumulation of sea see induced gonges on the shelves of the podar occam. Weeks, W.F., et al. [1985, p.239. 256]. MP 1930 Ice mideation activity of antacetic marine microorgamins. Parker, L.V., et al. [1985, p.124-125]. MP 1931 Ice mideation activity of antacetic marine microorgamins parker, L.V., et al. [1985, p.124-125]. MP 2217 Electromagnetic measurements of multi-year sea see ming impulse radar. Kowaci, A., et al. [1985, 259]. CR 85-13 Mechanical properties of multi-year sea see. Plane 2. Text results. Coa. (6 F.N., et al. [1985, 259]. CR 85-13 Mechanical properties of the sea see. Cover. Plane 2. Text results. Coa. (6 F.N., et al. [1985, 259]. MP 1934 Impulse radar sounding of level finit-year sea see from an seebreaker. Martinison, C.R., [1984, 97]. SR 85-21 Electromagnetic measurements of sea see. Lonac, A., et al., [1986, p.20-29]. MP 1934 Impulse radar sounding of level finit-year sea see from an seebreaker. Martinison, C.R., [1984, 97]. SR 85-21 Electromagnetic measurements of sea see	Physical properties of summer ses ice in the Fram Struct. Torker, W.B., et al. [1937, p.6737-6807]. MP 2300 Physical properties of estimates teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-860]. MP 2351 Mechanical properties of multi-year seaser. Richer-Menge, J.A., et al. [1937, p.121-153]. MP 2360 MP 2360 Measurement of characteristic length of finding see sheets. Sodia, D.S., [1937, n.p. (Ch.7b). MP 2360 Dispositio seconcian model. Hibber, W.D., Ill., et al. [1937, p. 937-1015]. MP 2360 Modeling the electromagnetic property strude in sea ice, Part. 1. Konney, A., et al. [1937, p. 937-205]. MP 2380 Mechanics distribution nerous the Adiastic sector of the Antactic Organ in modesinier. Wadhams, P., et al., [1937, p. 157-154]. MP 2360 Ice thickness distribution nerous the Adiastic sector of the Antactic Organ in modesinier. Wadhams, P., et al., [1937, p. 157-154]. MP 2360 Ice thickness distribution nerous the Adiastic sector of the Antactic Organ in modesinier. Wadhams, P., et al., [1937, p. 157-154]. MP 2360 Mechanic properties of multi-year sea are. Richer-Menge, J.A., et al., [1938, 2.7p.]. CR 80-05 Units SAR facility an systim. Weller, G., et al., [1938, p. 27-23]. MP 2360 MP 2360 Mr. et al., [1938, p. 121-1154]. MP 2360 Mr. computer-based smage-processing system. Dis., et al., [1938, p. 121-1154]. MP 2360 Mr. computer-based smage-processing system. Personch, D. k., et al., [1938, p. 121-1154]. MP 2360 Mr. (1938, p. 15-154). MP 2360 Mr. (1938,
Application of a numerical sea ice model to the East Greenland area. Tucker, W.B., [1992, 490,3] Equations for determining the gas and brine volumes in sea ice samples. Cos., G.F.N., et al., [1992, 119,3] Bering Strast sea ice and the Fairway Rock icefoot. Koracs, A., et al., [1992, 400,3] On the differences in ablation seasons of Arctic and Antarctic sea ice. Andreas. E.L., et al., [1992, 90,4] CR. 82-30 Physical properties of the ice cover of the Greenland Sea Weeks, W.F., [1992, 270,3] Physical chemical and biological properties of winter sea ice in the Weddell Sea. Clarke, D.B., et al., [1992, p.107-109,4] Almospheric boundary layer measurements in the Weddell Sea. Andreas. E.L., [1992, p.113-115,4] Comment on Water drag coefficient of first-pear sea ice by M.P. Langieben. Andreas, E.L., et al., [1993, p.729-732, MP 1577 Numerical simulation of the Weddell Sea pack ice. Hibber, W.D., Ill., et al., [1993, p.129-123, MP 1597 Alaska's Beaufert Sea coast ice ride-up and pole-up features. Koracs, A., [1993, p.129-123, MP 1597 Properties of sea ice in the coastal renes of the polar occass Weeks, W.F., et al., [1993, p.25-41, MP 1504 Surface meteorology U.S. (USSR Weddell Polymya Expediction, 1991. Andreas, E.L., et al., [1993, 1973. SR 83-14 Mechanical behavior of sea ice. Mellor, M., [1933, 1053, MP 1504] Sea ice model in wind forcing fields. Tucker, W.B., [1933, 1153, 1153] Equations for determining gas and brive volumes in sea ice. Cot., G.F. N., et al., [1933, p.106-116], MP 1737 Equations for determining gas and brive volumes in sea ice. Cot., G.F. N., et al., [1933, p.106-116], MP 1737 Equations for determining gas and brive volumes in sea ice. Cot., G.F. N., et al., [1934, p.1034, MP 1744, Mechanical properties of saline ice. Cot., G.F. N., [1933, p.1034, p.1034	Hiller, W.D., III. [1935, 50p.] CR. 85-85 Numerical sumulation of Noethern Hemisphere sea see variability. 1951-1980. Wishly, J.E., et al., [1935, p.48-7.4865]. 21P 1882 Eacrge eachange over antactic sea see in the speng. Andreas, E.L., et al., [1935, p.7199-7212]. MP 1889 Compressive strength of mini-year sea see Keracs, A., [1935, p.116-127]. MP 1899 Compressive strength of mini-year sea see Keracs, A., [1935, p.116-127]. MP 1902 Electromagnetic properties of multi-year sea see Morey, R.M., et al., [1935, p.151-167]. MP 1902 Physical properties of sea see in the Greenland Sea. Tracker, W.R., et al., [1935, p.151-167]. MP 1903 Ice electrical properties. Gow, A.J., [1935, p.76-32]. MP 1910 Dielectine properties at 4.75 GHz of salme sice slabs. Accome. SA., et al., [1935, p.31-36]. MP 1911 Laboratory studies of acoustic scattering from the underside of sea see. Jerck, K.C., et al., [1935, p.73-31]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tracker, W.R., et al., [1935, p.214-123]. MP 1912 Pressure ridge and sea see properties Greenland Sea. Tracker, W.R., et al., [1935, p.214-123]. MP 1935 Numerical simulation of sea see induced gonges on the shelves of the polar oceans. Weeks, W.F., et al., [1935, p.215-25]. MP 1938 Ice michasion activity of antacetic marine microorganiums. Parker, L.V., et al., [1935, p.126-125]. MP 1938 Ice michasion activity of antacetic marine microorganiums. Parker, L.V., et al., [1935, p.126-125]. MP 1938 Ice michasion activity of antacetic marine microorganiums. Parker, L.V., et al., [1935, p.13-125]. MP 2217 Electromagnetic measurements of midi-year sea see. Plane 2. Ten. et al., [1935, p.13, p.15,	Physical properties of summer ses ice in the Fram Struct. Tocker, W.B., et al. [1937, p.6737-6803]. MP 2300 Physical properties of ententine teem Great Ray, New Hampshire. Meese, D.A., et al. [1937, p.833-680]. MP 2251 Mechanical properties of multi-year seaser. Richer-Meage, J.A., et al. [1937, p.121-153]. MP 2252 Mechanical properties of multi-year seaser. Richer-Meage, J.A., et al. [1937, p.121-153]. MP 2260 Measurement of characteristic length of financing see steets. Sodia, D.S., [1937, n.p. (Ch.7)]. MP 2260 Dispositio secoscian model. Hibber, W.D. III, et al. [1937, p. 937-1015]. MP 2260 Medeling the electromagnetic property strude in sea ice, Part. T. Kowaca, A. et al. [1937, p. 937-215]. MP 2260 (et theckness distribution across the Adiantic sector of the Antactic Ocean in moleuniter. Walkami, F., et al. [1937, 470]. CR 37-23 MP 2360 (et theckness distribution across the Adiantic sector of the Antactic Ocean in moleuniter. Walkami, F., et al. [1937, 470]. CR 37-23 MP 2360 (et al. [1931, 173]). CR 37-23 MP 2360 (et al. [1931, 173]). MP 2360 Mechanical properties of multi-year sea see. Richter-Meage, J.A., et al. [1933, 173]. MP 2360 MP 2360 MP 2361 MP 2360

Son ice ridging in the Ross Sen, Autoretica, as compared with sites in the Arctic. Weeks, W.F., et al., (1909, p.4944-	Problems of the seasonal sea ice zone. Weeks, T.F., (1984, p.1-35). MP 1293	Shortwee distinct and open water in models of ore ison deepy. Provides, D.S., et al., 1990, p.242-799,
4105 ₁ MP 2410	Cheen-diagellata from the Nesdell Sea, suntract 1977,	Mr 2799
Chemical and structural properties of sea ice in the southers Benefict Sea. Mosse, D.A., (1999, 294p.) MP 2656	Buck, K.R., (1960, 26p.) (TR 89-16	Ven fer in the poles regions. Gam, A.L. et al., (1993), 0.47- 1221 MP 2750
Lider detection of lends in Arctic sea icc. Schnell, R.C., et	Review of sea-ice weather relationships in the Synthesis Hen- isphere. Acting, S.F., (1981, 2.127-15%) MP 1434	Sex level
al. (1909, p.530-532) MP 2602	for distribution and water surface developed. Rechernik	Grading's great emotion problem. Weerstee, 1, 1974, 200-204.
Elimic properties of fraul ice from the Woldell Sea, Astacc- tica. Lange, M.A., et al., (1909, p.206-217)	Boy, Alaska Gatta, L.W., (1901, p.995-1061) M7-1442	(1974), filtsiller Comparison of different sen beref presoure start as fields in
MP 2630	Air-ice-uceza interaction in Arctic morginal ice zones. Wat- hours, P., ed. (1981, 2003) SR 21-13	the East Greenland Sen. Turker, W.R., 21943, p.1844-
Compressive strength of naturenc frazil ice. Richter-Menge, J.A., et al., §1909, p.269-278; MP 2621	hams, P., ed. (1981, 20p.) SR 21-17 Summer conditions in the Frathier Day area, 1973-75 Cro.	See spray
Airborne sea ice thickness sounding. Kovacs, A., et al., (1909, p.1042-1052). MP 2623	GEN_cal_(1981, p.799-906) M7 7/37	ke morema sa ikipi. Itogadi, K., (1977, Ila.;
[1909, p.1042-1052] MP 2623 Roder beckscemering from artificially grown see icc. Rec-	Application of a memorical station modes to the Cost Green- land area. Tacket, W.S., (1981, 10%). MP 1835	Assessment of the represent on efficienc states over Mark.
dow, J., et al. (1909, p.259-264) MP 2667	Dynamics of neucobore ice. Novem, A. et al. (1991).	LD_(1754, 125); SR 54-64
Two-stream multilayer, spectral radiative transfer model for sen ice. Perovich, D.K., (1909, 17p.) CR 89-15	p. 125-135; MF 1999 for distribution and winter accep circulation, Kachelash Myr.	Measurement of iring on old hor structures. Mink, L.D., 1985, p 207-292; SP 2016
Printer microwave in site observations of winter Weddell Sea	Albita Gaza, L.W., (1991), 47-73 CR 87-22	See april frite a review a resent mater. Action, S.F.,
ice. Comito, J.C., et al., (1909, p. 10,091-10,105) MP 2655	Modeling pressure ridge leveleys so the dissely that selections, W.D. III, (1912, p.141-155). We 1990	(1966, p.2.5%-262) MP 2163 Thermal and size contains at sea spray draptets. Arthurs,
Year of Bones ratios over the french Benefort Sea. Andreas, E.L., (1909, p. 12,721-12,724; MP 2508	lee growth and executions in Natherina Bay, Alexa Day,	EL_(1799, 17p.) CR 29-11
E.L., (1909), p. 12.721-12.724; MP 2908 Effect of ice pressure on marginal see zone dynamics. Figs.	S.F., (1992, p.(C)1-(C)); MP 1561 loc-distribution and water cutofficing, Eucheman 2(1), Abuka	Time more and for the environment and the Right Conferm Au- dense, Ed., 1948, 4,147-159, 34P 2515
G.M., et al., [1989, p.514-521] MP 2522	Gatta, L.W., (1982, p.421-435) 34P 1949	Ses water
Oceanic hose than in the Front Surait measured by a drifting busy. Perovick, D.K., et al. (1909, p.995-996)	Modeling Suctionises of arctic sea Sec. Histor, 70 D. (7), to al. (1902, p.1514-152); MP 1579	Estimographic Alexa of Alexa Kathuri, CW., et al., 1978, 959.3 MP 1200
MP 2531	Charmanisms of pack we programes us the Worldell Sea.	Geochemistry of seitnes permutent at President Stay, Alman
Concurrent remote sensing of arctic sea ice from submarine and nirerals. Wadhans, P., et al., (1909, 20p.)	Acides, S.F., et 2', (1982, p.163-104) MP 1409 Sea for state decay the Woldell Sea Expedition. Acides,	Page F.W., et al. 1978, 1964 Since Can be the normal. Using sea the to secretary turbed heat Can be the normal.
MP 2097	SF_ct at (198), 6p. + 59%; SR 83-2	Million M.G. of 2, 1942, p. 271-2674 MP 1931
Chemical and structural properties of sea ice in the southern Benefiet Sen. Messe, D.A., §1909, §34p.; CR 09-25	lee properties in the Greenland and Escentishers Areas suits men. Overproed, S., et al. (198), p.142-(164)	Francisco el esperistre del sel fores lo sesenter spille, Ala- la: France C.L., et al. (1991, 1994) CR 83-24
Estimating sea ice thickness using data from impulse rathe	MP 2MI	Merchant respect to the same temperature and
soundings. Kornes, A., et al. (1999, 103.) CR 99-22. High frequency accounted properties of soline ice. Serial,	Season on the Nation Sound and adjacent dense Sea court. Korana, A., (1913), 7454-464; MP 1499	usay Samme P.V., est print pi 10-114. MP 2167
R.C., et al. (1909, p.9-25) MP 2606	See and shape of our diverse the Ballot des as opening. The	Chemic ban for in the Fren Strait manufact by a disting
Sea ice thickness measurement. Kovaca, A., et al. 4:747, p.394-424; MP 2003	parama, M., (1983, p.12), 134; NP 2641	Down Francia, D.L. of all 1889, p. 675-696, MP 1811
Development of an airborne sea ice thickness measurement	Conduct periodesics production in scenarized water	Occasio best ties in the Fram State measured by a differen
nystem and field test results. Kovacs, A., et al. (1929) 47p.; CR 89-19	Searchese SAR and service a prices report. Write, W.C.	hasp. Personals D.K., et al. gistin, p.191-299; 569-2100
Field studies of brackish ice to compare with sateliste data.	(1993, p.113-115; MP 2225 Autorise viz ise mistro vie nigastres. Greno, I C., et al.	Sea water Recision
Works, W.F., et al., (1909, p.1318-1333) MP 2763 Measurement of sen ice thickness using electrosungactic in-	[1994 ± 642-672] MP 1644	Server as for policerpies. Give, A.J., et al. 1990, p.45- 103; MP 2020
duction. Holladoy, J.S., et al., (1990), p.309-315;	Modeling the marginal acc more. Hilbert, W.G., El., ed., (1994, 1993)	5-plag
MP 2590 Physical properties of brackish ice, Boy of Botham. Weeks,	Large-scale ice/seem model for the marginal tre year. The	Wantervoor federstoom post Lange. Middlewels, E.J., et al., 1878, 1864.
W.F., et al. (1990, p.5-15; MP 2725	tier, W. J., III, et al., 1994, p. 1-7; JP 1778 De the delay and service of the ire cover in the some my MIZ.	SEASONAL PREEZE THAW
Physical properties of sea ice from the Webbell Sea. Elector, 11., et al., g1990, p.21-32; MP 2727	M的标题从中244个1525 XP 1786	Foundations of vicaculars in call repose. Sugge, F.J.,
Chemical and structural properties of sea ice in the souther-	Desgrowith the American period and Application	(154): 71p.; M 113-C6 Separat (page than
Besselert Sex. Meese, D.A., (1990, p.32-35) MP 2728	Mechanism for the chairing mitrauspeaker see. Low	Restrict problems. Burg. P.M., et al. 47514, p.1-154
Accordict and morphology of undeference sea on Jerei.	priority, No. 61 at 1984, p. 1966; MP 1785. Sea see data busys in the Westell terr. Action, 1.5., is at	MP 1062 Antitrop is optionly from and thereo is optione and
R.C., et al. (1990, p.67-75) MP 2730 Comparison of the compressive strength of unfarctic fraudice	21556, 15pg (A \$4)1	Chatheran E3-41 at 11977, 3325-3511 MP 1384
and inhoratory-grown columnar sec. Ricaser-Meage, J.A., et al., §1990, p.79-84; MP 2731	Reference dynamics in modeling CO2 increases 1200rg W D., III, §1984, p.239, 253; CO2 increases 1200rg	Design of metall protection for economic test and permateral confidence of the first filter and permateral for the filter of the
Sea see: a habitat for the forestable: Neoglobogundens pa-	"Select summitties of 30 years of southern becomplied season	Radert enweis et ren freien teit bernet sein Granter
chyderms? Dieckmann, G., et al. (1990, p.36-92) MP 2732	Sectionisms Walk, J.E., et al., §1988, p. 173-173-1 MP 1787	Fig. 1.2 of 2 (1979, p.257-27); MP 1176 Fig. 2.2 (1979, p. 257-27); septend from max.
Litter detection of Irada in arctic senice. Schnell, R.C., et al.	Andrewood notified expensions a Arms trapped or	Exc. RA CE 1979, 144 MP 1186
(1990, p.119-123) MP 2733 Wind-generated polynyms off the counts of the Bering Sea	SERFA Shore we exemple and phray features. Beauties fea-	Februarities between Interny temperatures and the winter repose in Germany - Micha, M.A., pt al. (1978, p. 17-17)
islands. Koco, T.L. et al., [1990, p. 124-132;	Emain, A. (1984, 184 - man) Cr. 81-25	MP 1216
MP 2734 Record measurements of are two transcripts on the content	Sea are penetration in the Artist Ocean. Wests WF., 1994 p.37-45; 210-1993.	Bertensin ac colonia in the continuous and in the colonia in No. (1918). The colonia in the colo
Record measurements of sea fee topography in the caseen. Arctic. Krabill W.B., et al. §1996, p.137-1365 MP 2715	Atomic sub-sub-turnic operations. HASto, W.D., ISL, G. &.	Interested represent their best from By Hall
Actions see see thickness seeming. Knock A., et il.	Here has another objective over interest are an Ap-	Real Prior, J. Cl., 1972, 1972, 578 86-19. Heal-best performance and associations stigetimes in Alssociations.
(1992, p.225-226) MP 2155	area Eligibility MP Int	is been the posterior than 1991 in the second of the secon
Covining find sea ice model Ratio, G.M., et al., 1999, p.234-242; Mr. 2346	Arrest eccas marriage in Array markes has been MITEN West Withhouse F. ed. (1945, 1194)	7 17 17 N VIP 1435
See ice thickness versus arguine rates time-of-tiple date.	SR AS-44	Process delector and freezes and throng Quarter-
Sen ice thickness versus arguine radar time-of-light data. Kovacs, A., et al. (1990, p. 9)-91;	SR AS-46 ***Section of the section o	Processed delicerum sele decentry and thromage Obsesber- land, F.J. (1914). 16p.; CR 81-15 Party produces a homeo-relaction and the procedurates table.
Ses for thickness versus sergouse radar time-of-thick, data. Koraca, A., et al. (1990, p. 1)-91; MP 2704. Rador hacknessen messus-messus over saline see S., et al. (1990, p.60)-617; MF 2741	SR 45-66 Section of the section of	Procurent defection site, freezony and throttag. Quantum law, E.J. (1981), 1972. Part proclaing of hereof-orderions and the premiousless title belinists, P.L. (1981), 1973. Sk 83-11.
Su ice thickness versus arranse ratus time-of-dight data. Koraci, A., et al. [1990, p. 91-91] MP 2794 Radar backsestier measurements over saline see Gogineir,	SR 85-06 ***Sand the service of themes: Hores, W.D. III, 1985, p. 569-579, MP 2001 In Sine destribution in the make of a sample wedge. These class, Fo. 11976, p. 521-674, MP 2006	Processed delicerum sele decentry and thromage Obsesber- land, F.J. (1914). 16p.; CR 81-15 Party produces a homeo-relaction and the procedurates table.
Ses for thickness versus arguese radar time-of-dicht, data. Rowan, A., et al. [1990, p.10-91]. MP 2704. Roder beforement measurements over saline see. Gegenem, S., et al. [1990, p.601-61]; MF 2741. Light reflection and transcreamen by see any control. Personals, D.K., [1990, p.6557-9587]. MP 2712. See for distribution.	SR 45-66 SR 45-66 Section of the sec	Procurate defection and discerning and through Oneober- tion, F.J. (1981), 1972. Part procling of hered-selection and the promotion of the Bi-II belinion, F.L. et al. (1983), 1973. The Bi-II Restord procedure for paramete design under resonal from conditions. Perg. R., et al. (1981), 1994. SR Bi-II Development and design of shape freezing both. Mariel.
Son for thickness versus arrange radar time-of-dight, data. Kowan, A., et al. (1990, p.19-8). MP 2704 Radar hadrocente mensuscenarios over saline ser. Gogenere, S., et al. (1990, p.603-617). MF 2741 Light reflection and transmission by ser over covert. Personals, D.M. (1990, p.6557-657). Son for distribution. To dynamica, Caradina Archipelaga at Ladjacent Archic basis. Samorect, R.O., et al. (1975, p.655-877).	SR 45-66 SR	Freemant deflection and treezing and throtog. Quantum I J. (1981, 1972). Party profiling of hermal-reflections and the premised at table. Selfman, F.I. or 32, 1993. 1993. Respect procedure for parameter design under resemble and conditions. Forg. R. o. 21, 1553. 1994. SR 83-27. Development and design of sharps freezing both. Martid. C.J. (1996. p. 1984) 19. Separate variations.
Son ice thickness versus arquise radar time-of-dicht, data. Koraca, A., et al. (1990, p.10-91). MP 2704 Radar backscamer messuscencess over saline see. Gegenem, S., et al. (1990, p.601-617). MP 2741 Light reflection and transmission by see are covere. Personal, D.M. (1990, p.6557-9557). MP 2771 Son fee distribution. Tre dynamics, Cavadan Archivelogo at Ladjacent Archivelogo. Ramecier, R.O., et al. (1975, p.655-877). MP 7-45	SR 45-66 SR 26-66	Promissi deflection site freezos and throting. Quantem- ium, E.J. (1981, 1972). Part produing at hereofordection and the premiserant thic. Selimina, P.C. et al. (1981, 1972). CR 83-81. Restrict providure for paramete derige under seasonal from conditional. Perg. R. et al. (1981, 1974). SR 83-27. Deschonnest and design of shorty freezong belo. Marcel. C.J. (1984, p. 1984). Separate securions. Separate securions.
Son for thickness versus arranes rather time-of-dight, data. Korsan, A., et al. (1990, p.1971). MP 2704 MP 2705 MP 270	SR 45-66 SR	Procurant deflection after freezing and throtting. Quantitization, F.J. (1981, 1972). Party profiting at hemoder-freezines and the premisent rather for B. BB.1. Party proclimated and series of the premiser and the premiser and the feet and from the foreign and the procedure of the procedure
Son for thickness versus arquise radar time-of-dichi, data. Roman, A., et al. [1990, p.10-91]. MP 2704. Roder backment resonancements over saline see. Gegenem, S., et al. [1990, p.601-617]. MF 2741. Light reflection and transmission by see see towart. Promoted, D.M. [1990, p.6551-957]. MP 271. Son for distribution. He general Archivelogo at Ladjacent Archive in Ramocia, R.O., et al. [1975, p.655-87]. MP 7-85. Generalisas and seedment doubt bring the distribution and seedment doubt bring to Good Links, Alaska, Gaine, L.W., [1976, p.859-27]. MP 205. See accompleteness and the generally over continents to chiefe.	SR 45-66 SR 26-66 SR	Procurant deflection after freezing and throttag. Quantum E.J. (1981, 1972). Part procling at hereofer-decision and the premiser table, bedittion, P.L. et al. (1983, 1972). Restrict procling the parameter derige student annual frost conditions. Perg. R. et al. (1981, 1994). Development and design of shooty freezing belos. Martid. C.J. (1984, p. 1983). Septimal variations. Septimal procurates to track's soils. Microscopic strations. Septimal variations in print procurates to track's soils. Microscopic completions in the Astron. Weeks, W.F. (1984, p. 173-285).
Ses for thickness versus arquise radar time-of-dich. data. Rowack A., et al. [1990, p.19-91]. MP 2794. Roder beforement intersections were saline see. Gegenem, S., et al. [1990, p.601-61]; MF 2741. Light reflection and transcrassion by see see towart. Provisely, D.K., [1990, p.6557-9557]. MP 2771. Sen for distribution. The dynamics, Cavadian Archivelege at 1 adjacent Armic lamb. Romeits, R.O., et al. [1975, p.655-877]. MP 7-85. Geodation and sediment door british in Cond. Like, Alinda, Gaine, L.W., [1976, p.305-227]. MP 265. Sen accomplying sea the geometry over construction-to-to-Works, W.F., et al. [1977, p.32-41]. (JP 114).	SR 45-66 Sr 45-66 Sr 45-67 Sr 45-67 Sr 45-67 Sr 45-67 Mr 2061 le fine distribution in the make of a sample wedge. Tanociesa, I of 1816, 7421-676 F error section of the Artise seas. Weeks, W.F. et al. 12165, 7444 Mr 2017 Mr 2018 Mr 2017 Mr 2018	Procurant deflection after freezing and throtting. (Chamberlan, F.J. 1981, 1972) Party profiling at hemoder-freezine and the premiser at this selfman, F.J. et al. 1994. 1993 Restrict procedure for parameter design under resonal front conditions. Ferg. 8, et al. 1987, 1994. SR 83-27 Development and design of storige freezing both. Martid. C.J. 1984. p. 70-810.9 Separate varieties. Franchis varieties. Fra
Ses for thickness versus arquise radar time-of-dich. data. Rowack A., et al. [1990, p.19-91]. MP 2794. Roder beforement intersections were saline see. Gegenem, S., et al. [1990, p.601-61]; MF 2741. Light reflection and transcrassion by see see towart. Provisely, D.K., [1990, p.6557-9557]. MP 2771. Sen for distribution. The dynamics, Cavadian Archivelege at 1 adjacent Armic lamb. Romeits, R.O., et al. [1975, p.655-877]. MP 7-85. Geodation and sediment door british in Cond. Like, Alinda, Gaine, L.W., [1976, p.305-227]. MP 265. Sen accomplying sea the geometry over construction-to-to-Works, W.F., et al. [1977, p.32-41]. (JP 114).	SR 45-66 SR 45-66 SR 45-66 SR 45-66 SR 45-66 SR 25-67 MP 2061 le five distribution in the wide of a sample wedge. Tanocuse a control of the Artist seas. Weeks, R.F. of al. 1995, p. 58-64. MP 2018 Force exchange of the Artist seas. Weeks, R.F. of al. 1995, p. 58-64. MP 2017 MP 2018 MP 2017 MP 2017 MP 2017 SR 26-69 Artist marginal see some series internation every meeting internation of properties in Artist marginal see some MP 25-MP 2017 Artist 1975 Artist 1976 MP 2018 Sambeles of Artist sia see death. Tacker, R.B. of al. 1984, p. 237-256. United parties and properties and p. CAS (Santon) species. Called a control of a control	Procurant deflection and freezons and throtony. Quantum 20, 21-25, 1672. Party profiting at hered-reflection and the premiseon table, betiming, P.C. et al. 1793, 1693. Restrict procedure for particular design under resonal from conditions. Perg. R. et al. 1855, 1893. Berschonnent and design of shorte freezons belong Marcel, C.J. (1916 p. 196-20). Separate sociations. Separate structions in print information in track's soils. Microny, R.S., et al. (1871 p. 55.57).
Son for thickness versus arquise radar time-of-dight, data. Rownes, A., et al. (1990, p-1)-91. MP 2704. Roder backment measurements were salare see: Geogram, S., et al. (1990, p-60)-617; MF 2741. Light reflection and transmission by see see course. Personals, D.M., (1990, p-655-657). Son for distribution. In dynamics, Canadam Architectura at Ladjuccan Armic busin. Rassiscies, Ro., et al. (1975, p-655-877). MP 1-45. Geralation and sed ment dout better to Cook Index, Alaska Gaine, L.W., (1976, p-859-227). MP 2-65. Son see residing and the geometry over continental system. Works, W.F., et al. (1977, p-12-41). Son see residing in the Weddell Sea region should 5-5CG Batton lassed. Ackley, S.F., (1977, p.172-17). Problems of offshore oil dealing in the Beauther Sea. Weiler.	SR 45-66 SR 45-66 SR 45-66 SR 45-66 SR 45-66 SR 45-66 SR 55-579 MP 2061 le five distribution in the make of a sample wedge. Tatorities, Fall (1976, Fall-1976) MP 2068 MP 206	Procument deflections after freezong and throwing. Quantition, F.J. (1981, 1972). Party procling of hemodendictures and the premisenter table, between R. C. al. (1981, 1972). Restrict procedure for parameter design under resonal from conditions. Perg. R. C. al. (1982, 1972). Development and design of strong freezong both. Martel, C.J. (1984, p. 1984). Development and design of strong freezong both. Martel, C.J. (1984, p. 1984). Separate securious. Separate securious. Separate securious. Separate securious in print information at trades soils. McComp. B.L. et al. (1981, p. 1985). Per see conditions in the Arter. Weeks, W.S. (1984, p. 1983, 208). MF 986 Datage animal briefs of freesolund see. Language, C. J. L., c. S. (1987). p. mil. 200. MF 1006 Districturate consense of permutions. Account, S.A., et al. (1982). Prominents of the seasons season and Weeks, W.S. (1984).
Sen for thickness series original radar time-of-dicht, data. Rosena, A., et al. (1990, p.1975). MP 2768 Rober backscatter messurchients over saline on Gegener, S., et al. (1990, p.601-61). MF 2781 Light reflection and transmission by ser are constr. Personal Light reflection and transmission by ser are constr. Personal D. K., (1990, p.857-9587). MP 2771 Sen for distribution. The dynamics, Caradian Archivelege at Endpacent Archivelege, in Endpacent Archive, S.F., (1977, p.12). MP 1101 Sen ser studies in the Weldell Sca region should Section Research Archive, S.F., (1977, p.172). MP 1219 Problems of offshore of deciding to the Beautiful Section 1971, p.4111	SR AS-66 Switching service of turner. Hover, W.D. III, 1981, p. 559-579, In See distribution in the make of a sample wedge. Throcesses, 17, 1876, p. \$21-879, In See distribution in the make of a sample wedge. Throcesses, 17, 1876, p. \$21-879, I street seeming of the Arche seas. Weeks, W.F. or al. 1978, p. 59-84, INFE. I program for increase all service occess interaction experienced secondary modeling. Hidden, W.D. tal. p. \$87, 264-264, p. 197-264. Increased secondary modeling. Hidden, W.D. tal. p. \$87, 264-264, p. 197-264. Increased secondary modeling. Hidden, W.D. tal. p. \$87, 264-264, p. 197-264. Increased secondary modeling. Hidden, W.D. tal. p. \$87, 264-264, p. 197-264. Increased secondary modeling to the p. \$87, 264-264, p. 197-264, Increased secondary for the p. \$87, 264-264, p. 197-264, Increased secondary modeling secondary. II so be a program of the p. \$100, 198-264, Increase secondary modeling to the p. \$100,	Procument deflections after freezing and throwing. Quantities in E. J. 1981, 1992. Party procling at hemoder-fleetines and the premisering table. Settings, P.C. et al. 1993. 1993. Restrict procling at hemoteridate force under examinations conditions. Perg. et al. 1981, 1994. Restrict procling for participate design under examinations conditions. Perg. et al. 1981, 1994. Development and design of shoots freezing both. Martid. Cl. 1986. p. 1994. Merid. McConn. B.D. 1994. McConn. B.D. 1994. 1997. p. 1995. McConn. B.D. 1994. 1997. p. 1997. McConn. B.D. 1997. p. 1997. 1997. Mr 1997. p. 1997. 1997. Distinguational freezing freezings for Language C. Lit. 1997. p. 1997. Distinguational freezing of permutation. Appears. S.A. et al. 1997. 1997. Distinguation of the seasons was accurate. Weeks. W. F. 1982. Dissident of the seasons was accurate. Weeks. W. F. 1982. Dissident of the seasons was accurate. Weeks. W. F. 1982. Mr 1996. Mr 1996.
Son for thickness versus arquise radar time-of-dight, data. Rowne, A., et al. (1990, p.1971). MP 2704 Radar hadrocenter mensusceners serie salue vor. Gegener, S., et al. (1990, p.603-617). MF 2741 Light reflection and transmission by ser ser course. Personisch, D.M. (1990, p.6557-657). MP 2771 Son for distribution. In dynamica, Candena Archiveloga at Ladpicent Armic busin. Ramonica, Ro., et al. (1975, p.655-877). MP 4-85 Gerelation and sed ment dout better to Cod. India, Alaska Gatta, L.W., (1976, p. 859-877). MP 245 Generations and sed ment dout better to Cod. India, Alaska Gatta, L.W., (1976, p. 859-277). MP 245 Sea see residing and the Weddell Sea region about 5-SCG Ration leaved. Arkley, S.F., (1977, p.172-17). MP 1816 Problems of offshore oil dealing in the Beauther Sea. Weiler G. et al. (1977, p.471). MP 1816 Sea see religion.	SR AS-66 Sending senser by same. Heren, W.D., III, 1985, p. 559-579, MP 2063 le five distribution in the make of a sample wedge. Tanscissa, I.o., 1876, p. 213-679, MP 2068 Force sensing of the Artile seas. Weeks, W.F., or al., 1985, p. 59-84. WE 2017 SUFEN: a programs for empossible senser were interaction every emerical Artile integral see inters. MIZEA reflect. T. (1986, Mp.) **Supposed reconcision modeling. Histor. W.D. al., 1984, p. 314, p. 324, p.	Procument deflections after freezing and throwing (Daudier- lian, F.J. (1981), 1972. Party procling of hemoder-flections and the premiser trible. Selfman, F.J. (2012), 1983. Restrict procedure for parameter design under resonal from conditions. Perg. R. (2012), 1983. Perschooning and design of shorter freezing both. Martid. (2), 1984. p. 1984.02. Deschooning and design of shorter freezing both. Martid. (2), 1984. p. 1984.02. Separate securious. Mechan, B.L. (2), 1881. p. 18.5. p. 1885. p. 1
Sen for thickness series original radar time-of-dicht, data. Rosena, A., et al. (1990, p.1979). MP 2768 Radar backsenter measurements over saline on Gegener, S., et al. (1990, p.603-617). MF 2721 Light reflection and transmission by ser over control. Personal Light reflection and transmission by ser over control. Personal Light reflection and transmission by ser over control. Personal Light reflection and transmission by ser over control. MP 2721 Sen for distribution. The dynamics, Caradana Archivelega at Endpacent Archive lamin. Rassociet, R.O., et al. (1975, p.855-877). MP 385 Geresiation and sediment dustributions in Cond. Life, Alistia Grain, L.W., (1976, p.855-227). MP 385 Sen see resigners and fine geometry over continents twelves. Weeks, W.F., et al. (1977, p.372). MP 1818 Sen see resigners in the Weddell Sea region should? SCOC Baction lamin. Archive, S.F., (1977, p.372). MP 1818 Problems of offshore of declarge on the Residen Sea. Weder, G., et al. (1978, p.411). MP 1229 Sea see resigners over the Alialian commercial shock. Fusion W.R., et al. (1979, 247). CR 79 69 Overyston on the general state. Weeks, W.F. et al.	SR AS-66 Septiments of the same of the second of the same of the s	Freemant deflection and freezing and throning. Quantum 18. J. 1981, 1992. Part procling of hered-effectives and the presidency table. Set Bi-15. Part procling of hered-effectives and the presidency table. Set Bi-17. Respect procling to present deeps under sequential first conditions. Set Bi-17. Respect procling to particular deeps under equalified conditions. Set Bi-17. Berchonical set conditions of sharps freezing both. Martid. C. J. (1984), 1984, 1984, 1984. Separate securious. ME 1986. Separate securious. ME 1987. Separate securious. ME 1986. Philips. Philip
Son for thickness versus arquise radar time-of-dight, data. Rowne, A., et al. (1990, p.1971). MP 2794 Radar hadrocenter mensurements are radius ver. Geogram, S., et al. (1990, p.603-617). MF 2741 Light reflection and transmission by ser are course. Personally, D. (1990, p.603-757). MP 2771 Son for distribution. In dynamica, Candena Archivelogo at Ladpicent Armic busin. Ramonica, R.O., et al. (1972, p.653-877). MP 4-85 Geralation and sed ment done broads as Cook Inch. Alaska Gatta, L.W., (1976, p. 200-217). MP 2-95 Son for residence and fine geometry over continental society. Weeks, W.F., et al. (1977, p. 23-41). MP 143 Son for residence and fine geometry over continental society. Weeks, W.F., et al. (1977, p. 23-41). MP 1410 Problems of offshore oil drading in the Beauther Sca. Weiler, G. et al. (1972, p. 4-11). MP 1220 Son for residence were the Alaskar commercial shell. Taxata: W.B., et al. (1979, 24-3). CR 79-04 Overview on the semantal sea for the C. (1979, p. 23-3-3). MP 1320 Son for religing over the Alaskar commercial shell. Taxata: W.B., et al. (1979, p. 24-3). CR 79-04 Overview on the semantal sea for the C. (1979, p. 23-3-3). MP 1320 Son for religing over the Alaskar commercial state. Tooloy,	SR 45-66 Sr 45-66 Sr 45-67 Sr 45-67 Sr 45-67 Mr 2061 le five distribution in the make of a sample wedge. Targeone, I'm 1915, 7421-675 le five distribution in the make of a sample wedge. Targeone, 1-2-1915, 7-421-675 F other section of the Artise seas. Weeks, W.F. et al. 1953, 7-5-64. Mr 2015 Mr 2015 Mr 2015 Mr 2016 Mr 2016 Sr 20-68 Mr 20-6	Procument deflections after freezing and throwing (Outstander, F.) (1981, 1972). Party profiling of hemoder-fleetines and the premiser of this for the features, F.1 (2.0), et al. (1981, 1972). Restrict procedure for parameter delays under resemble from conditions. Perg. 8, v. al. (1982, 1992). Berschonnest and delays of stricts freezing both. Martel, C.1. (1984, p. 1964). Deschonnest and delays of stricts freezing both. Martel, C.1. (1984, p. 1964). Separate securious. Mer 1985. Separate securious. Mer 1986. Separate securious. Mer 1987. Diagon animal brears of forcestand sec. Longuag. C., B., v. 1987. Separate securious. Mer 1986. Separate securious. Mer 1986. Separate securious. Mer 1986. Separate securious. Mer 1986. Procedure of the separate securious. Mer 1986.
Sen for thickness series arguine radar time-of-dight, data. Rosens, A., et al. (1990, p.1975). MP 2794. Radde backment measurements over saline see. Gegener, S., et al. (1990, p.603-617). MF 2741. Light reflection and reconstince by see over covert. Ferrovich, D.R., (1990, p.9557-9587). MP 2771. Sen for distribution. Its dynamics, Caradian Archivelego at Ladjacent Archive lamin. Ramories, R.O., et al. (1975, p.853-877). MP 278. Geolation and sed-ment dust buttons in Cord. Link, Alimia. Gamo, L.W., (1976, p. 803-227). MP 265. Sen acc roughness and fine geometry over construction-time. Weeks, W.E., et al. (1977, p.1244). (J.P. 1143). Sen acc roughness and fine geometry over construction-time. Weeks, W.E., et al. (1977, p.1977, p.1977, p.1977.). MP 1444. Problems of offshere of declarge to the Beaution Sea. Weiler, G. et al. (1978, p.411). Get the religion over the Aladjan commercial shell. Tuster W.B., et al. (1979, 1981). (R. 79-04). Overview on the seasonal sea are zeroe. Weeks, W. et al. (1979, p.350-377). MP 1130.	SR AS-66 Sendering service of turner. Herer, W.D., III, 1988. p 559-579, M2 2081 le fine destribution in the make of a sample medge. Tarrection, I.C. (1976, p. 821-879) F other section of the Artile seas. Weeks, W.F. et al. (1988, p. 59-84). W2 2017 MIFEN a program for otherwise attended in the 2018 MIFEN a program for otherwise states. MIFEN others, T. (1986, 349). SR 26-60. T. (1986, 349). SR 26-60. M1FEN others, T. (1986, 349). SR 26-60. T. (1986, 349). SR 26-60. M1FEN others, T. (1986, 349). Landress of Artise was see death. Tasker, W.B. et al. (1988, p. 79). Tasker. Landress of Artise was see death. Tasker, W.B. et al. (1988, p. 79). Tasker. MIFEN of its (1987, p. 56). M16. MIFEN of its (1987, p. 56). M16. MIFEN OF Its (1988, p. 79). The common of the second	Procument deflections after freezing and throntog. Quantum 19, 1915, 1972. Party profiling of herender-freezines and the premision of this file. Selfmann, F.J. et al. 1995, 1972. Respect procedure for parternant decays under resonal files of this files. Selfmann, F.J. et al. 1995, 1972. Respect procedure for parternant decays under resonal files. Selfmann Selfmann 19, 1985, 1987

Seasonal variations (cont.)	Sediments	Seismic reflection
Seasonal growth and accumulation of N, P, and K by grass	ERTS mapping of Arctic and subarctic environments And-	Hyperbolic reflections on Beaufort Sea seismic records.
irrigated with wastes. Palazzo, A.J., [1981, p.64-68] MP 1425	erson, D.M., et al., [1974, 128p.] MP 1047 Environmental consequences of 1964 Alaska earthquake in	Neave, K.G., et al, (1981, 16p) CR 81-02 Seismic refraction
Ocean circulation: its effect on seasonal sea-ice simulations.	Portage, Alaska. Ovenshine, AT, et al, [1974, p.3-9]	Seismic site characterization techniques, Münster Nord,
Hibler, W.D., III, et al, [1984, p 489-492] MP 1700	MP 2409	FRG. Albert, D.G., (1982, 33p) CR 82-17
Numerical simulation of Northern Hemisphere sea ice variability, 1951-1980. Walsh, J.E., et al, (1985, p.4847-	Placer River Silt—an intertidal deposit caused by the 1964 Alaska earthquake. Ovenshine, A.T., et al, 11976, p.151-	Subsea permafrost in Harrison Bay, Alaska. Neave, K.G., et al, {1982, 62p} CR 82-24
4865) MP 1882	162 ₁ MP 2410	Seismic velocities and subsea permafrost in the Beaufort Sea,
Ground motion induced by an acoustic pulse, and its winter-	Effect of temperature on the strength of frozen sit. Haynes, F.D., et al, [1977, 27p.] CR 77-03	Alaska Nea\ K.G., et al, [1983, p.894-898] MP 1665
time variations. Peck, L., r1988, p.361-3851 MP 2597	Geochemistry of subsea permafrost at Prudhoe Bay, Alaska.	Seismic surveys
Year of Bowen ratios over the frozen Beaufort Sea Andreas,	Page, F W., et al, [1978, 70p] SR 78-14	Analysis of ex, vely generated ground motions using
E.L., [1989, p.12,721-12,724] MP 2508	Direct filtration of streamborne glacial silt. Ross, M.D., et al, (1982, 17p.) CR 82-23	Fourier techniques. Blouin, S.E., et al, [1976, 86p.] CR 76-28
Seasonal distribution of low flow events in New Hampshire streams with emphasis on the winter period. Melloh, R.A.,	Modifications of permafrost, East Oumalik, Alaska. Law-	Creep rupture at depth in a cold ice sheet. Colbeck, S.C., et
[1990, p.47-53] MP 2681	son, D.E., [1982, 33p.] CR 82-36	al, (1978, p.733) MP 1168
Sediment transport	Ground ice in perennially frozen sediments, northern Alaska. Lawson, DE, (1983, p 695-700) MP 1661	Sea ice north of Alaska. Kovacs, A, (1978, p.7-12) MP 1252
Influence of irregularities of the bed of an ice sheet on deposi- tion rate of till. Nobles, L.H., et al, (1971, p 117-126)	Bank recession of the Tanana River, Alaska. Gatto, L.W.	Geophysics in the study of permafrost. Scott, W.J., et al,
MP 1009	[1984, 59p] MP 1746	[1979, p 93-115] MP 1200
Permafrost and vegetation maps from ERTS imagery Anderson, D.M., et al. (1973, 75p) MP 1003	Impact of dredging on water quality at Kewaunee Harbor, Wisconsin Iskandar, I.K., et al, [1984, 16p]	Distribution and properties of subsea permafrost of the Beaufort Sea. Sellmann, P.V., et al., [1979, p.93-115]
Baseline data on tidal flushing in Cook Inlet, Alaska. Gatto,	CR 84-21	MP 1287
L.W. (1973, 11p) MP 1523	Techniques for measuring Hg in soils and sediments. Cragin, J.H., et al. [1985, 16p] SR 85-16	Features of permafrost beneath the Bezufort Sea. Sellmann, P.V., et al. (1980, p.103-110) MP 1344
Circulation and sediment distribution in Cook Inlet, Alaska Gatto, L.W., t1976, p 205-227, MP 895	Explosives in soils and sediments Cragin, J.H., et al., (1985,	P.V., et al. (1980, p.103-110) MP 1344 Subsea permafrost in Harrison Bay, Alaska. Neave, K.G., et
Effect of open water disposal of dredged sediments. Blom,	Ilpj CR 85-15 Tanaila attenuth of featan eile. Thu V at al. 1086 p.15.	al, [1982, 62p] CR 82-24
B.E., et al, [1976, 183p] MP 967	Tensile strength of frozen silt. Zhu, Y., et al, (1986, p.15-28) MP 1971	Effects of snow on vehicle-generated seismic signatures Albert, D.G., r1984, p.83-109; MP 2074
Baseline data on the oceanography of Cook Inlet, Alaska. Gatto, L.W., 11976, 84p CR 76-25	Seepage	bert, D.G., (1984, p.83-109) MP 2074 Seismic surveys of shallow subsea permifrost Neave, K.G.
Ice and navigation related sedimentation. Wuebben, J.L., et	Land treatment of wastewaters. Reed, S.C., et al. (1974, p. 12-13) MP 1036	et al, [1985, p 61-65] MP 1954
al, (1978, p 393-403) MP 1133 Sediments of the western Matanuska Glacie. Lawson, D E.	Land treatment of wastewaters for rural communities. Reed,	Seismic velocity
(1979, 112p.) CR 79-09	S.C., et al, (1975, p.23-39) MP 1399	Surface-wave dispersion in Byrd Land Acharya, H.K., [1972, p 955-959] MP 992
Pebble orientation ice and glacial deposits. Lawson, D.E.,	Reclamation of wastewater by application on land. Iskandar, I.K., et al, [1976, 15p.] MP 896	Seismic exploration in cold regions. Roethlisberger, H.,
t1979, p.629-645; MP 1276 Distribution and features of bottom sediments in Alaskan	Wastewater renovation by a prototype slow infiltration land	(1972, 138p.) M II-A2a
coastal waters. Sellmann, P.V., [1980, 50p]	treatment system Iskandar, I.K., et al, [1976, 44p] CR 76-19	Delineation and engineering of subsea permafrost, Beaufort Sea. Sellmann, P.V., et al, (1981, p 137-156)
SR 80-15	Treatment of primary sewage effluent by rapid infiltration.	MP 1600
Sediment displacement in the Ottauquechee River—1975- 1978. Martinson, C.R., [1980, 14p] SR 80-20	Satterwhite, M.B., et al. [1976, 15p] CR 76-49	Determining distribution patterns of ice-bonded permafrost in the U.S. Beaufort Sea from seismic data. Neave, K.G., et
Diamictons at the margin of the Matanuska Glacier, Alaska.	Wastewater treatment at Calumet, Michigan et al, (1977, p.489-510) Baillod, CR, MP 976	al, (1984, p 237-258) MP 1839
Lawson, D.E., [1981, p.78-84] MP 1462 Sediment load and channel characteristics in subarctic upland	Wastewater treatment alternative needed. Iskandar, IK, et	Experimental and theoretical studies of acoustic-to-seismic coupling Albert, D.G., (1988, p 19-31) MP 2432
catchments Slaughter, C.W., et al., [1981, p 39-43]	al, [1977, p.82-87] MP 968	Observations of low-frequency acoustic-to-seismic coupling
MP 1518	NO3-N in percolate water in land treatment Iskandar, I.K., et al, (1978, p 163-169) MP 1148	in the summer and winter Albert, D.G., et al. (1989,
Subaerial sediment flow of the Matanuska Glacier, Alaska. Lawson, D E., [1982, p 279-300] MP 1806	Nitrogen behavior in land treatment of wastewater a simpli-	p 352-359; MP 2054 Seismology
Shoreline erosion and shore structure damage on the St.	fied model Selim, H M, et al, (1978, p 171-179) MP 1149	Fluid dynamic analysis of volcanic tremor. Ferrick, M G, et
Marys River. Wuebben, J.L., [1983, 36p.] SR 83-15	Wastewater stabilization pond linings. Middlebrooks, E J.,	al, (1982, 12p) CR 82-32
Tanana River monitoring and research studies near Fair- banks, Alaska. Neill, C.R., et al. [1984, 98p. ± 5 ap-	et al, (1978, 116p) SR 78-28 Energy requirements for small flow wastewater treatment sys-	Observations of volcanic tremor at Mount St. Helens volcano. Fehler, M., 1984, p.3476-34841 MP 1770
pends j SR 84-37	tems. Middlebrooks, E.J., et al, [1979, 82p]	Effect of snow on vehicle-generated seismic signatures Al-
Potential use of SPOT HRV imagery for analysis of coastal sediment plumes. Band, L.E., et al. (1984, p 199-204)	SR 79-07 Energy requirements for small flow wastewater treatment sys-	bert, D.G., (1984, 24P.) CR 84-23 Review of methods for generating synthetic seismograms
MP 1744	tems. Middlebrooks, E.J., et al, [1979, 82p]	Peck, L, (1985, 39p.) CR 85-10
Shoreline erosion processes: Orwell Lake, Minnesota Reid, J.R., [1984, 101p] CR 84-32	SR 79-07	Effect of snow on vehicle-generated seismic signatures Albert, D.G., [1987, p 881-887] MP 2229
Use of remote sensing for the U.S. Army Corps of Engineers	Water movement in a land treatment system of wastewater by overland flow Nakano, Y, et al. (1979, p.185-206)	Acoustic-to-seismic coupling through a snow layer. Peck,
dredging program. McKim, H.L., et al, (1985, p 1141- 1150) MP 1890	MP 1285	L, (1987, p.47-55) MP 2294
Study of sea ice induced gouges in the sea floor Weeks,	Land treatment systems and the environment McKim, H.L., et al. (1979, p.201-225) MP 1414	Acoustically induced ground motion in sand under winter conditions. Peck, L., [1989, p 37-54] MP 2626
W.F., et al, (1985, p 126-135) MP 1917	Cost of land treatment systems Reed, S.C., et al. [1979,	Sensor mapping
Numerical simulation of sea ice induced gouges on the shelves of the polar oceans Weeks, W.F., et al., (1985, p.259-	135p ₁ MP 1387 Functional analysis of the problem of wetting fronts. Naka-	Use of SPOT HRV data in the Corps of Engineers dredging program. Merry, C.J., et al. (1988, p 1295-1299)
265 ₁ MP 1938	no, Y , (1980, p 314-318) MP 1307	program. Merry, C.J., et al. (1988, p 1293-1297) MP 2528
Data acquisition in USACRREL's flume facility. Daly, S.F., et al, [1985, p.1053-1058] MP 2089	Removal of organics by overland flow. Martel, C.J., et al., (1980, 9p.) MP 1362	Settlement (structural)
Glaciers and sediment Bezinge, A, et al, (1986, p 53-69;	(1980, 9p) MP 1362 Energy and costs for agricultural reuse of wastewater Sict-	Piles in permafrost for bridge foundations. Crory, F E., et al., [1967, 41p.] MP 1411
MP 2154	ten, RS, et al, (1980, p 339-346) MP 1401	Slumping failure of an Alaskan earth dam Collins, CM, et
Morphology, hydraulics and sediment transport of an ice- covered river. Lawson, D E, et al. (1986, 37p)	Soil infiltration on land treatment sites Abele, G., et al. [1980, 41p] SR 80-36	al, (1977, 21p) SR 77-21
CR 86-11	Hydraulic characteristics of the Deer Creek Lake land treat-	Kotzebue hospital—a case study Croty, F.E., (1978, p 342-359) MP 1084
Preliminary simulation of the formation and infilling of sea ice	ment site during wastewater application Abele, G, et al. (1981, 37p) CR 31-07	Construction of an embankment with frozen soil Botz, JJ.
MP 2218	(1981, 37p) CR 31-07 Land treatment of wastewater Reed, S.C., (1982, p.91-	et al, {1980, 105p} SR 80-21 Foundations on permafrost, US and USSR design and prac-
Effects of an ice cover on flow in a movable bed channel Wuebben, J.L., [1988, p.137-146] MP 2499	123 ₃ MP 1947	tice Fish, A M. (1983, p.3-24) MP 1682
Detection of coarse sediment movement using radio transmit-	Horizontal infiltration of water in porous materials Nakano, Y., [1982, p 156-166] MP 1840	Creep of a strip footing on ice-rich permafrost Sayles, F.H.,
ters. Chacho, E.F., Jr, et al, [1989, p 367-373(B)] MP 2752	Land application systems for wastewater treatment. Reed,	(1985, p 29-51) MP 1731 Partial verification of a thaw settlement model. Guymon,
Sedimentation	SC, 1983, 26p + figs; MP 1946 Analysis of infiltration results at a proposed North Carolina	G L, et al, (1985, p 18-25) MP 1924
Baseline data on tidal flushing in Cook Inlet, Alaska Gatto.	wastewater treatment site Abele, G., et al, (1984, 24p)	Hydraulic proporties of selected soils Ingersoll, J. et al. (1985, p.26-35) MP 1925
L W. (1973, 11p.) MP 1523 Estuarine processes and intertidal habitats in Grays Harbor,	SR 84-11	Physical changes in clays due to frost action Chamberlain,
Washington, a demonstration of remote sensing techniques.	Problems with rapid infiltration—a post mortem analysis Reed, S.C. et al. (1984, 17p + figs) MP 1944	ÉJ, (1989, p 863-893) MP 2595
Gatto, L.W., [1978, 79p] CR 78-18	Nitrogen removal in cold regions trickling filter systems	Sewage Utilization of sewage sludge for terrain stabilization in cold
Stratified debris in Antarctic ice cores Gow, AJ, et al. [1979, p 185-192] MP 1272	Reed, S.C., et al., (1986, 39p.) SR 86-02 New approach for sizing rapid infiltration systems. Martel,	regions Gaskin, DA, et al. [1977, 45p] SR 77-37
Removal of o.ganics by overland flow Martel, CJ, et al.	CJ. [1988, p 211-215] MP 2323	Heat recovery from primary effluent using heat pumps
[1980, 9p] MP 1362 Deposits in the glacial environment Lawson, D.E. (1981,	New approach for sizing rapid infiltration systems (discussion and closure) Reed, S.C., et al. (1989, p. 879-882)	Phetteplace, G. et al. (1985, p 199-203) MP 1978 SEWAGE DISPOSAL
16p. ₁ CR 81-27	MP 2712	Sewerage and sewage disposal in cold regions Alter, A.J.
Pebble fabric in an ice-rafted diamieton Domack, EW, et	Seismic prospecting	[1969, 106p] M III-C5b
al, (1985, p 577-591) MP 1959 Glacigenic resedimentation related to mass-movement pro-	Recent research on acoustic to seismic coupling Albert. DG, [1987, p 223-225] MP 2416	Sewage disposal Utility distribution systems in Iceland Aamot, HWC.
cesses Lawson, DE, [1989, p.147-169] MP 2472	Seismic and acoustic wave propagation working group report	[1976, 63p] SR 76-05
SEDIMENTS Patterned ground in Alaska Péwé T1 ct al 41969 870 a	Albert, D.G. et al. (1987, p. 253-255) MP 2419 Seismic/acoustic experiments at SNOW IV Peck, L.	Utility distribution systems in Sweden, Finland, Norway and England Aamot, H.W. C., et al. [1976, 121p]
Patterned ground in Alaska Péwé, T.L., et al., [1969, 87p] MP-1180	[1989-p.155-157] MP-2646	SR 76-16

		Shore erosion
et al (1977, p.489-510) MP 976	Forces on an ice boom in the Beauharnois Canal Perham,	Historical shoreline changes along the outer coast of Cape
Effects of wastewater and sludge on turfgrasses Palazzo,	R.E., et al., 1975, p.397-4071 MP 858 Measuring the uniaxial compressive strength of ice. Haynes.	Aerial photointerpretation for shoreline changes. Gatto,
Sewage sludge for terrain stabilization, Part 2 Gaskin, D A.,	F.D., et al, (1977, p 213-223) MP 1027	L W., (1980, p.167-170) MP 1503 Shoreline erosion and shore structure damage on the St. Shoreline erosion and shore structure damage on the St.
et al. (1979, 36p) Utilization of sewage sludge for terrain stabilization in cold	Effect of freeze-thaw cycles on resilient properties of fine- grained soils. Johnson, T.C, et al. (1978, 19p)	Marve River, Wilebben, J.L. (1983, 30p) Sk 63-13
regions. Pt. 3. Rindge, S.D., et al. (1979, 33p.) SR 79-34	MP 1082 Freeze thaw effect on resilient properties of fine soils John	Erosion of perennially frozen streambanks. Lawson, D E., (1983, 22p) CR 83-29
Revegetation at two construction sites in New Hampshire and	son, T.C., et al, [1979, p 247-276] MP 1220	Shoreline erosion processes Or Lake, Minnesota. Reid, J.R., [1984, 101p.]
Alaska. Palazzo, A.J. et al. (1980, 21p.) CR 80-03 Sewage sludge aids revegetation. Palazzo, A.J., et al., (1982,	Pressure waves in snow Brown, R.L., [1980, p 99-107] MP 1306	Erosion of northern reservoir shores. Lawson, D.E. (1985)
p.198-301 ₃ MF 1735	Measurement of the shear stress on the underside of simulated tee covers. Calkins, D J., et al, (1980, 11p)	Rank conditions and erosion along selected reservoirs Gat-
SEWAGE TREATMENT Sewerage and sewage disposal in cold regions Alter, A.J.	CR 80-24	to, L.W., et al. (1987, p.143-154) MP 2196 Techniques for measuring reservoir bank erosion. Gatto, 98-03
[1969, 106p.] M 111-C5B	Analysis of velocity profiles under ice in shallow streams. Calkins, D J, et al. [1981, p 94-111] MP 1397	L.W., (1988, 27p)
Waste management in the north Rice, E. et al. (1974,	Vehicle tests and performance in snow Berger, R H, et al.	Shoreline modification Aerial photography of Cape Cod shoreline changes. Gatto,
p.14-21; MP 1048 Land treatment in relation to waste water disposal Howells,	Shallow snow test results. Harrison, W.L., [1981, p. 69-71]	L.W. (1978, 49p) CR 78-17 Estuarine processes and intertidal habitats in Grays Harbor,
D.H., et al. (1976, p 60-62) MP 869 Rapid infiltration of primary sewage effluent at Fort Devens,	Asymmetric flows application to flow below ice jams	Washington a demonstration of remote sensing techniques
Massachusetts Satterwhite, MB, et al, [1976, 34p] CR 76-48	Gogus, M, et al. (1981, p.342-350) MP 1733	Historical shoreline changes along the outer coast of Cape
Treatment of primary sewage effluent by rapid infiltration.	Force distribution in a fragmented ice cover. Daly, S.F., et al, t1982, p 374-387; MP 1531	Cod Gatto, L.W., (1979, p 69-90) MP 1502 Coastal marine geology of the Beaufort, Chukchi and Being
Satterwhite, M.B., et al. [1976, 15p] CR 76-49 Land treatment of wastewater at West Dover, Vermont	Model study of Port Huron ice control structure, wind stress simulation Sodhi, DS, et al, [1982, 27p] CP 82.00	Seas. Gatto, L. W., (1980, 33/D) 38 0003
Bouzoun, J.R., [1977, 24p] SR 77-33	CR 82-03	Aerial photointerpretation for shoreline changes. Gatto, L.W., (1980, p 167-170) MP 1503
Wastewater treatment alternative needed Iskandar, I K, et al, [1977, p.82-87] MP 968	Flow velocity profiles in ice-covered shallow streams Calkins, D.J., et al., {1982, p.236-247 ₁ MP 1540	Bank erosion of U.S. northern rivers Gatto, L.W., (1982, 75p.)
Land treatment present status, future prospects Pound, C.E., et al, [1978, p 98-102] MP 1417	Asymmetric plane flow with application to ice jams Tatin- claux, JC, et al, [1983, p 1540-1556] MP 1645	Shoreline erosion and shore structure damage on the St
Mass water balance during anray irrigation with wastewater at	Force distribution in a fragmented ice cover. Stewart, D.M.,	Shares
Deer Creek Lake land treatment site Abele, G., et al, [1978, 43p] SR 79-29	et al. [1984, 16p.] CR 84-07 Frost jacking forces on H and pipe piles embedded in Fair-	lce pile-up and ride-up on Arctic and subarctic beaches. Kovacs, A, et al. (1979, p.127-146) MP 1230
Cost of land treatment systems Reed, S.C., et al., (1979, 135p.) MP 1387	banks silt Johnson, J.B., et al, [1985, p 125-133] MP 1930	Shore are nileun and tide-up field observations, models,
Development of a rational design procedure for overland flow	Measurement of frost heave forces on H-piles and pipe piles	theoretical analyses Kovacs, A., et al. (1980, p 209- 298) MP 1295
Energy conservation and water pollution control facilities	Johnson, J B, et al, [1988, 49p] CR 88-21 Shelters	Summer air temperature and precipitation in northern A ¹ 1ska. Haugen, R.K., et al. (1980, p 403-412) MP 1439
Martel, CJ, et al, [1982, 18p] SR 82-24 Restoration of acidic dredge soils with sewage sludge and	Observations during BRIMFROST '83. Bouzoun, JR, et al,	Effect of vessel size on shorelines along the Great Lakes chan-
lime. Palazzo, A.J., (1983, 11p) CR 83-28	(1984, 36p) SR 84-10 Ship icing	Sea ice on the Norton Sound and adjacent Bering Sea coast.
Accumulation, characterization, and stabilization of sludges for cold regions lagoons. Schneiter, R.W., et al. 1984,	Ice accumulation on ocean structures Minsk, L.D., 1977.	Kovacs, A., (1983, p 654-666) MP 1699 Side looking radar
40p j SR 84-08 Primary effluent as a heat source for heat pumps. Phette-	loe accretion on ships Itagaki, K., (1977, 220)	Sea ice roughness and floe geometry over continental shelves.
place, GE, et al. (1988, p.141-146) MP 2443	SR 77-27 Ice observation program on the semisubmersible drilling ves-	Extraction of tonography from side-looking satellite systems
C.L. (1988, 49p) CR 88-20	sel SEDCO 708. Minsk, L D , (1984, 14p) SR 84-02	—a case study with SPOT simulation data Ungar, S.G., et al. (1983, p.535-550) MP 1695
Dewaterability of freeze-thaw conditional sludges Martel, C.J., [1989, p 237-241] MP 2616	Assessment of ice accretion on offshore structures Minsk,	Signy Island
Primary effluent as a heat source for heat pumps Phette-	L.D., (1984, 12p.) SR 84-04 Sea spray icing: a review of current models Ackley, S.F.,	Soil properties of the International Tundra Biome sites Brown, J. et al, (1974, p 27-48) MP 1043
Shafts (excavations)	(1986, p 239-262) MP 2103	Simulation Sea ace growth, drift, and decay Hibler, W D, III, [1980,
Heat transfer in a freezing shaft wall Liandi, F., [1986, 24p]	Evaluation of shear strength of freshwater ice adhered to icephobic coatings Mulherin, N.D., (1990, p.149-154).	n 141-200, WH 1470
Shear flow	MP 2578 Ships	Structure and dielectric properties at 4 8 and 9.5 GHz of saline ice Arcone, S.A., et al., [1986, p 14,281-14,303] MP 2182
Effect of size on stresses in shear flow of granular materials. Pt.1. Shen, H.H., [1985, 18p] CR 85-02	Arctic marine navigation and ice dynamics-summary find-	Simulation of planar instabilities during solidification Sul-
Effect of size on stresses in shear flow of granular materials, Pt.2. Shen, H.H., [1985, 20p] CR 85-03	Towing ships through ice-clogged channels by warping and	livan, J M, Jr, et al. (1987, p.81-11.) MP 2585 Simulation of district heating systems for piping design.
Constitutive relations for a planar, simple shear flow of rough	kedging Mellor, M. (1979, 21p.) CR 79-21 Ship resistance in thick brash ice Mellor, M. (1980, p. 305-	Phetteplace, G., (1989, 2/p)
Sar properties	321 ₁ MP 1329	Site accessibility Site access for a subarctic research effort Slaughter, C.W.
Mitigative and remedial measures for chilled pipelines in dis- citinuous permafrost Sayles, F.H., [1984, p.61-62]	Vibrations caused by ship traffic on an ice-covered waterway Haynes, F.D., et al. [1981, 27p] CR 81-05	(1976, 13p) CR 76-05 Site selection methodology for the land treatment of wastewa
Jphifting forces exerted by adfrozen ice on marine piles.	State of the art of ship model testing in ice Vance, GP, 1981, p 693-706; MP 1573	ter. Ryan, J k., et al, [1981, 74p] SR 81-28
Christensen, FT, et al. (1985, p 529-542) MP 1905	Effect of vessel size on shorelines along the Great Lakes chan-	Numerical studies for an airborne VLF resistivity survey
Shear strain Dynamics of snow avalanches Meltor, M. (1978, p. 753-	Boom for shipboard deployment of meteorological instru-	Arcone, S.A. (1977, 10p.) Runway site survey, Pensacola Mountains, Antarctica
792 ₁ MP 1070	ments Andreas, E.L., et al. (1983, 14p) SR 83-28 Development of a river ice-prow Part 2 Tatinclaux, J.C.	Kovacs, A., et al, (1977, 430)
SHEAR STRENGTH Properties of snow Mellor, M. (1964, 105p)	(1988, p 44-52) MP 2497	C.L., (1978, p.107-119) MP 1140
M III-A1 Mechanical properties of sea ice Weeks. W F., et al. [1967.	Ship model testing in level ice an overview Tatinclaux, J.C., [1988, 20p.] Cr. 88-15	
80p) M II-C3	CHOCK WAVEE	
Shear strength Compressive and shear strengths of fragmented ice covers	Explosions and snow Mellor, M. (1965, 34p) M III-A3a	
Cheng, S.T., et al. (1977, 82p.) Field investigations of a hanging ice dam Beltaos, S., et al.	Ground pressures exerted by underground explosions John-	materials Merry, C.J., et al, (1980, p 138-170) MP 131
(1982, p 475-488) MP 1533 How effective are icephobic coatings Minsk, L.D., (1983.	son, PR. (1978, p 284-290) MP 1520	Post occupancy evaluation for communities in not or col-
p.93.951 MP 1034	(1979, 14p1 CR 79-29	Introduction to abiotic components in tundra. Brown, J
Shear strength in the zone of freezing in saline soils. Chamberlain, E.J., [1985, p. 566-574] MP 1879	MP 1306	Harbor design for ice conditions Wortley, CA, (1987.
Shear strength anisotropy in frozen saline and freshwater	NP 1354	p 14-15; p 14-15; properties of some frozen mater
MP 1931	Propagation of stress waves in alpine snow Brown, R.L.	als Acone SA, et al. (1989, 1801)
ED (1986 p.238-241) MP 1989	(1980, p 235-243) MP 1367 Dynamic testing of free field stress gages in frozen soil Aith-	. 15) MP 204
lee properties in a grounded man-made ice island Cox GFN, et al. [1986, p 135-142] MP 2032	cn. G W , ct al. (1980, 26p)	St. friction and thermal response Warren, GC, et a
Vibration analysis of the Yamachiche Lightpier Haynes	Blasting and blast effects in cold regions Part 1. Air blast Mellor, M., 1985, 62p., SR 85-25	MP 274
Ship model testing in level ice an overview Tatinclaux, J C	Blasting and blast effects in cold regions Part 2: underwate	CR 89.
[1988, 30p.] Evaluation of shear strength of freshwater ice adhered to	Techniques for gas gun studies of shock wave attenuation it	Sleds Denamic friction of bobsled runners on ice Huber N.P.,
icephobic coatings Mulherin, N.D. (1990, p 149-154) MP 2570	thow brown, 3 A , et al. (1 700;) to 1 900)	3 al. (1985, 26p) MP 208

Sleds (cont.)	Snow accumulation	Increased heat flow due to snow compaction: the simplistic approach Colbeck, S.C., [1983, p 227-229]
Preliminary study of fraction between are and sled runners Itagaki, K., et al. [1987, p 297-301] MP 2358	Snow accumulation for arctic freshwater supplies Slaughter, C W., et al, (1975, p.218-224) MP 860	MP 1693
Dynamic friction of a metal runner on ice I Model sled test Itagaki, K., et al, [1989, 17p] CR 89-14	Snow load data analysis, winter 1976-77 O'Rourke, M., [1977, 9p. + appends.] MP 2427	Thermal measurements in snow. Jordan, R., et al, [1986, p.183-193] MP 2660
Slope orientation	Role of research in developing surface protection measures	Improved techniques for construction of snow roads and air- strips. Lee, S.M., et al, (1988, 99p) SR 88-18
Snow load data analysis, winter 1976-77. O'Rourke, M, (1977, 9p + appends) MP 2427	for the Arctic Slope of Alaska. Johnson, P.R., [1978, p.202-205] MP 1068	Compacted-snow runways: design and construction guide-
Roof response to icing conditions Lane, J.W, et al. [1979,	Surface protection measures for the Arctic Slope, Alaska.	lines for Antarctica. Russell-Head, D.S., et al, [1989, 68p] SR 89-10
40p ₁ C ₁ · 79-17 Tundra soils on the Arctic Slope of Alaska. Everett, K.R.,	Johnson, P.R., (1978, p.202-205) MP 1519 Snow accumulation, distribution, melt, and runoff Colbeck,	Snow composition
et al, 1982, p.264-280; MP 1552 Uniform snow loads on structures. O'Rourke, MJ, et al,	S.C., et al, [1979, p 465-468] MP 1233 Relationships between January temperatures and the winter	Composition and structure of South Pole snow crystals. Kumai, M., (1976, p.833-841) MP 853
[1982, p 2781-2798] MP 1574	regime in Germany Bilello, M A, et al, [1979, p.17-27]	Vanadium and other elements in Greenland ice cores. Herron, M.M., et al, (1976, 4p.) CR 76-24
Analysis of roof snow load case studies, uniform loads O'- Rourke, M., et al, [1983, 29p] CR 83-01	MP 1218 Extending the useful life of DYE-2 to 1986. Tobiasson, W.,	Tracer movement through snow Colbeck, S.C., 1977,
Slope processes	et al, (1980, 37p) SR 80-13 Shallow snow model for predicting vehicle performance.	p 255-262 ₁ MP 1093 Atmospheric pollutants in snow cover runoff. Colbeck, S.C.,
Drainage network of a subarctic watershed S.R., et al, [1979, 9p.] Bredthauer, SR 79-19	Harrison, W.L., [1981, 21p] CR 81-20	(1981, p 1-10 ₃ MP 1586
Shoreline erosion processes Orwell Lake, Minnesota Reid, J.R., [1984, 101p] CR 84-32	Climate of remote areas in north-central Aiaska 1975-1979 summary. Haugen, R.K., {1982, 110p.} CR 82-35	Nitrogenous chemical composition of antarctic ice and snow Parker, B C., et al, (1981, p 79-81) MP 1541
Erosion of northern reservoir shores Lawson, D.E., [1985,	Case study of land treatment in a cold climate-West Dover,	Nitrate fluctuations in anterctic snow and firm et al, [1982, p 243-248] Parker, B.C., MP 1551
198p ₁ M 85-01 SLOPE STABILITY	Vermont. Bouzoun, J.R., et al, (1982, 96p) CR 82-44	Chemical obscurant tests during winter, environmental fate.
Avalanches Mellor, M., (1968, 215p) M III-A3d Slope stability	Snow concentration and effective air density during snow- falls Mellor, M. [1983, p.505-507] MP 1769	Field sampling of snow for chemical obscurants at SNOW-
Pipeline haul road between Livengood and the Yukon River.	Intensity of snowfall at the SNOW experiments Bates, R.E.	TWO/Smoke Week VI Cragin, J H , [1984, p 265-270] MP 2096
Berg, R L., et al. (1976, 73p) SR 76-11 Slopes	et al, (1986, p 205-217) MP 2287 Snow mass concentration and precipitation rate Koh, G., et	Snow chemistry of obscurants released during SNOW-
Crude oil spills on subarctic permafrost in interior Alaska.	al, [1988, p 89-92] MP 2326	TWO/Smoke Week VI. Cragin, J.H., [1984, p 409-416] MP 1873
Johnson, L.A, et al, [1980, 67p] CR 80-29 Antitank obstacles for winter use. Richmond, PW, [1988,	Snowfall amounts and snow depths in Germany and NE USA. Bates, R.E., et al. (1988, p.107-117) MP 2401	Acidity of snow and its reduction by alkaline acrosols. Kumai, M., (1985, p.92-94) MP 2008
11p ₃ SR 88-19 Hydraulic model of overland flow on grass covered slopes	Snow concentration and precipitation rate measurements dur- ing SNOW IV Lacombe, J., [1989, p 25-29]	Low temperature effects on organophosphonates. Britton,
Adrian, D.D., et al, (1989, p 569-578) MP 2710	MP 2643	K.B., [1986, 47 refs.] SR 86-38 Chemical properties of snow in the northeastern United
Sludges Reclamation of acidic dredge soils with sewage sludge and	Snow acoustics Surface-wave dispersion in Byrd Land. Acharya, H.K.,	States. Kumai, M, {1987, p (C1)625-(C1)630 ₁ MP 2232
lime. Palazzo, A J., [1977, 24p] SR 77-19 Municipal sludge management environmental factors	[1972, p 955-959] MP 992 Acoustic emissions in the investigation of avalanches St.	Octanol-water partition coefficients for organophosphonates. Britton, KB, et al. (1988, 24p) SR 88-11
Reed, S.C., ed, [1977, Var p] MP 1406	Lawrence, W.F., [1977, p.VII/24-VII/33] MP 1630	Does snow have ion chromatographic properties. Hewitt,
Utilization of sewage sludge for terrain stabilization in cold regions. Gaskin, D.A., et al., [1977, 45p] SR 77-37	Acoustic emission response in polycrystalline materials. St. Lawrence, W F., [1979, p 223-228] MP 1246	A D., et al, (1989, p.165-171) MP 2755 Chemical migration in snowpack. Murphey, B.B., et al,
Sewage sludge for terrain stabilization, Part 2 Gaskin, D.A.	Acoustic emission response of snow. St. Lawrence, W.F.,	[1989, p 282-286] MP 2757
et al, (1979, 36p) SR 79-28 Sewage sludge aids revegetation. Palazzo, A.J., et al, (1982,	(1980, p.209-216) MP 1366 Snow Symposium, 1st, Hanover, NH, Aug. 1981. (1982.	Effect of aerosols on pH of snow. Kumai, M., (1990, p 17-30) MP 2675
p.198-301 ₁ MP 1735 Engineering systems for wastewater treatment Lochr, R, et	324p; SR 82-17 Comparative near-millimeter wave propagation properties of	Snow compression Shallow snow performance of wheeled vehicles Harrison,
al, [1983, p 409-417] MP 1948	snow or rain. Nemarich, J., et al, (1983, p 115-129)	W.L., (1976, p 589-614) MP 1130
Wastewater treatment and reuse process for cold regions. Bouzoun, J.R., [1983, p 547-557] MP 2112	MP 1690 Detection of sound by persons buried under snow avalanche.	Unconfined compression tests on snow: a comparative study. Kovacs, A, et al, (1977, 27p) SR 77-20
Restoration of acidic dredge soils with sewage sludge and lime Palazzo, A.J., (1983, 11p) CR 83-28	Johnson, J.B., (1984, p.42-47) MP 1920 Audibility within and outside deposited snow. Johnson, J.B.,	Compression of wet snow Colbeck, S.C., et al, (1978, 17p.) CR 78-10
Accumulation, characterization, and stabilization of sludges	(1985, p.136-142) MP 1960	Effect of water content on the compressibility of snow-water
for cold regions lagoons Schneiter, R.W., et al., [1984, 40p] SR 84-08	Ground motion induced by an acoustic pulse, and its winter- time variations Peck, L., [1988, p 36!-385]	mixtures Abele, G., et al. [1979, 26p] CR 79-02 Volumetric constitutive law for snow under strain. Brown,
Problems and opportunities with winter wastewater treatment. Reed, S.C., (1986, p 16-20) MP 2205	MP 2597	R.L., [1979, 13p] CR 79-20 Constitutive relation for the deformation of snow. St. Law-
Treatment and disposal of alum and other metallic hydroxide	Observations of low-frequency acoustic-to-seismic coupling	rence, W F, et al. [1981, p 3-14] MP 1370
sludges Reed, S.C., et al., [1987, 40p + plates] SR 87-05	in the summer and winter. Albert, D.G., et al, [1989, p. 352-359] MP 2654	Macroscopic view of snow deformation under a vehicle. Richmond, P.W., et al. (1981, 20p.) SR 81-17
Rational design of sludge freezing beds Martel, CJ, 1988, p.575-581; MP 2343	Acoustic pulse propagation above grassland and snow Albert, D.G., et al. (1990, p.93-100) MP 2573	Workshop on snow traction mechanics, 1979. IIarnson, W.L., ed, (1981, 71p.) SR 81-16
Developing a thawing model for sludge freezing beds Mar-	Snow air interface	Snow measurements in relation to vehicle performance.
Predicting freezing design depth of sludge-freezing beds	Measurements of refractive index spectra over snow. Andreas, E.L., [1986, p 248-260] MP 2212	Harrison, W. L., (1981, p. 13-24) MP 1473 Techniques for gas gun studies of shock wave attenuation in
Martel, C.J., (1988, p. 145-156) MP 2461 Development and design of sludge freezing beds Martel,	Theory for scalar roughness and transfer coefficients over	snow Brown, JA, et al, [1988, p 657-660] MP 2543
C.J., (1988, 49p) CR 88-20	snow and ice Andreas, E.L., (1987, p.159-184) MP 2195	SNOW (CONSTRUCTION MATERIAL)
Dewaterability of freeze-thaw conditional sludges Martel, C.J., (1989, p 237-241) MP 2616	Spectral measurements in a disturbed boundary layer over snow. Andreas, E.L., [1987, p. 1912-1939] MP 2254	Methods of building on permanent snowfields Mellor, M., 1968, 43p Mill-A2a
Thermal conductivity of sludges Vesilind, PA, et al, [1989, p 241-245] MP 2632	On the micrometeorology of surface hoar growth on snow in	investigation and exploitation of snowfield sites Mellor, M., [1969, 57p] MIII-A2b
Development and design of sludge freezing beds Martel, C.J., (1989, p 799-808) MP 2556	mountainous area. Colbeck, S.C., [1988, p.1-12] MP 2359	Foundations and subsurface structures in snow. Mellor, M,
Simple and economical thermal conductivity measurement	Thermal model for snow-covered terrain Petzko, D.R., et al, (1989, p.25-36) MP 2625	[1969, 54p] N III-A2c Snow (construction material)
system. Atkins, R.T., [1989, p 108-116] MP 2566 Sludge dewatering by natural freeze-thaw. Martel, C.J.,	Snow-surface temperature analysis Bates, RE, et al,	Mechanical properties of snow used as construction material. Wuori, A.F., [1975, p.157-164] MP 1057
(1990, p 116-122) MP 2714	(1989, p.109-116) MP 2753 Air movement in snow due to windpumping Colbeck, S.C.,	The strength of natural and processed snow. Abele, G.,
Slush Statistics of coarsening in water-saturated snow. Colbeck.	(1989, p.209-213) MP 2562	(1975, p.176-186) MP 1058 Defensive works of subarctic snow. Johnson, P.R., (1977,
S C., [1986, p.347-352] MP 2015 Small arms ammunition	Snow bearing strength Mechanical properties of snow used as construction material	23p ₃ CR 77-06
Test of snow fortifications Farrell, D.R. (1979, 15p)	Wuori, A.F., [1975, p 157-164] MP 1057 The strength of natural and processed snow. Abele, G.	Role of research in developing surface protection measures for the Arctic Slope of Alaska. Johnson, P.R., 1978,
SR 79-33 Smoke generators	(1975, p 176-186) MP 1058	p 202-205; MP 1068 Bullet penetration in snow Cole, D.M., et al., (1979, 23p.)
Propane dispenser for cold fog dissipation system. Hicks, J.R., et al., r1973, 38p 1 MP 1033	Study of piles installed in polar snow Kovacs, A., (1976, 132p) CR 76-23	SR 79-25
Field sampling of snow for chemical obscurants at SNOW-	Snow compaction	Test of snow fortifications Farrell, D.R. (1979, 150) SR 79-23
TWO/Smoke Week VI Cragin, J H , [1984, p 265-270] MP 2096	Mechanical properties of snow used as construction material Wuori, A.F., (1975, p. 157-164) MP 1057	Snow fortifications as protection against shaped charge an- titank projectiles Farrell, D.R., (1980, 199.)
Snow chemistry of obscurants released during SNOW- TWO/Smoke Week VI Cragin, J.H., [1984, p.409-416]	The strength of natural and processed snow Abele, G., (1975, p. 176-186) AP 1058	SR 80-11 Snow in the construction of ice bridges Coutermarsh, B A.,
MP 1873	Sintering and compaction of snow containing liquid water	et al. (1985, 12p) SR 85-18
Snow Study of water drainage from columns of snow. Denoth. A.	Colbeck, S.C., et al. (1979, p.13-32) MP 1190 Compaction of wet snow on highways Colbeck, S.C.,	Winter field fortification. Farrell, D, [1986, 50p] SR 86-25
et al. (1979, 19p.) CR 79-01 Dynamics of snow and ice masses Colbeck, S.C. ed.	(1979, p 14-17) MP 1234 Vehicle tests and performance in snow. Berger, R.H., et al.	Contribution of snow to ice bridges Coutermarsh, B.A., et al., (1987, p 133-137) MP 2192
(1980, 468p) MP 1297	(1981, p 51-67) MP 1477	Compacted-snow runways design and construction guide-
Instrumented vehicle for the measurement of mobility parameters. Blaisdell, G L, [1988, p 377-388] MP 2486	Predicting wheeled vehicle motion resistance in shallow snow Blarsdell G L, [1981, 18p] SR 81-30	ines for Antarctica Russell-Head, D.S. et al. (1989, 68p.) SR 89-10
	, ,	

SNOW COVER Antarctic ice sheet. Mellor, M, (1961, 50p) M I-B1	Field investigations of vehicle traction in snow. Harrison, W L., (1981, p. 47-48) MP 1476	Water flow through heterogeneous snow. Colbeck, S.C. (1979, p.37-45) MP 121
Snow cover	Shallow snow test results Harrison, W.L., [1981, p 69-71]	Acoustic emission response in polycrystalline materials. St
ERTS mapping of Arctic and subarctic environments Anderson, D.M., et al., [1974, 128p] MP 1047	MP 1478 Near-infrared reflectance of snow-covered substrates O'-	Lawrence, W.F., (1979, p. 223-228) MP 1246 Constitutive relation for the deformation of snow St. Law
Ecological investigations of the tundra biome in the Prudhoe	Brien, H.W, et al. (1981, 17p) CR 81-21	rence, W.F., et al, [1981, p.3-14] MP 1370
Bay Region, Alaska Brown, J, ed, [1975, 215p.] MP 1053	Vechicle mobility and snowpack parameters Berger, R.H., [1983, 26p] CR 83-16	Overview of seasonal snow metamorphism. Colbeck, S.C. (1982, p 45-61) MP 1500
Generation of runoff from subarctic snowpacks et al, [1976, P.677-685] Dunne, T. MP 883	Progress in methods of measuring the free water content of snow Fisk, D J., (1983, p 48-51) MP 1649	Increased heat flow due to snow compaction: the simplistic approach. Colbeck, S.C., [1983, p. 227-229]
Computer routing of unsaturated flow through snow. Tuck-	Helicopter snow obscuration sub-test. Ebersole, JF,	MP 1693
er, W.B., et al. [1977, 44p] SR 77-10 Aerosols in Greenland snow and ice Kumai, M. [1977,	(1984, p.359-376) MP 2094 Detection of sound by persons buried under snow avalanche.	Observations of the backscatter from snow at millimete: wavelengths. Berger, R H., et al. (1986, p 311-316)
p.341-350 ₂ MP 1725	Johnson, J.B., (1984, p 42-47) MP 1920	SNOW CREEP
Water resources by satellite. McKim, H L, [1978, p 164- 169] MP 1090	Constraints and approaches in high latitude natural resource sampling and research. Slaughter, C.W., et al, t1984,	Properties of snow. Mellor, M., (1964, 105p)
Terminal baltistics in cold regions materials. Aitken, GW, [1978, 6p] MP 1182	p 41-46; MP 2013 Effects of snow on vehicle-generated seismic signatures Al-	M III-A
Modeling snow cover runoff meeting, Sep 1978. Colbeck,	bert, D.G., (1984, p.83-109) MP 2074	Growth of faceted crystals in a snow cover. Colbeck, S.C.
S C., ed, [1979, 432p] SR 79-36 Winter surveys of the upper Sustta River, Alaska Bilello,	Change in orientation of artillery-delivered anti-tank mines in snow Bigl, S.R., [1984, 20p] CR 84-20	(1982, 19p) CR 82-29 Snow crystal growth
M.A., (1980, 30p) SR 80-19	Effect of snow on vehicle-generated seismic signatures Albert, D.G., [1984, 24P] CR 84-23	Growth of faceted crystals in a snow cover Colbeck, S C [1982, 19p] CR 82-25
Impact fuse performance in snow (Initial evaluation of a new test technique). Aitken, G.W., et al. [1980, p 31-45]	Review of antitank obstacles for winter use Richmond,	Theory of metamorphism of dry snow Colbeck, S.C.
MP 1347 Snow cover characterization O'Brien, H W., et al, [1982,	PW. [1984, 12p] CR 84-25 Water supply and waste disposal in Greenland and Antarc-	[1983, p.5475-5482] MP 1603 Snow characterization at SNOW-ONE-B. Berger, R.H., e
p 559-577 ₁ MP 1564	tica Reed, S.C., et al. (1985, p 344-350) MP 1792	al, [1983, p.155-195] MP 1847 Comments on the metamorphism of snow. Colbeck, S.C
Landsat-4 thematic mapper (TM) for cold environments Gervin, J.C., et al, (1983, p. 179-186) MP 1651	Audibility within and outside deposited snow. Johnson, J.B., [1985, p. 136-142] MP 1960	(1983, p.149-151) MP 1650
Water supply and waste disposal on permanent snow fields Reed, S.C., et al. (1984, p.401-413) MP 1714	Meteorological and snow cover measurements at Grayling, Michigan. Bates, R.E., et al, [1985, p.212-229]	Comments on "Theory of metamorphism of dry snow" by S C. Colbeck. Sommerfeld, R A., [1984, p.4963-4965]
Conventional land mines in winter Richmond, PW,	MP 2176	What becomes of a winter snowflake Colbeck, S.C., [1985,
[1984, 23p] SR 84-30 Explosive obscuration sub-test results at the SNOW-TWO	Measurement and evaluation of tire performance under win- ter conditions Blaisdell, G L, [1985, p 198-228]	p 312-215 ₁ MP 2060
field experiment. Ebersole, J.F., et al. (1984, p. 347-354) MP 1872	MP 2387 Winter tire tests 1980-81 Blaisdell, G.L., et al., (1985,	Some observations on the character of snow. Townsend RA, et al, [1987, p 48-53] MP 2397
Permafrost, snow cover and vegetation in the USSR Bigl,	p 135-151 ₁ MP 2045	Metamorphism and classification of seasonal snow crystals Colbeck, S.C., [1987, p.3-34] MP 2438
SR., [1984, 128p.] SR 84-36 New method of measuring the snow-surface temperature	Field demonstration of traction testing procedures. Blais- dell, G L., [1985, p.176] MP 2046	Snow crystal growth at varying surface temperatures. Col-
Andreas, E.L., [1986, p. 39-156] MP 2166 Intercomparison of snow cover liquid water measurement	Mine detection in cold regions using short-pulse radar. Arcone, S A, [1985, 16p] SR 85-23	beck, S C., [1989, p 23-29] MP 2634 Snow crystal nuclei
techniques Boyne, H.S., et al. [1987, p 167-172]	Spectra and cospectra of atmospheric turbulence over snow	Composition and structure of South Pole snow crystals
MP 2262 History of snow-cover research. Colbeck, SC, 1987,	Andreas, E.L., [1986, p.219-233] MP 2661 Utilization of Unmanned Aerial Vehicles in the ALBE Thrust	Kumai, M, (1976, p 833-841) MP 853 Snow crystal structure
p 60-65 ₁ MP 2316 Kinetic friction of snow Colbeck, S.C., [1988, p.78-86 ₁	Greeley, HP, et al. (1986, p 249-257) MP 2663	Grain clusters in wet snow. Colbeck, S.C., (1979, p.371-384) MP 1267
MP 2339	Effect of snow on vehicle-generated seismic signatures. Albert, D.G., [1987, p 881-887] MP 2229	Volumetric constitutive law for snow. Brown, R L., [1980,
On the pressure drop through a uniform snow layer Yen, Y.C., (1988, 10p.) CR 88-14	Proceedings of the 6th Snow Symposium, Hanover, NH, 1986. (1987, 207p) SR 87-12	p.161-165; MP 1803 Snow crystal habit. Koh, G., et al, (1982, p.181-216)
Chemical migration in snowpack. Murphey, B.B., et al., 1989, p 282-286; MP 2757	Acoustic-to-seismic coupling through a snow layer Peck,	MP 1561 Airborne snow and fog distributions Berger, R.H., (1982,
Snow cover and glacier variations Colbeck, S.C., ed,	L., (1987, p 47-55) MP 2294 Spectral measurements in a disturbed boundary layer over	p 217-223 ₁ MP 1562
(1989, 111p) MP 2672 Sea ice thickness versus impulse radar time-of-flight data	snow. Andreas, E.L., (1987, 41p) CR 87-21 Obscuration and background dynamics in and over snow	Geometry and permittivity of snow at high frequencies Colbeck, S.C., [1982, p. 4495-4500] MP 1545
Kovacs, A., et al. (1990, p 91-98) MP 2704	Hogan, A.W., 1987, p. 181-185, MP 2417	Meteorology and observed snow crystal types during the SNOW-ONE experiment. Bilello, M.A., (1982, p.59-
SNOW COVER DISTRIBUTION Characteristics of the cold regions Gerdel, R.W., [1969,	Recent research on acoustic to seismic coupling. Albert, DG, (1987, p 223-225) MP 2418	75 ₁ MP 1983
51p.j M I-A Snow cover distribution	Seismic and acoustic wave propagation: working group report. Albert, D.G., et al., [1987, p.253-255] MP 2419	Snow Symposium, 2nd, 1982, [1983, 295p] SR 83-84 Atmospheric conditions and snow crystal observations during
Red and near-infrared spectral reflectance of snow O'Brien,	Vehicle mobility over snow. Blaisdell, G L., [1987, p 265-	SNOW-ONE-A. Bilello, M A, et al, [1983, p 3-18] MP 1754
H.W., et al. (1975, p 345-360) MP 872 Snow accumulation, distribution, melt, and runoff Colbeck,	Arctic mobility problems Abele, G, [1987, p 267-269]	Visible propagation in falling snow as a function of mass con-
S C, et al. (1979, p 465-468) MP 1233 Snow cover mapping in northern Maine using LANDSAT	MP 2421	centration and crystal type Lacombe, J. et al. (1983, p 103-111) MP 1757
Merry, C.J., et al. (1979, p 197-198) MP 1510	Estimating Cn square over snow and sea ice from meteorological quantities. Andreas, E L. (1988, p 258-267)	Snow particle morphology in the seasonal snow cover Colbeck, S.C., (1983, p. 602-609) MP 1684
Snowpack estimation in the St. John River basin Power, J.M., et al. [1980, p.467-486] MP 1799	MP 2440 Estimating Cn square over snow and sea ice from meteorolog-	Snow characterization at SNOW-ONE-B. Berger, R H, et
Snow cover and meteorology at Allagash, Maine, 1977-1980 Bates, R., (1983, 49p.) SR 83-20	ical data Andreas, E.L., [1988, p.481-495] MP 2393	al. [1983. p 155-195] MP 1847 Snow Symposium. 3rd. Hanover, NH. Aug 1983. Vol 1
Snow characterization at SNOW-ONE-B Berger, R.H., et	Experimental and theoretical studies of acoustic-to-seismic	[1983, 241p] SR 83-31 New classification system for the seasonal snow cover Col
al. (1983, p 155-195) MP 1847 Using Landsat data for snow cover vegetation mapping	coupling Albert, D.G. (1988, p. 19-31) MP 2432 Overview of obscuration in the cold environment Berger,	beck, S.C. [1984, p 179-181] MP 1921
Merry, C.J., et al. (1984, p II(140)-II(144)) MP 1975	R.H. et al. (1988, p 537-555) MP 2609 Antitank obstacles for winter use Richmond, PW. (1988,	Performance of microprocessor-controlled snow crystal repli- cator. Koh, G., [1984, p 107-111] MP 1860
Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p) CR 84-22	11p) SR 88-19	Approach to snow propagation modeling Koh, G., [1984, p. 247-259] KP 1869
Overview of meteorological and snow cover characterization at SNOW-TWO Bates, R.E. et al. (1984, p 171-191)	Using the Ground Emplaced Mine Scattering System in winter Richmond, P.W., et al. [1988, 13p] SR 88-27	Forward-scattering corrected extinction by nonspherical par-
MP 1868	SNOW III WEST field experiment report Volume 1. La- combe, J. et al. (1988, 170p) SR 88-28	ticles Bohren, C.F., et al., (1984, p.261-271) MP 1870
Dielectric measurements of snow cover Burns, B.A., et al. (1985, p.829-834) Burns, B.A., et al. MP 1913	Radar backscatter in snow at millimeter wave frequencies	Forward-scattering corrected extinction by nonspherical par- ticles. Bohren, C.F., et al. (1985, p. 1023-1029)
Use of Landsat for snow cover mapping, Saint John River basin, Maine Merry, C.J. et al. (1987-68p.)	Berger, R.H., et al. (1989, p 133-136) MP 2631 Wheeled versus tracked vehicle snow mobility test program	MP 1958
Snow properties and processes Colock, SC, (1987,	Green, C E, et al. (1989, 19p] MP 2715	Temperature dependence of the equilibrium form of ice Colbeck, S.C., [1985, p.726-732] MP 1935
p 145-150 ₁ MP 2413	Snow cover effects on antarctic sea ice thickness Ackley. SF, et al. [1990, p 16-21] MP 2726	What becomes of a winter snowflake Colbeck, S.C., 1985, p. 312-215, MP 2060
Snow cover effect Carbon dioxide dynamics on the Arctic tundra Coyne, P.I.,	Snow cover stability Instrument for determining snow properties related to traffi-	Classification of seasonal snow cover crystals Colbeck
et al. (1971, p 48-52) MP 903	cability Parrott, W.H., et al. (1972, p.193-204)	Impact of wet snow on visible, infrared and millimeter wave
Abiotic overview of the Tundra Biome Program, 1971 Weller, G. et al. (1971, p 173-181) MP 906	Acoustic emissions in the investigation of avalanches. St	attenuation Bates, R.E., et al. [1988, p. 523-535] MP 2606
Effect of snow cover on obstacle performance of vehicles Hanamoto, B., [1976, p.121-140] MP 933	Lawrence, W.F., (1977, p.VIII'24-VII'33) MP 1630 Dynamics of snow avalanches Mellor, M., (1978, p.753-	Application of serosol physics to snow research Hogan A.W., (1989, p. 201-207) MP 2756
Projectile and fragment penetration into ordinary snow	792 ₁ MP 1070	Snow crystal characterization. Koh. G., [1989, p 17-23]
Swinzow, G.K., (1977, 30p.) MP 1750 Snow and snow cover in military science Swinzow, G.K.	Snow studies associated with the sideways move of DY E-3. Tobiasson, W., (1979, p.117-124) MP 1312	Snow crystals MP 2642
(1978, p. 1-239-1-262) MP 926 Application of energetics to schicle trafficability problems	Snow cover structure Water percolation through homogeneous snow Colbeck.	Elemental compositions and concentrations of micros
Brown, R.L., (1981, p.25-38) MP 1474	S.C., et al. (1973, p. 242-257) MP 1025	pherules in snow and pack ice from the Weddell Sea Kumai, M, et al. [1983, p 128-131] MP 1777
Prediction methods for vehicle traction on snow Marrison, W.L., §1981, p. 39-46 ₁ MP 1475	Physical aspects of water flow through snow Colbeck S.C. (1978, p. 165-206) MP 1566	Scavenging of infrared screener EA 5763 by falling snow Cragin J H, et al. (1987, p.13-20) MP 2292

Snow crystals (cont.)	Growth of black ice, snow ice and snow thickness, subarctic	Snow impurities
Does snow have ion chromatographic properties Hewitt,	basins l eppäranta, M, (1983, p 59-70) MP 2063	Engineering properties of snow. Mellor, M., (1977, p.15-
A D, et al. [1989, p 165-171] MP 2755 Snow crystal characterization. Koh, G, [1989, p.17-23]	Regional an i seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p] CR 84-22	66 ₁ MP 1015
MP 2642	Use of Landsat for snow cover mapping, Saint John River	Atmospheric pollutants in snow cover runoff. Colbeck, S.C. [1981, p.1-10] MP 1586
Snow deformation	basın, Muine. Merry, C.J., et al. [1987, 68p]	Atmospheric pollutants in snow cover runoff. Colbeck, S.C.,
Compressibility characteristics of compacted snow. Abele, G, et al, [1976, 47p] CR 76-21	CR 87-08 Field observations of mine detection in snow using UHF	(1981, p.1383-1388) MP 1487
Thermodynamic deformation of wet snow Colbeck, S.C.	short-pulse radar Arcone, SA, et al, (1987, 24p)	Nitrate fluctuations in antarctic snow and firm et al. (1982, p 243-248) Parker, B C., MP 1551
(1976, 9p.) CR 76-44	Vehicle mobility over snow Blaisdell, G.L., 1987, p 265-	Evaporation of chemical agents from ice and snow. Leggett,
Acoustic emissions in the investigation of avalanches. St Lawrence, W.F., [1977, p VII/24-VII/33] MP 1630	266 ₁ MP 2420	DC, (1988, 10p) CR 88-03 Chemical migration in snowpack. Murphey, BB., et al,
Regelation and the deformation of wet snow. Colbeck, S.C.	Snowfall amounts and snow depths in Germany and NE USA.	(1989, p 282-286) MP 2757
et al, [1978, p 639-650] MP 1172 Effect of water content on the compressibility of snow-water	Bates, R E, et al, [1988, p 107-117] MP 2401 Roof design in cold regions Tobiasson, W, [1989, p 462-	Snow loads
mixtures Abele, G, et al. (1979, 26p) CR 79-02	472 ₁ MP 2613	Snow load design criteria for the United States Tobiasson, W., et al, [1976, p 70-72] MP 947
Acoustic emission response in polycrystalline materials. St	Perspective ground loads and mapping Tobiasson, W.	Update on snow load research at CRREL. Tobiasson, W., et
Lawrence, W.F., (1979, p 223-228) MP 1246 Volumetric constitutive law for snow under strain Brown,	(1989, p.512-513) MP 2614 Comparative studies of the winter climate at selected loca-	al, [1977, p 9-13] MP 1142 Methodology used in generation of snow load case histories.
R L., [1979, 13p] CR 79-20	tions in Europe and the United States. Bates, R.E., et al.	McLaughlin, D., et al. (1977, p.163-174) MP 1143
Analysis of plastic shock waves in snow Brown, RL, [1979, 14p.] CR 79-29	[1989, p 283-293] MP 2598 Sea ice thickness versus impulse radar time-of-flight data	Roof loads resulting from rain-on-snow. Colbeck, S.C.,
Volumetric constitutive law for snow Brown, R.L. [1980,	Kovacs, A, et al, [1990, p.91-98] MP 2704	[1977, 19p.] CR 77-12 Snow load data analysis, winter 1976-77. O'Rourke, M.,
p 161-165 ₁ MP 1803	Snow elasticity	(1977, 9p. + appends) MP 2427
Constitutive relation for the deformation of snow rence, W.F., et al., [1981, p.3-14] St. Law-MP 1370	Review of the propagation of inelastic pressure waves in snow Albert, D.G., [1983, 26p.] CR 83-13	Roof loads resulting from rain on snow. Colbeck, S.C., [1977, p 482-490] MP 982
Macroscopic view of snow deformation under a vehicle.	Snow electrical properties	Snow loads on structures O'Rourke, M.J., [1978, p 418-
Richmond, P.W., et al. [1981, 20p] SR 81-17 Firn quake (a rare and poorly explained phenomenon) Den-	Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015	428 ₁ MP 1801
Hartog, S.L., [1982, p 173-174] MP 1571	Dielectric constant and reflection coefficient of snow surface	Loading on the Hartford Civic Center roof before collapse. Redfield, R, et al, [1979, 32p] SR 79-09
SNOW DENSITY	layers in the McMurdo Ice Shelf Kovacs, A., et al. (1977,	Impact fuse performance in snow (Initial evaluation of a new
Greenland ice sheet Bader, H., (1961, 18p) M I-B2 Snow density	p.137-138 ₁ MP 1011 Liquid distribution and the dielectric constant of wet snow.	test technique). Aitken, GW, et al. (1980, p 31-45) MP 1347
Mesoscale measurement of snow-cover properties Bilello.	Colbeck, S C, [1980, p 21-39] MP 1349	New 2 and 3 inch diameter CRREL snow samplers Bates,
M.A., ct al, [1973, p 624-643] MP 1029	Geometry and permittivity of snow at high frequencies Col-	R.E, et al, [1980, p 199-200] MP 1430
Compressibility characteristics of compacted snow. Abele, G, et al. [1976, 47p] CR 76-21	beck, S.C., [1982, p. 4495-4500] MP 1545 Geometry and permittivity of snow. Colbeck, S.C., [1982,	Uniform snow loads on structures. O'Rourke, M.J., et al., [1982, p 2781-2798] MP 1574
Update on snow load research at CRREL. Tobiasson, W., et	p.113-131 ₃ MP 1985	Ground snow loads for structural design Ellingwood, B., et
al, (1977, p.9-13) MP 1142	Progress in methods of measuring the free water content of snow Fisk, D J, (1983, p.48-51) MP 1649	al, [1983, p.950-964] MP 1734 Atmospheric icing of structures Minsk, L.D., ed. [1983,
Defensive works of subarctic snow Johnson, P.R., (1977, 23p) CR 77-06	use of radio frequency sensor for snow/soil moisture water	366p ₁ SR 83-17
Projectile and fragment penetration into ordinary snow	content measurement McKim, H L., et al. (1983, p 33-	Probability models for annual extreme water-equivalent
Swinzow, G.K, [1977, 30p] MP 1750 Effect of water content on the compressibility of snow-water	42) MP 1689 Snow-cover characterization: SADARM support O'Brien,	ground snow. Ellingwood, B., et al, [1984, p.1153-1159] MP 1823
mixtures Abele, G, et al, (1979, 26p) CR 79-02	H, et al, (1984, p 409-411) MP 2095	Secondary stress within the structural frame of DYE-3: 1978-
Snowpack optical properties in the infrared Berger, R H.	Dielectric measurements of snow cover Burns, BA, et al.	1983 Ucda, HT, et al, [1984, 44p] SR 84-26 Proposed code provisions for drifted snow loads O'Rourke,
(1979, 16p) CR 79-11 Pressure waves in snow Brown, R.L. (1980, p 99-107)	(1985, p 829-834) MP 1913 SNOW FENCES	M., et al. (1986, p 2080-2092) MP 2148
MP 1306	Blowing snow Mellor, M., (1965, 79p) M III-A3c	Environments and standards for military operation. Opitz,
Analysis of non-steady plastic shock waves in snow. Brown, R.L., [1980, p. 279-287] MP 1354	Snow fences	B K. et al. (1987, 137p) MP 2309 International Conference on Snow Engineering, 1st, July
Propagation of stress waves in alpine snow. Brown, R.L.	Computer simulation of the snowmelt and soil thermal regime at Barrow, Alaska Outcalt, SI, et al. (1975, p 709-715)	1988 (1989, 573p) SR 89-06
[1980, p 235-243] MP 1367	MP 857	Changes coming in snow load design criteria Tobiasson, W. (1989, p.413-418) MP 2612
lce characteristics in Whitefish Bay and St. Marys River in winter. Vance, G.P., (1980, 27p.) SR 80-32	Snowdrift control at ILS facilities in Alaska. Calkins, D.J., (1976, 41p.) MP 914	Perspective ground loads and mapping Tobiasson, W.,
Investigation of the snow adjacent to Dye-2, Greenland	Hydraulic model investigation of drifting snow Wuebben,	(1989, p 512-513) MP 2614
Ueda, H.T., et al. (1981, 23p) SR 81-03	J L., (1978, 29p) CR 78-16	Changes coming in snow load design criteria Tobiasson, W., [1989. p 918-920] MP 2650
Review of thermal properties of snow, ice and sea ice Yen, YC., (1981, 27p) CR 81-10	Snow hardness Snow cover characterization O'Brien, H.W., et al., [1982]	SNOW MECHANICS
Macroscopic view of snow deformation under a vehicle	p 559-577 ₁ MP 1564	Explosions and snow. Mellor, M. (1965, 34p) M III-A3a
Richmond, P.W., et al. (1981 20p.) SR 81-17 Snow cover characterization O'Brien, H.W., et al. (1982,	Snow heat flux	Snow mechanics
p 559-577 ₁ MP 1564	Increased heat flow due to snow compaction, the simplistic approach. Colbeck, S.C., [1983, p 227-229]	Mechanical properties of snow used as construction material.
Geometry and permittivity of snow at high frequencies. Col- beck, S.C., 1982, p. 4495-4500; MP 1545	MP 1693	Wuon, A.F., (1975, p.157-164) MP 1057
Permeability of a melting snow cover Colbeck, S.C. et al.	Thermal convection in snow. Powers, DJ, et al. (1985, 61p.) CR 85-09	Study of piles installed in polar snow. Kovacs, A., 1976, 132p.; CR 76-23
(1982, p 904-908) MP 1565		
Deceleration of projectiles in snow Albert, D.G. et al.	Field observations of thermal convection in a subarctic snow	Shallow snow performance of wheeled vehicles Harrison.
r1982, 290 1 CR 87-70	Field observations of thermal convection in a subarctic snow cover. Johnson, J.B., et al. [1987, p 105-118]	W.L., [1976, p 589-614] MP 1130
(1982, 29p) CR 82-20 Utilization of the snow field test series results for development	cover. Johnson, J.B., et al. [1987, p 105-118] MP 2439	W.L., [1976, p 589-614] MP 1130 Ice and snow at high altitudes. Mellor, M. [1977, 10p] MP 1121
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983,	cover. Johnson, J.B., et al., [1987, p 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p 5- 2 ³] MP 2624	W.L., 1976, p 589-614; MP 1130 lcc and snow at high altitudes. Mellor, M., (1977, 10p.) MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p. 209-217] MP 1692 Regional and seasonal variations in snow-cover density in the	cover. Johnson, J.B., et al., [1987, p 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p 5-23] MP 2624 Thermal model for snow-covered terrain Petzko, D.R., et	W.L., [1976, p 589-614] MP 1130 lcc and snow at high altitudes. Mellor, M., [1977, 10p.] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p. 209-217] MP 1692 Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p] CR 84-22	cover. Johnson, J.B., et al., [1987, p 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p 5- 2 ³] MP 2624	W.L., 1976, p 589-614; MP 1130 lcc and snow at high altitudes. Mellor, M., (1977, 10p) MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) MP 1015 Avial double point-load tests on snow and ice (1978, 11p) CR 78-01
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p.209-217]. MP 1692. Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p.]. CR 84-22. International Conference on Snow Engineering, 1st, July	cover. Johnson, J.B., et al., [1987, p. 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p. 5-23] Thermal model for snow-covered terrain Petzko, D.R., et al., [1989, p. 25-36] MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydro-	W.L., [1976, p 589-614] MP 1130 lcc and snow at high altitudes. Mellor, M., [1977, 109, MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] Avial double point-load tests on snow and icc (1978, 11p). Sintering and compaction of snow containing liquid water
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersole, J F., et al., [1983, p 209-217] MP 1692 Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 [1989, 573p.] SR 89-06 Comparative studies of the winter climate at selected loca-	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989, p 5- 24) Thermal model for snow-covered terrain al. (1989, p 25-36) MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p) CR 76-11	W.L., 1976, p 589-614; MP 1130 lcc and snow at high altitudes. Mellor, M., [1977, 10p; MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015 Axial double point-load tests on snow and icc (1978, 11p; Sintering and compaction of snow containing liquid water Colbeck. S.C., ct al., [1979, p.13-32] MP 1190 Volumetric constitutive law for snow Brown, R.L., [1980,
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p.209-217] Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p.] U.S.S.R. Bilello, M.A., [1984, 70p.] International Conference on Snow Engineering, 1st. July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States. Bates, R.E., et al.	cover. Johnson, J.B., et al., [1987, p. 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p. 5-23] Thermal model for snow-covered terrain Petzko, D.R., et al., [1989, p. 25-36] MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydro-	W.L., [1976, p 589-614] MP 1130 lcc and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015 Axial double point-load tests on snow and icc (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., ct al., [1979, p.13-32] Volumetric constitutive law for snow p 161-165j MP 1803
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersele, J. F. et al., [1983, p. 209-217] Regional and seasonal variations in snow-cover density in the U.S.S. R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., [1989, p. 283-293] Friction loss through a uniform snow layer. Yen, Y.C.	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989, p 5-24) Thermal model for snow-covered terrain Petzko, D R. et al. (1989, p 25-36) MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p) On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack.	W.L., 1976, p 589-6143 Ice and snow at high altitudes. Mellor, M., [1977, 109] MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) Avial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck. S.C., et al., [1979, p.13-32] Wolumetric constitutive law for snow Brown, R. L., (1980, p 161-165) Analysis of non-steady plastic shock waves in snow Brown.
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p.209-2175] Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1989, p.283-293) Friction loss through a uniform snow layer. Yen, Y.C., [1990, p.83-90]	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989, p 5-22) Thermal model for snow-covered terrain al. (1989, p 25-36) Snow hydrology Lifects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p) On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) Energy balance and runoff from a subarctic sowapack. Price, A.G., et al. (1976, 29p) MP 2439 MP 2625 Snow hydrology CR 76-11 On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) Energy balance and runoff from a subarctic conspace.	W.L., [1976, p 589-614] MP 1130 lcc and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) MP 1015 Axial double point-load tests on snow and icc (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., ct al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., (1980, p. 161-165) Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p. 279-287) Workshop on snow traction mechanics, 1979 Harrison,
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p. 209-217] Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p]. CR 84-22 International Conference on Snow Engineering. Ist, July 1988 (1989, 573p]. SR 89-06 Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1989, p. 283-293). MP 2598 Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90). Snow depth	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989, p 5-24) Thermal model for snow-covered terrain Petzko, D R. et al. (1989, p 25-36) MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p) On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack.	W.L., 1976, p 589-6143 Ice and snow at high altitudes. Mellor, M., [1977, 109] MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) Avial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck. S.C., et al., [1979, p.13-32] Wolumetric constitutive law for snow p 161-165, Analysis of non-steady plastic shock waves in snow Brown, R.L., (1980, p. 279-287) Workshop on snow traction mechanics, 1979 Will., ed., (1981, 71p) Well., ed., (1981, 71p) RMP 130
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J.F., et al., [1983, p.209-217] Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering. 1st. July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1989, p.283-293) Frietion loss through a uniform snow layer. Yen, Y.C., (1990, p.83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p.214-241) MP 887	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989, p 5-24) Thermal model for snow-covered terrain al. (1989, p 25-36) Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p) CR 76-11 On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack, Price, A.G., et al. (1976, 29p) CR 76-27 Short-term forecasting of water run-off from snow and ice Colbeck, S.C. (1977, p 571-588) MP 1067 Physical aspects of water flow through snow Colbeck, S.C.	W.L., [1976, p 589-614] MP 1130 lcc and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) MP 1015 Axial double point-load tests on snow and icc (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., ct al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., (1980, p. 161-165) Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p. 279-287) Workshop on snow traction mechanics, 1979 Harrison,
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersole, J F., et al., [1983, p 209-217] MP 1692 Regional and sacional variations in snow-cover density in the U.S. S R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] SR 89-06 Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1982, p 283-293) Friction loss through a uniform snow layer. (1990, p 83-90) Friction loss through a uniform snow layer. (1990, p 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., [1972, p 214-241] MP 887 Mesoscale measurement of snow-cover properties Bilello,	cover. Johnson, J.B., et al., [1987, p. 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p. 5-23] Thermal model for snow-covered terrain p. 2624b, D. R., et al., [1989, p. 25-36] MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, 9. p.] On the use of tensiometers in snow hydrology. S.C., [1976, p. 135-140] Energy balance and runoff from a subarctic snowpack. Price, A.G., et al., [1976, 29. p.] Short-term forecasting of water run-off from snow and ice Colbeck, S.C., (1977, p. 571-588) Physical aspects of water flow through snow Colbeck, S.C., [1978, p. 165-206)	W.L., 1976, p 589-6143 lee and snow at high altitudes. Mellor, M., [1977, 105, MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck. S.C., et al., (1979, p.13-32) Volumetric constitutive law for snow Brown, R. L., (1980, p 161-165), p 161-165, p 161-165, p 181-165, p 181-167, mm 191-168, p 181-168, mm 191-168, p 181-168, p 181-1
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J. F., et al., (1983, p. 209-217) Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.) CR 84-22 International Conference on Snow Engineering. Ist., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1989, p. 283-293) Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p. 214-241) Mesoccale measurement of snow-cover properties Bilello, M.A., et al., (1973, p. 624-643) Analysis of snow water equivalent using LANDSAT data	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989 p 5-22) Thermal model for snow-covered terrain al. (1989, p 25-36) Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p.) CR 76-11 On the use of tensiometers in snow hydrology. Colbeck, S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack, Price, A.G., et al. (1976, 29p.) Short-term forecasting of water run-off from snow and ice Colbeck, S.C. (1977, p 571-588) MP 1067 Physical aspects of water flow through snow (1978, p 165-206) Snow, ice and frozen ground revearch at the Sleepers River, VT. Pangburn, T., et al. (1984, p 229-240)	W.L., [1976, p 589-614] Ice and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) MP 1015 Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck. S.C., et al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R., (1980, p. 161-165) Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p. 279-287) Workshop on snow traction mechanics, 1979 W.L., ed., [1981, 71p] Modelling a snowdrift by means of activated clay particles Anno, Y., (1985, p. 48-52) MP 2007
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersole, J. F. et al., [1983, p. 209-217] Regional and seasonal variations in snow-cover density in the U.S. S. R. Biello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., [1989, p. 283-293] Friction loss through a uniform snow layer. Yen, Y.C., [1990, p. 83-90] Some depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., [1972, p. 214-241] MP 887 Mesoccale measurement of snow-cover properties Biello, M.A., et al., [1973, p. 624-643] Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., [1977, 16 leaves) MP 1113	cover. Johnson, J.B., et al., [1987, p. 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p. 5-23] Thermal model for snow-covered terrain p. 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, 9p.] On the use of tensiometers in snow hydrology. S.C., [1976, p. 113-140] Energy balance and runoff from a subarctic snowpack, Price, A.G., et al., [1976, 29p.] Short-term forecasting of water run-off from snow and ice Colbeck, S.C., [1977, p. 571-588] Physical aspects of water flow through snow Colbeck, S.C., [1978, p. 155-206] Snow, ice and frozen ground research at the Sleepers River, VI Pangburn, T., et al., [1984, p. 229-240] MP 2071	W.L., 1976, p 589-6143 lee and snow at high altitudes. Mellor, M., [1977, 105, MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck. S.C., et al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R.L., (1980, p 161-165) Analysis of non-steady plastic shock waves in snow Brown, R.L., (1980, p 279-287) Workshop on snow traction mechanics, 1979 Will., ed., (1981, 71p) Medelling a snowdrift by means of activated clay particles Anno, Y., (1985, p 48-52) Comparison of snow cover liquid water measurement techniques Boyne, H.S., et al., (1987, p 1833-1836) MP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J. F., et al., (1983, p. 209-217) Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.) CR 84-22 International Conference on Snow Engineering. Ist., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1989, p. 283-293) Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p. 214-241) Mesoccale measurement of snow-cover properties Bilello, M.A., et al., (1973, p. 624-643) Analysis of snow water equivalent using LANDSAT data	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989 p 5-22) Thermal model for snow-covered terrain al. (1989, p 25-36) Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p.) CR 76-11 On the use of tensiometers in snow hydrology. Colbeck, S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack, Price, A.G., et al. (1976, 29p.) Short-term forecasting of water run-off from snow and ice Colbeck, S.C. (1977, p 571-588) MP 1067 Physical aspects of water flow through snow (1978, p 165-206) Snow, ice and frozen ground revearch at the Sleepers River, VT. Pangburn, T., et al. (1984, p 229-240)	W.L., [1976, p 589-614] Ice and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015 Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., ct al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., [1980, p 161-165] Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p 279-287) Workshop on snow traction mechanics, 1979 William, C. (1981, 71p) Mrdelling a snowdrift by means of activated clay particles Anno, Y., (1985, p 48-52) Comparison of snow cover liquid water measurement techniques Boyne, H.S., ct al., (1987, p 1833-1836) MP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., (1988, p 1513-1518)
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersole, J. F. et al., [1983, p. 209-217] Regional and seasonal variations in snow-cover density in the U.S. S. R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., (1989, p. 283-293) Friction loss through a uniform snow layer. MP 2598 Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p. 214-241) MP 887 Mestocale measurement of snow-cover properties Bilello, M.A., et al., (1973, p. 624-643) Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) MP 1113 Snow cover mapping in northern Maine using LANDSAT Merry, C.J., et al., (1977, 16 leaves) MP 1510 Me characteristics in Whitefish Bay and St. Marry, River in	cover. Johnson, J.B., et al., [1987, p. 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p. 5-23] Thermal model for snow-covered terrain al., [1989, p. 25-36] Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, 9p.] On the use of tensiometers in snow hydrology. Colbeck, S.C., [1976, p. 135-140] Energy balance and runoff from a subarctic snowpack. Price, A.G., et al., [1976, 29p.] Short-term forecasting of water run-off from snow and ice Colbeck, S.C., [1977, p. 571-588] MP 1067 Physical aspects of water flow through snow Colbeck, S.C., [1978, p. 165-206] Snow, ice and frozen ground research at the Sleepers River, VT Pangburn, T., et al., [1984, p. 229-240] History of snow-cover research Colbeck, S.C., [1987, MP 2316] Snow properties and processes Colbeck, S.C., [1987, MP 2316]	W.L., [1976, p 589-614] Ice and snow at high altitudes. Mellor, M. [1977, 109, MP 1121 Engineering properties of snow. Mellor, M. [1977, p 15-66] Avail double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al. [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., [1980, p 279-287] MP 1190 Analysis of non-steady plastic shock waves in snow Brown, R. L., [1980, p 279-287] Workshop on snow traction mechanics, 1979 W.L., ed., [1981, 71p) Wodelling a snowdrift by means of activated clay particles Anno, Y., [1985, p 48-52] Comparison of snow cover liquid water measurement techniques Boyne, HS, et al., [1987, p 1833-1836] WP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., [1988, p 1513-1518] Overview of obscuration in the cold environment Berger, R. H. et al., [1988, p 537-555] WP 2609
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J. F. et al., [1983, p. 209-217) Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.) Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.) CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States. Bates, R.E., et al., (1989, p. 283-293) MP 2598 Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1973, p. 624-643) MS osociale measurement of snow-cover properties. Bilello, M.A., et al., (1973, p. 624-643) MP 1029 Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) Snow cover mapping in northern Maine using LANDSAT Merry, C.J., et al., (1977, p. 197-198) Ice characteristics in Whitefish Bay and St. Mary Sniver in winter. Vance, G.P., (1980, 27p.) SR 80-32	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989 p 5-23) Thermal model for snow-covered terrain Petzko, D.R. et al. (1989, p 25-36) MP 2624 Thermal model for snow-covered terrain Petzko, D.R. et al. (1989, p 25-36) MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, p 9p.) CR 76-11 On the use of tensiometers in snow hydrology. Colbeck, S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack, Price, A.G., et al. (1976, 29p.) Short-term forecasting of water run-off from snow and ice Colbeck, S.C. (1977, p 571-588) MP 1067 Physical aspects of water flow through snow (1978, p 165-206) Snow, ice and frozen ground research at the Sleepers River, VI Pangburn, T., et al. (1984, p 229-240) MP 2071 History of snow-cover research Colbeck, S.C. (1987, p 60-65) Snow properties and processes Colbeck, S.C. (1987, p 145-150) MP 2413	W.L., [1976, p 589-614] Ice and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015 Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., (1980, p 161-165) Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p 279-287) Workshop on snow traction mechanics, 1979 William, C.L., [1985, p 48-52] Modelling a snowdrift by means of activated clay particles Anno, Y., (1985, p 48-52) MP 2007 Comparison of snow cover liquid water measurement techniques Boyne, H.S., et al., [1987, p 1833-1836) MP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., [1988, p 1513-1518] Overview of obscuration in the cold environment Berger, R.H. et al., [1988, p 537-555] MP 2341 Overview of obscuration in the cold environment Berger, MP 2369 International Conference on Snow Engineering, 1st, July
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersele, J. F. et al., [1983, p. 209-217) Regional and seasonal variations in snow-cover density in the U.S. S. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E. et al., (1980, p. 283-293) Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p. 214-241) MP 887 Mestocale measurement of snow-cover properties Bilello, M.A., et al., (1973, p. 624-643) Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) MP 1113 Snow cover mapping in northern Maine using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) MP 1510 Lee characteristics in Whitefish Bay and St. Marry, River in winter. Vance, G.P., (1980, 27p.) MP 1478	cover. Johnson, J.B., et al., [1987, p 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p 5-23] Thermal model for snow-covered terrain p 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, 9p] CR 76-11 On the use of tensiometers in snow hydrology. Colbeck, S.C., [1976, p 135-140] MP 843 Energy balance and runoff from a subarctic snowpack, Price, A.G., et al., [1976, 29p] CR 76-27 Short-term forecasting of water run-off from snow and ice Colbeck, S.C., [1977, p 571-588] MP 1067 Physical aspects of water flow through snow Colbeck, S.C., [1978, p 165-206] Snow, ice and frozen ground research at the Sleepers River, VT Pangburn, T., et al., [1984, p 229-240] History of snow-cover research Colbeck, S.C., [1987, p 60-65] Snow properties and processes Colbeck, S.C., [1987, p 145-150] Snow hydrology in the upper Yamuna basin, India Valhotra, R.V., et al., [1988, p 84-93]	W.L., [1976, p 589-614] Ice and snow at high altitudes. Mellor, M. [1977, 109, MP 1121 Engineering properties of snow. Mellor, M. [1977, p 15-66] Avail double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al. [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., [1980, p 279-287] MP 1190 Analysis of non-steady plastic shock waves in snow Brown, R. L., [1980, p 279-287] Workshop on snow traction mechanics, 1979 W.L., ed., [1981, 71p) Wodelling a snowdrift by means of activated clay particles Anno, Y., [1985, p 48-52] Comparison of snow cover liquid water measurement techniques Boyne, HS, et al., [1987, p 1833-1836] WP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., [1988, p 1513-1518] Overview of obscuration in the cold environment Berger, R. H. et al., [1988, p 537-555] WP 2609
Utilization of the snow field test series results for development of a snow obscuration primer. Ebersole, J. F. et al., [1983, p. 209-217). Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.). Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.). Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p.). Regional and seasonal variations in snow-cover density in the U.S.R. Bilello, M.R. Bates, R.E., et al., (1988, 1989, 573p.). Small states and the United States. Bates, R.E., et al., (1989, p. 283-293). MP 2598. Priction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90). Snow depth. Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p. 214-241). MP 887 Mesoscale measurement of snow-cover properties. Bilello, M.A., et al., (1973, 624-643). MP 1029 Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., (1977, 16 leaves). Snow cover mapping in northern Maine using LANDSAT Merry, C.J., et al., (1977, p. 197-198). MP 1510 Ice characteristics in Whitefish Bay and St. Mary, River in winter. Vance, G.P., (1980, 27p.). SR 80-32 Shallow snow test results. Harrison, W.L., (1981, p. 69-71), MP 1478 Predicting wheeled vehicle motion resistance in shallow.	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989 p 5-23) Thermal model for snow-covered terrain Petzko, D R. et al. (1989, p 25-36) MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S C. (1976, 9p) CR 76-11 On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack. Price, A G., et al. (1976, 29p) CR 76-27 Short-term forecasting of water run-off from snow and ice Colbeck, S C. (1977, p 571-588) MP 1067 Physical aspects of water flow through snow Colbeck, S C. (1978, p 165-206) Snow, ice and frozen ground research at the Sleepers River, VI Pangburn, T., et al. (1984, p 229-240) History of snow-cover research Colbeck, S C. (1987, p 60-65) Snow properties and processes Colbeck, S C. (1987, p 145-150) Snow hydrology in the upper Yamuna basin, India Malhotta, R V. et al. (1988, p 84-93) Snow lee	W.L., [1976, p 589-614] lec and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] Avial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck. S.C., et al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., [1980, p 161-165] Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p 279-287) Workshop on snow traction mechanics, 1979 William, C. (1981, 71p) Modelling a snowdrift by means of activated clay should be added to the finite of the should be should b
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersole, J. F. et al., [1983, p. 209-217; MP 1692 Regional and seasonal variations in snow—cover density in the U.S.S.R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] Snow Europe and the United States Bates, R.E., et al., (1989, p. 283-293) MP 2598 Friction loss through a uniform snow layer. Yen, Y.C., (1990, p. 83-90) MP 2793 Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., (1972, p. 214-241) MP 887 Mesoccale measurement of snow-cover properties Biello, M.A., et al., (1973, p. 624-643) MP 1029 Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) MP 1113 Snow cover mapping in northern Maine using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) MP 1510 Ice characteristics in Whitefish Bay and St. Mary, River in winter. Vance, G.P., (1980, 27p.) SR 80-32 Shallow snow test results. Harrison, W, (1981, p. 69-71), MP 1478 Predicting wheeled vehicle motion resistance in shallow snow. Blaisdell, G.L., (1981, 18p.). SR 81-30	cover. Johnson, J.B., et al., [1987, p 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p 5-23] Thermal model for snow-covered terrain p 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, 9p] CR 76-11 On the use of tensiometers in snow hydrology. Colbeck, S.C., [1976, p 135-140] MP 843 Energy balance and runoff from a subarctic snowpack, Price, A.G., et al., [1976, 29p] CR 76-27 Short-term forecasting of water run-off from snow and ice Colbeck, S.C., [1977, p 571-588] MP 1067 Physical aspects of water flow through snow Colbeck, S.C., [1978, p 165-206] Snow, ice and frozen ground research at the Sleepers River, VT Pangburn, T., et al., [1984, p 229-240] History of snow-cover research Colbeck, S.C., [1987, p 60-65] Snow properties and processes Colbeck, S.C., [1987, p 145-150] Snow hydrology in the upper Yamuna basin, India Valhotra, R.V., et al., [1988, p 84-93]	W.L., (1976, p 589-614) lee and snow at high altitudes. Mellor, M., (1977, 105) MP 1121 Engineering properties of snow. Mellor, M., (1977, p 15-66) MP 1015 Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., (1979, p.13-32) Volumetric constitutive law for snow Brown, R. L., (1980, p 161-165) Analysis of non-steady plastic shock waves in snow Brown, R. L., (1980, p. 279-287) Workshop on snow traction mechanics, 1979 Workshop on snow traction mechanics, 1979 William (1980, p. 279-287) Workshop on snow traction mechanics, 1979 Workshop on snow traction mechanics, 1979 Comparison of snow cover liquid water measurement techniques Boyne, H.S., et al., (1987, p 1833-1836) MP 2007 Comparison of snow cover liquid water measurement techniques Boyne, H.S., et al., (1987, p 1833-1836) MP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., (1988, p 1513-1518) Overview of obscuration in the cold environment Berger, R.H. et al., (1988, p.537-555) International Conference on Snow Engineering, 1st, July 1988, (1989, 573p) SR 89-06 Snow melting Spread of cetyl-1-C14 alcohol on a melting snow surface, Meiman, J.R., et al., (1966, p 5-8) MP 276
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersole, J F., et al., [1983, p 209-217] Regional and seasonal variations in snow—cover density in the U.S. S.R. Bilello, M.A., [1984, 70p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] CR 84-22 International Conference on Snow Engineering, 1st, July 1988 (1989, 573p.] Experimental States at selected locations in Europe and the United States Bates, R.E., et al., [1982, p 283-293] Friction loss through a uniform snow layer. Yen, Y.C., (1990, p 83-90) Friction loss through a uniform snow layer. Yen, Y.C., (1990, p 83-90) Friction loss through a uniform snow layer. Yen, Y.C., (1990, p 83-90) MP 2703 Friction loss through a uniform snow layer. Yen, Y.C., (1982, p 40) MP 2703 MP 887 MP 887 MS 886-03 MS 1990, p 39-90 MP 1029 Analysis of snow sater equivalent using LANDSAT data Merry, C.J., et al., (1977, 16 leaves) MP 1019 Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., (1979, p 197-1198) MP 1510 Ice characteristics in Whitefish Bay and St. Mary, River in winter. Vance, G.P., (1980, 27p.) SR 80-32 SR 80-32 Shallow snow text results. Harrison, W.L., (1981, p 69-71) MP 1478 Predicting wheeled vehicle motion resistance in shallow snow Blaisdell, G.L., (1981, 18p.) SR 81-30 Snow cover characterization O'Brien, H.W., et al., (1982, p 559-577) MP 1564	cover. Johnson, J.B. et al. (1987, p 105-118) MP 2439 Snow as a thermal background Jordan, R. et al. (1989 p 5-23) Thermal model for snow-covered terrain Petzko, D.R. et al. (1989, p 25-36) MP 2625 Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C. (1976, 9p.) On the use of tensiometers in snow hydrology. S.C. (1976, p 135-140) S.C. (1976, p 135-140) Energy balance and runoff from a subarctic snowpack. Price, A.G., et al. (1976, 29p.) CR 76-27 Short-term forecasting of water run-off from snow and ice Colbeck, S.C. (1977, p 571-588) MP 1067 Physical aspects of water flow through snow Colbeck, S.C. (1978, p 165-206) Snow, ice and frozen ground research at the Sleepers River, VI Pangburn, T., et al. (1984, p 229-240) MP 2071 History of snow-cover research Colbeck, S.C. (1987, p 60-65) Snow properties and processes Colbeck, S.C. (1987, p 145-150) Snow hydrology in the upper Yamuna basin, India Malhotta, R.V. et al. (1988, p 84-93) Snow ice Growth of black ice, snow ice and snow thickness subarctic basins. Lepparanta, M. (1983, p 59-70) MP 2063 Snow lee interface	W.L., [1976, p 589-614] lea and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015 Axial double point-load tests on snow and ice (1978, 119) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., [1980, p 161-165] Analysis of non-steady plastic shock waves in snow Brown, R. L., [1980, p. 279-287] Workshop on snow traction mechanics, 1979 W.L., ed., [1981, 71p] Modelling a snowdrift by means of activated clay particles Anno, Y., [1985, p 48-52] Comparison of snow cover liquid water measurement techniques Boyne, H. S., et al., [1987, p 1833-1836] MP 2007 Comparison of snow cover liquid water measurement techniques Boyne, H. S., et al., [1987, p 1833-1836] MP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., [1988, p 1513-1518] Overview of obscuration in the cold environment Berger, R. H. et al., [1988, p.537-555] MP 2341 Overview of obscuration in the cold environment Berger, R. H. et al., [1988, p.537-555] Snow melting Spread of cetyl-1-C14 alcohol on a melting snow surface. Meman, J. R., et al., [1966, p.5-8] Short-term forecasting of water run-off from snow and ice. Colbeck, S. C., [1977, p.571-588] MP 1067
Utilization of the snow field text series results for development of a snow obscuration primer. Ebersele, J. F. et al., [1983, p 209-217] Regional and seasonal variations in snow-cover density in the U.S. S. Bilello, M.A., [1983, 70p.] CR 84-22 International Conference on Snow Engineering, 1st., July 1988 (1989, 573p.) Comparative studies of the winter climate at selected locations in Europe and the United States Bates, R.E., et al., [1989, p 283-293] Friction loss through a uniform snow layer. Yen, Y.C., (1990, p 83-90) Snow depth Some effects of air cushion vehicle operations on deep snow Abele, G., et al., [1972, p 214-241] MP 887 Mesocate measurement of snow-cover properties MA. et al., [1973, p 624-643] Analysis of snow water equivalent using LANDSAT data Merry, C.J., et al., [1977, 16 leaves) MP 1113 Snow cover mapping in northern Maine using LANDSAT data Merry, C.J., et al., [1977, 16 leaves) MP 1113 Snow cover mapping in northern Maine using LANDSAT data Merry, C.J., et al., [1977, 16 leaves) MP 1110 Snow cover mapping wheeled with the mainer using LANDSAT Merry, C.J., et al., [1977, 16 leaves) MP 1478 Predicting wheeled vehicle motion resistance in shallow snow Blaisdell, G.T., [1981, 18p.] Snow-cover characterization O'Brien, H.W., et al., [1982, 1881-30] Snow-cover characterization O'Brien, H.W., et al., [1982, 1872, 1872)	cover. Johnson, J.B., et al., [1987, p 105-118] MP 2439 Snow as a thermal background Jordan, R., et al., [1989, p 5-24] Thermal model for snow-covered terrain al., [1989, p 25-36] Snow hydrology Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, 9p] On the use of tensiometers in snow hydrology. Colbeck, S.C., [1976, p 135-140] Energy balance and runoff from a subarctic snowpack. Price, A.G., et al., [1976, 29p] Short-term forecasting of water run-off from snow and ice Colbeck, S.C., [1977, p 571-588] MP 1067 Physical aspects of water flow through snow Colbeck, S.C., [1978, p 155-206] Snow, ice and frozen ground research at the Sleepers River, VT Pangburn, T., et al., [1984, p 229-240] History of snow-cover research Colbeck, S.C., [1987, p 60-65] Snow properties and processes Colbeck, S.C., [1987, p 145-150] Snow hydrology in the upper Yamuna basin, India Malhotra, R.V., et al., [1988, p 84-93] Snow ice Growth of black ice, snow ice and snow thickness subarctic basins Lepparanta, M., [1983, p 59-70] MP 2063	W.L., [1976, p 589-614] Ice and snow at high altitudes. Mellor, M., [1977, 105] MP 1121 Engineering properties of snow. Mellor, M., [1977, p 15-66] MP 1015 Axial double point-load tests on snow and ice (1978, 11p) Sintering and compaction of snow containing liquid water Colbeck, S.C., et al., [1979, p.13-32] Volumetric constitutive law for snow Brown, R. L., [1980, p 161-165] Malyus of non-steady plastic shock waves in snow Brown, R. L., (1980, p 279-287) Workshop on snow traction mechanics, 1979 William, G. (1981, 71p) MP 1354 Workshop on snow traction mechanics, 1979 William, G. (1981, 71p) MP 2007 Comparison of snow cover liquid water measurement techniques Boyne, H.S., et al., [1987, p 1833-1836] MP 2007 Comparison of snow cover liquid water measurement techniques Boyne, H.S., et al., [1987, p 1833-1836] MP 2283 Vibration analysis of a DEW Line station. Haynes, F.D., et al., [1988, p 1513-1518] Overview of obscuration in the cold environment Berger, R.H. et al., [1988, p 537-555] MP 2009 International Conference on Snow Engineering, 1st, July 1988, [1980, 573p] SR 89-06 Showt-term forecasting of water run-off from snow surface. Meman, J.R., et al., [1966, p 5-8]

Free water measurements of a snowpack Fisk, D.J., (1983.	Occinety and permittery of the same and the same	Snow slides Cold regions roof design. Tobiasson, W., (1987, p.457-
p.173-176 ₁ MP 1758 Snow morphology	Problems in snow cover characterization O'Brien, H.W.,	MP 2243 Roof design in cold regions Tobiasson, W. (1989, p.462-
Snow particle morphology in the seasonal snow cover Colbeck, S.C., [1983, p 602-609] MP 1688	Workshop on the Properties of Snow, 1981 Brown, R L, ed.	MP 2613 Changes coming in snow load design criteria Tobiasson, W.,
Snow optics Red and near-inf-ared spectral reflectance of snow O'Brien.	(1982, 135p) SR 82-18 Snow Symposium, 2nd, 1982 (1983, 295p) SR 83-04	(1989, p 918-920) MF 2050
H.W., et al. (1975, p.345-360) MP 872 Engineering properties of snow. Mellor, M., (1977, p 15-	Snow Symposium, 3rd, Hanover, NH, Aug 1983, Vol.1. (1983, 241p) SR 83-31	Roof design in cold regions Tobiasson, W, [1989, p 1029-1037] Tobiasson, W of the Page 1037
66 ₁ MP 1015	Comparative near-millimeter wave propagation properties of snow or rain Nemarich, J., et al. (1983, p 115-129)	Snow stratigraphy Water flow through heterogeneous snow Colbeck, S.C.,
Observations of the ultraviolet spectral reflectance of snow. O'Brien, H.W., (1977, 19p.) CR 77-27	MP 1690 SNOW-TWO data report Volume 2. System performance.	(1979, p.37-45) MP 1219 SNOW STRENGTH
Snowpack optical properties in the infrared. Berger, R.H., (1979, 16p) CR 79-11	Jordan, R., ed. (1984, 417p.) SR 84-20	Properties of snow. Mellor, M, (1964, 105p) M III-A1
Snow crystal habit Koh, G, et al, [1982, p.181-216] MP 1561	Snow Symposium, 4th, Hanover, NH, Vol.1 [1984, 433p] SR 84-35	Investigation and exploitation of snowfield sites Mellor, M., t1969, 57p 1 MIII-A2b
Snow Symposium, 1st, Hanover, NH, Aug. 1981, (1982, 324p) SR 82-17	Overview of meteorological and snow cover characterization at SNOW-TWO Bates, R E., et al, [1984, p 171-191] MP 1868	Snow strength
Problems in snow cover characterization O'Brien, H W., [1982, p.139-147] MP 1987	Discrete reflections from thin layers of snow and ice Jezek,	Instrument for determining snow properties related to traffi- cability. Parrott, W H., et al. (1972, p 193-204) MP 886
Snow Symposium, 2nd, 1982 [1983, 295p] SR 83-04 Atmospheric conditions and snow crystal observations during	K.C., et al. [1984, p.323-331] MP 1871 Climatic factors in cold regions surface conditions Bilello.	Effect of temperature on the strength of snow-ice Haynes,
SNOW-ONE-A. Bilello, M.A., et al., [1983, p 3-18] MP 1754	MA., [1985, p 508-517] MP 1961 Experiments on thermal convection in snow. Powers, D. et	Snow studies associated with the sideways move of DYE-3.
Visible propagation in falling snow as a function of mass concentration and crystal type Lacombe, J, et al. (1983).	al. (1985, p.43-47) MP 2006 Meteorological and snow cover measurements at Grayling.	Tobiasson, W, (1979, p.117-124) MP 1312 Snow fortifications as protection against shaped charge an-
p.103-111 ₁ MP 1757	Michigan. Bates, R.E., et al. (1985, p 212-229) MP 2176	titank projectiles Farrell, D.R., (1980, 199.) SR 80-11
Performance and optical signature of an AN/VVS-1 laser rangefinder in falling snow. Preliminary test results La- combe. Jr. 1983, p. 253-2660 MP 1759	Theory of natural convection in snow. Powers, D. et al. 1985, p 10,641-10,649; MP 1957	Pressure waves in snow Brown, R.L., [1980, p.99-107] MP 1306
Chemical obscurant tests during winter: Environmental fate.	Proceedings, Vol.1 (1986, 369p) SR 86-15	Extending the useful life of DYE-2 to 1986 Tobiasson, W., et al. (1980, 37p) SR 80-13
Cragin, J.H., (1983, p 267-272) MP 1760 Utilization of the snow field test series results for development	Observations of the backscatter from snow at millimeter wavelengths Berger, R H, et al. (1986, p 311-316) MP 2665	Snow pads for pipeline construction in Alaska Johnson, P.R. et al. (1980, 28p) CR 80-17
of a snow obscuration primer Ebersole, J.F., et al., (1983, p 209-217) MP 1692	Comments on the characteristics of in situ snow at millimeter	Investigation of the snow adjacent to Dyc-2, Greenland. Ueda, H.T., et al., (1981, 23p) SR 81-03
Snow-cover characterization SADARM support. O'Brien, H. et al., [1984, p.409-411] MP 2095	wavelengths Walsh, J, et al, [1986, p 317-320] MP 2666	Prediction methods for vehicle traction on snow. Harrison,
Measurements of refractive index spectra over snow Andreas, E.L., (1986, p 248-260) MP 2212	Proceedings of the 6th Snow Symposium, Hanover, NH, 1986 (1987, 207p) SR 87-12	Vehicle tests and performance in snow Berger, R.H., et al.
Scattering at mm wavelengths from in situ snow. Walsh, J. et al., 1986, p 1.6.1-1 6 2 ₁ MP 2141	Preview of the SNOW-III West data base Lacombe, J. (1987, p.3-11) MP 2291	Trailing-tire motion resistance in shallow snow. Blaisdell,
Ice and snow optics in the polar oceans, Pt 1. Perovich, D.K, et al, [1986, p.232-241] MP 2255	Heat conduction in a medium with variable properties Yen, Y-C., [1987, 18p] CR 87-19	G L . (1987, p 296-304) MP 2248 Snow surface
Ice and snow optics in the polar oceans, Pt 2 Grenfell, T.C. et al., (1986, p 242-251) MP 2256	Snow properties and processes. Coloeck, S.C. (1987,	Spread of cetyl-1-C14 alcohol on a melting snow surface Meiman, J R, et al, [1966, p.5-8] MP 876
Optical snow precipitation gauge Koh, G, et al. 1987,	Compacted-snow runways design and construction guide- lines for Antarctica. Russell-Head, D.S. et al., 11889.	Dielectric constant and reflection coefficient of snow surface layers in the McMurdo Ice Shelf Kovacs, A., et al., (1977.
Two-stream approximation to radiative transfer in falling	68p.j	p 137-138 ₁ MP 1011 Measurement of snow surfaces and tire performance evalua-
Increased transmission through brass obscurant clouds during	Physical and optical properties of falling snow [1989, 22p] Koh, G., CR 89-16	tion. Blaisdell, G.L., et al. [1982, 7p] MP 1516 Chemical obscurant tests during winter, environmental fate.
snowfall. Hewitt, A.D., et al. [1988, p. 489-496] MP 2605	Snow plasticity Seismic exploration in cold regions Roethlisberger, H.	Cragin, J H., (1982, 9p.) SR 82-19 Firn quake (a rare and poorly explained phenomenon) Den
Snow-smoke interaction. Hogan, A.W., et al. (1988, p 497- 506) MP 2607	(1972, 138p) M II-A2a SNOW REMOVAL	Hartog, S.L., (1982, p 173-174) MP 1571 Roughness and transfer coefficients over snow and sea ice.
Proceedings (1989, 136p) SR 89-07 Optical technique for characterizing precipitation Koh, G.	Snow removal and ice control Mellor, M., [1965, 37p] MIII-A3b	Andreas, E L., (1986, 19p) CR 86-09
[1989, p 71-76] MP 2627 Model of smoke concentration reduction due to scavenging	Snow removal Computer model of municipal snow removal Tucker, W.B.	Theory for scalar roughness and transfer coefficients over snow and ice Andreas, E.L., [1987, p.159-184] MP 2195
by snow. Hutt, D.L., et al. (1989, p 87-98) MP 2628	(1977, 7p) CR 77-30 Current research on snow and ice removal in the United	Scientific challenges at the poles Welch, J.P., et al., (1987,
Light transmission through smoke screens in falling snow Farmer, W M, et al. (1989, p. 99-111) MP 2629	States Minsk, L.D., [1978, p.21-22] SIP 1199	Spectral measurements in a disturbed boundary layer over
Radiative transfer in falling snow a two-stream approxima- tion Koh, G., (1989, 10p) CR 89-06	Compaction of wet snow on highways Colbeck, S.C., MP 1234	Snow Andreas, E.L. (1987, p 1912-1939) MP 2254 On the micrometeorology of surface hoar growth on snow in
Application of acrosol physics to snow research. Hogan,	Systems study of snow removal Minsk, L. D., (1979, p. 220- 225) MP 1237	mountainous area Colbeck, S.C., (1988, p.1-12) MP 2359
Physical and optical properties of falling snow Koh, G.	Computer simulation of urban snow removal Tucker, W.B. et al. (1979, p. 293-302) MP 1238	Snow surface temperature New method for measuring the snow-surface temperature.
Motion detection systems under winter conditions Peck, L.	Snow removal equipment Minsk, L.D., [1981, p. 648-670] MP 1446	Andreas, E.L., [1984, p. 161-169] MP 1867 Snow as a thermal background Jordan, R., et al., (1989, p. 5-
(1989, 8p.) CR 89-17 Snow permeability	Snow and ice control on railroads, highways and airports Minsk, L.D., et al. (1981, p. 671-706) MP 1447	24j MP 2624 Thermal model for snow-covered terrain. Petzko, D.R. et
Spread of cetyl-1-C14 alcohol on a melting snow surface. Meiman, JR, et al. [1966, p 5-8] MP 876	Strategies for winter maintenance of pavements and road- ways Minsk, L.D., et al. [1984, p.155-167]	al. (1989, p 25-36) MP 2625 Snow crystal growth at varying surface temperatures Col-
Water percolation through homogeneous snow SC, et al. (1973, p 242-257) Colbeck, MP 1025	Snow and ice prevention in the United States Minsk, L.D.	beck. S.C., (1989, p.23-29) Snow-surface temperature analysis Bates, R.E., et al.
Analysis of water flow in dry snow. Colbeck, S.C., [1976, p.523-527] MP 871	(1986, p. 37-42) MP 1874	(1989, p 109-116) MP 2753
Physical aspects of water flow through snow Colbeck, S.C., 1978, p. 165-206; MP 1566	Concentration and flux of wind-blown snow. Mellor, M. et al. (1986, 16p)	Snowpack profile analysis using extracted thin sections.
Permeability of a melting snow cover Colbeck, S.C., et al. (1982, p. 904-908) MP 1565	Military snow removal problems Minsk, L.D. (1987, p. 452-453) MP 2268	Snow surveys
Friction loss through a uniform snow layer Yen, Y.C.,	Snow roads Mechanical properties of snow used as construction material	Snow and ice Colbeck, S.C., et al. (1975, p.435-441, 475- 487) MP 844
SNOW PHYSICS	Wuori, A.F., (1975, p.157-164) MP 1057 The strength of natural and processed snow Abele, G.,	MP 1129
Snow as a material Bader, H., et al. (1962, 79p.) M II-B	(1975, p 176-186) MP 1058 Surface protection measures for the Arctic Slope, Alaska	Notes and quotes from snow and ice observers in Alaska. Bilello, M.A., r1979, p. 116-1181 MP 1631
Snow and ice on the earth's surface. Mellor, M. [1964, 163p] M. II-CI	Johnson, P.R. (1978, p 202-205) MP 1519 Snow and ice roads in the Arctic Johnson, P.R. (1979,	Focus on U.S. snow research Colbeck, S.C., (1979, p.41- 521 MP 1261
Properties of snow Mellor, M. (1964, 105p) M. III-A1	p 1063-1071 ₃ MP 1223	Snow and the organization of snow research in the United
Foundations and subsurface structures in snow Mellor, M., (1969, 54p.) M. III-A2c	P.R. et al. (1980, 28p) CR 80-17	Snow Symposium, 1st, Hanover, NH, Aug 1981, 1982,
Snow physics lee and snow at high altitudes Mellor, M., (1977, 10p.)	Hard surface runways in Antarctica Mellor, M., 1988, 87p.; SR 88-13	Workshop on the Properties of Snow. 1981 Brown, R L . ed.
MP 1121 Grain clusters in wet snow Colbeck, S.C. (1979, p. 371-	Improved techniques for construction of snow roads and air- strips I ee. S.M., et al., [1988, 99p.] SR 88-18	Bibliography on glaciers and permafrost, China, 1938-1979.
MP 1267 Propagation of stress waves in alpine snow. Brown, R.L.	Improving snow roads and airstrips in Antarctica Lee, S.M. et al. (1989, 18p.) SR 89-22	Proceedings of the Symposium on Applied Glaciology, 2nd,
(1980, p 235-243) Overview of seasonal snow metamorphism Colbeck, S.C.	Snow samplers New 2 and 3 inch diameter CRREE snow samplers. Bates	Snow cover and meteorology at Allagash, Maine, 1977-1980.
(1982, p 45-61) MP 1500		Bates, R., (1983, 49p.) SR 83-20

Snow surveys (cont.)	Intercomparison of snow cover liquid water measurement techniques Boyne, H S, et al, [1987, p 167-172]	Visible propagation in falling snow as a function of mass con- centration and crystal type Lacombe, J, et al. (1983,
Regional and seasonal variations in snow-cover density in the U.S.S.R. Bilello, M.A., (1984, 70p) CR 84-22	MP 2262	p.103-111 ₁ MP 1757
Topical databases Cold Regions Technology on-line Lis-	Metamorphism and classification of seasonal snow crystals	Performance and optical signature of an AN/VVS-1 laser rangefinder in falling snow. Preliminary test results La-
ton, N., et al. (1985, p.12-15) MP 2027 Techniques for measurement of snow and ice on freshwater.	Colbeck, S.C., [1987, p. 3-34] MP 2438 Field observations of thermal convection in a subarctic snow	combe, J. (1983, p 253-266) MP 1759
Adams, WP, et al. (1986, p 174-222) MP 2000	cover Johnson, J.B., et al., (1987, p.105-118)	Synoptic meteorology during the SNOW-ONE-A Field Ex-
Remote sensing of ice and snow (review) Jezek, K.C., [1987, p.51] MP 2429	MP 2439 Comparison of snow cover liquid water measurement tech-	periment. Bilello, M.A., [1983, 80p.] SR 83-10 SNOW-ONE-B data report. Bates, R.E., ed., [1983,
Corps of Engineers research in the Arctic. Smallidge, P.D.,	niques Boyne, H.S., et al. (1987, p 1833-1836)	284p. _j SR 83-16
et al, (1987, p.81-87) MP 2411	MP 2283	Site-specific and synoptic meteorology Bates, R.E., (1983, p. 13-80) MP 1845
Snow properties and processes Colbeck, S.C., [1967, p 145-150] MP 2413	Snow water equivalent Analysis of snow water equivalent using LANDSAT data.	Atmospheric turbulence measurements at SNOW-ONE-B.
Snow/ice/frozen ground properties, working group report.	Merry, C J., et al. (1977, 16 leaves) MP 1113	Andreas, E.L., [1983, p.81-87] MP 1846
Sterrett, K.F., et al. [1987, p 163-166] MP 2416 Snow cover and glacier variations Colbeck, S.C., ed,	Landsat data for watershed management. Cooper, S, et al. (1977, c150p) MP 1114	Snow characterization at SNOW-ONE-B Berger, R H, et al. (1983, p.155-195) MP 1847
(1989, 111p) MP 2672	Landsat data analysis for New England reservoir manage-	Technique for measuring the mass concentration of falling
Cold regions weather data systems Bates, R E, et al. (1989, p.139-145) MP 2568	ment. Merry, C.J., et al. (1978, 61p) SR 78-06	snow Lacombe, J. (1983, p. 17-28) MP 1647 Characterization of snow for evaluation of its effect on elec-
(1989, p.139-145) MP 2568 Snow temperature	Snow cover mapping in northern Maine using LANDSAT. Merry, C.J. et al. (1979, p.197-198) MP 1510	tromagnetic wave propagation Berger, R.H., 1983,
Mesoscale measurement of snow-cover properties Bilello,	New 2 and 3 inch diameter CRREL snow samplers Bates,	p 35-42 ₁ MP 1648 Comments on the metamorphism of snow Colbeck, S.C.,
MA. et al., [1973, p 624-643] MP 1029 Computer simulation of the snowmelt and soil thermal regime	R E., et al, £1980, p.199-200; MP 1430	(1983, p.149-151) MP 1650
at Barrow, Alaska Outcalt, S 1, et al, [1975, p.709-715]	Snowpack estimation in the St John River basin Power, J.M., et al., [1980, p.467-486] MP 1799	Snow concentration and effective air density during snow- falls. Mellor, M, [1983, p.505-507] MP 1769
MP 857 Compressibility characteristics of compacted snow. Abele,	Ground snow loads for structural design Ellingwood, B, et	falls. Mellor, M, (1983, p.505-507) MP 1769 Snow Symposium, 3rd, Hanover, NH, Aug 1983, Vol.1.
G., et al., (1976, 47p) CR 76-21	al, (1983, p 950-964) MP 1734 Snow cover and meteorology at Allagash, Maine, 1977-1980	(1983, 241p ₃ SR 83-31
On the temperature distribution in an air-ventilated snow lay-	Bates, R., [1983, 49p] SR 83-20	Comparative near-millimeter wave propagation properties of snow or rain Nemarich, J, et al. (1983, p 115-129)
er. Yen, YC, [1982, 10p] CR 82-05 New method of measuring the snow-surface temperature	Use of Landsat data for predicting snowmelt runoff in the	MP 1690
Andreas, E.L., (1986, p 139-156) MP 2166	upper Saint John River basin. Merry, C J, et al. (1983, p 519-533) MP 1694	Utilization of the snow field test series results for development of a snow obscuration primer Ebersole, J.F., et al., (1983).
Thermal measurements in snow. Jordan, R, et al. (1986, p 183-193) MP 2660	Snow Symposium, 3rd, Hanover, NH, Aug 1983, Vol 1	p 209-217 ₁ MP 1692
Snow thermal properties	[1983, 241p] SR 83-31 Hydrologic forecasting using Landsat data Merry, C.J., et	Snow-Two/Smoke Week VI field experiment plan Red- field, R.K., et al. 1984, 85p 1 SR 84-19
Analysis of water flow in dry snow Colbeck, S.C., [1976,	al. (1983, p 159-168) MP 1691	field, R.K., et al. [1984, 85p] SR 84-19 Field sampling of snow for chemical obscurants at SNOW-
p 523-527 ₁ MP 871 Engineering properties of snow Mellor, M ₁ (1977, p 15-	Probability models for annual extreme water-equivalent	TWO/Smoke Week VI Cragin, J.H., [1984, p 265-270]
66 ₁ MP 1015	ground snow. Ellingwood, B, et al. (1984, p 1153-1159) MP 1823	MP 2096 Climate at CRREL, Hanover, New Hampshire Bates, R E,
Thermodynamics of snow metamorphism due to variations in curvature Colbeck, S.C. [1980, p.291-301]	Snow, ice and frozen ground research at the Sleepers River,	(1984, 78p) SR 84-24
MP 1368	VT. Pangburn, T, ct al, (1984, p.229-240) MP 2071	Frozen precipitation and weather, Munchen/Riem, West Germany Bilello, M.A., [1984, 47p.] SR 84-32
Review of thermal properties of snow, ice and sea ice Yen, YC., (1981, 27p.) CR 81-10	Intensity of snowfall at the SNOW experiments Bates, RE,	Snow Symposium, 4th, Hanover, NH, Vol 1, (1984, 433p)
YC., (1981, 27p) CR 81-10 Snow calorimetric measurement at SNOW-ONE Fisk, D.	ct al, [1986, p 205-217] MP 2287	SR 84-35
(1982, p 133-138) MP 1986	Use of Landsat for snow cover mapping, Saint John River basin, Maine Merry, C.J., et al. (1987, 68p.)	Performance of microprocessor-controlled snow crystal repli- cator. Koh, G., [1984, p 107-111] MP 1866
Thermal convection in snow. Powers, DJ, et al. [1985, 61p] CR 85-09	CR 87-08	Approach to snow propagation modeling Koh, G., [1984,
Field observations of thermal convection in a subarctic snow	SNOWDRIFTS Blowing snow Mellor, M. (1965, 79p) M III-A3c	p 247-259 ₁ MP 1869 Snow chemistry of obscurants released during SNOW-
cover. Johnson, J B, et al, (1987, p 105-118) MP 2439	Snowdrifts	TWO/Smoke Week VI Cragin, J.H., (1984, p 409-416)
Proceedings, (1989, 136p) SR 89-07	Snowdrift control at ILS facilities in Alaska Calkins, D.J.,	MP 1873 Frozen precipitation and concurrently observed meteorologi-
Snow as a thermal background. Jordan, R. et al. (1989, p. 5-	(1976, 41p) MP 914 Snow load data analysis, winter 1976-77 O'Rourke, M.,	cal conditions Bilello, M.A., (1985, 11p.) MP 2075
241 MP 2624 Thermal model for snow-covered terrain. Petzko, D.R, et	[1977, 9p + appends] MP 2427	Meteorological and snow cover measurements at Grayling,
al, (1989, p 25-36) MP 2625	Surface protection measures for the Arctic Slope, Alaska	Michigan. Bates, R.E., et al. (1985, p.212-229) MP 2176
Heat conduction in snow. Yen, Y C, [1989, p 21-32] MP 2546	Johnson, P.R., (1978, p 202-205) MP 1519 Hydraulic model investigation of drifting snow. Wuebben,	Wavelength-dependent extinction by falling snow. Koh, G.
Air movement in snow due to windpumping Colbeck, S.C.,	J L , [1978, 29p] CR 78-16	(1986, p 51-55) MP 2019 Intensity of snowfall at the SNOW experiments. Bates, R E.
(1989, p 209-213) MP 2562 SNOW VEHICLES	Modelling a snowdrift by means of activated clay particles. Anno, Y., (1985, p 48-52) MP 2007	et al, (1986, p 205-217) MP 2287
Oversnow transport Mellor, M. (1963, 58p. plus ap-	Concentration and flux of wind-blown snow Mellor, M. et	Proceedings, Vol 1 [1986, 369p] SR 86-15 Use and application of PRESTO in Snow-III West. Stallings,
pends j M III-A4 Snow vehicles	al. [1986, 16p] SR 86-11 Proposed code provisions for drifted snow loads O'Rourke,	ES, et al. (1986, p 11-24) MP 2658
Effect of snow cover on obstacle performance of vehicles	M, et al. [1986, p.2080-2092] MP 2148	Snow mass extinction coefficient Koh. G. (1986, p.35-38) MP 2659
Hanamoto, B., (1976, p 121-140) MP 933	Changes coming in snow load design criteria Tobiasson, W.,	Extinction coefficient measurement in falling snow. Koh.
Snow water content Water percolation through homogeneous snow Colbeck,	(1989, p.413-418) MP 2612 Snowfall	G. (1987, 9p.) SR 87-94
S.C., et al. [1973, p 242-257] MP 1025	Midwinter temperature regime and snow occurrence in Ger-	Optical snow precipitation gauge Koh. G., et al. [1987, p.26-31] MP 2259
Analysis of water flow in dry snow. Colbeck, S.C., [1976, p.523-527] MP 871	many Bilello, M.A., et al. (1978, 56p) CR 78-21	Proceedings of the 6th Snow Symposium, Hanover, NH,
Compression of wet snow Colbeck, S.C., et al. (1978.	Synoptic meteorology during the SNOW-ONE field experi- ment Bilello, M.A. (1981, 55p) SR 81-27	1986 (1987, 207p) SR 87-12 Scavenging of infrared screener EA 5763 by failing snow.
17p ₁ CR 78-10	SNOW-ONE-A, Data report Aitken, GW, ed. (1982.	Cragin, J H, et al (1987, p 13-20) MP 2292
Difficulties of measuring the water saturation and porosity of snow Colbeck, S.C., (1978, p. 189-201) MP 1124	641p j SR 82-08 Synoptic weather conditions during snowfall, Dec. 1981-Feb	Forward scatter meter for measuring extinction in adverse weather. Koh, G. (1987, p.81-84) MP 2295
Effect of water content on the compressibility of snow-water	1982. Bilello, M A , [1982, p 9-42] MP 1559	Solid precipitation measurement at Sleepers River, VT.
mixtures Abele, G, et al. (1979, 26p.) CR 79-02 Liquid distribution and the dielectric constant of wet snow	Meteorology Bates, R E., (1982, p.43-180) MP 1560	Bates, R.E., et al. [1987 p.1-7] MP 2396 Some observations on the character of snow. Townsend.
Colbeck, S.C., [1980, p.21-39] MP 1349	Snow crystal habit Koh, G. et al. (1982, p. 181-216) MP 1561	Some observations on the character of snow. Townsend, R.A., et al. (1937, p.48-53) MP 2397
Overview of seasonal snow metamorphism Colbeck, S.C., [1982, p.45-61] Colbeck, S.C., MP 1500	Measurements of airborne-snow concentration Lacombe,	Snowfall amounts and snow depths in Germany and NE USA
Snow calorimetric measurement at SNOW-ONE Fisk, D.	J. ₁ 1982, p 225-281 ₃ MP 1563	Bates, R.E., et al., (1988, p. 107-117) MP 2401 Two-stream approximation to radiative transfer in falling
[1982, p 133-138] MP 1986	Snow cover characterization O'Brien, HW, et al. (1982, p 559-577) MP 1564	snow Koh, G. (1988, p.463-470) MP 2604
Free water measurements of a snowpack Fisk D J. [1983, p 173-176] MP 1758	Snow Symposium, 1st, Hanover, NH, Aug 1981, (1982,	Increased transmission through brass obscurant clouds during snowfall. Hewitt, A.D., et al. (1988, p. 489-496)
Snow particle morphology in the seasonal snow cover. Col-	324p) SR 82-17	MP 2605
beck, S.C., [1983, p.692-609] MP 1688 Progress in methods of measuring the free water content of	Airborne-Snow Concentration Measuring Equipment. La- combe, J., (1982, p. 17-46) MP 1981	Snow-smoke interaction Hogan, A.W., et al. (1988, p. 497- 506) MP 2607
snow Fisk, DJ, (1983, p.48-51) MP 1649	Meteorology and observed snow crystal types during the	Impact of wet snow on visible, infrared and millimeter wave
Landsat-4 thematic mapper (TM) for cold environments, Gervin, J.C., et al. [1983, p.179-186] MP 1651	SNOW-ONL experiment Bilello, M.A., [1982, p.59-75] MP 1983	attenuation Bates, R.E., et al. (1988, p.523-535) MP 2608
Use of radio frequency sensor for snow soil moisture water	Meteorological measurements at Camp Ethan Allen Fraining	Overview of obscuration in the cold environment Berger,
content measurement McKim, H L, et al. (1983, p.33-	Center, Vermont Bates, R., (1982, p.77-112) MP 1984	R H . et al. (1988 p 537-555) MP 2609
421 MP 1689 New classification system for the seasonal snow cover Col-	Snow Symposium, 2nd, 1982 (1983, 295p) SR 83-04	Dynamic acrossl flow chamber Hewitt, AD, (1988, 13p) SR 88-21
beck, S.C. (1984, p.179-181) MP 1921	Atmospheric conditions and snow crystal observations during	Comparative studies of the winter climate at selected loca-
Statistics of coarsening in water-saturated snow Colbeck, S.C., [1986, p.347-352] Colbeck, MP 2015	SNOW ONE-A Bilello, M.A., et al. (1983, p.3-18) MP 1754	tions in Europe and the United States Bates, R E., et al., (1989, p. 283-293) MP 2598
Liquid water mass fraction of snow measured by alcohol solu-	Northwest snowstorm of 15-16 December 1981 Bates,	Synoptic meteorology crystal habit, and snowfall rates in
tion Fisk, DJ, [1986, p.538-541] MP 2245 Alcohol calorimetry for measuring the liquid water fraction of	R E., [1983, p. 19-34] MP 1755 Falling snow characteristics and extinction Berger, R H.	Northeastern snowstorms Ryerson, CC, et al. (1989, p. 335-345) MP 2599
snow Fisk, D.J., [1987, p 163-166] MP 2261	(1983, p.61-69) MP 1786	Proceedings (1989, 136p) SR 89-07

Model of smoke concentration reduction due to scavenging by snow. Hutt, D L., et al, [1989, p 87-98]	Prediction of winter battlefield weather effects. Ryerson, C.C., et al, [1988, p.357-362] RP 2402	Modeling nitrogen transport and transformations in soils 2. Validation. Iskandar, I.K., et al., [1981, p 303-312] MP 1441
MP 2628 Light transmission through smoke screens in falling snow.	Self aggregates Repetitive loading tests on membrane enveloped road sec-	Model for prediction of nitrate leaching losses in soils. Meh-
Farmer, W.M., et al. (1989, p 99-111) MP 2629 Millimeter-wave performance during mixed precipitation.	tions during freeze thaw. Smith, N., et al, [1977, p 171- 197] MP 962	Effect of soil temperature on nitrification kinetics. Parker,
Bates, R.E., et al. (1989, p 113-120) MP 2630 Application of aerosol physics to snow research. Hogan.	Effect of freeze-thaw cycles on soils. Chamberlain, E., et al. (1990, p 145-155) MP 2678	Premoval during land treatment of wastewater. Ryden, J.C.,
A.W., (1989, p 201-207) MP 2756	Soil analysis	et al, [1982, 12p.] SR \$2-14 Mathematical simulation of nitrogen interactions in soils.
SNOW IV field experiment data report. Wright, E.A., ed., (1989, 250p.) SR 89-14	Reclamation of acidic dredge soils with sewage sludge and lime. Palazzo, A.J., (1977, 24p.) SR 77-19	Selim, H.M., et al. (1983, p.241-248) MP 2051 Frost heave of saline soils Chamberlain, E.J. (1983, p.121-
Snow concentration and precipitation rate measurements dur- ing SNOW IV Lacombe, J, [1989, p 25-29]	Determining explosive residues in soil Jenkins, T.F., et al. [1988, 46p.] CR 88-08	126 ₁ MP 1655
Physical and optical properties of falling snow. Koh. G.	Soli chemistry Proceedings 1972 Tundra Biome symposium. [1972, 211p.]	Restoration of acidic dredge soils with sewage sludge and lime Palazzo, A J., (1983, 11p.) CR 83-28
[1989, 22p] CR 89-16 Snowflakes	MP 1374 Ionic migration and weathering in frozen Antarctic soils	Techniques for measuring Hg in soils and sediments Cragin, J.H., et al., (1985, 16p.) SR \$5-16
SNOW-ONE-A, Data report Aitken, GW., ed, 1982, 641p SR 82-08	Ugolini, F.C., et al, [1973, p 461-470] MP 941	Explosive residues in soil Jenkins, T.F., et al. (1985, 33p) SR 85-22
Snow crystal habit Koh, G., et al. (1982, p 181-216) MP 1561	Micrometeorological investigations near the tundra surface. Kelley, J J., [1973, p.109-126] MP 1006	Retention and release of metals by soils—evaluation of several models. Amacher, M.C., et al, (1986, p.131-154)
Airborne snow and fog distributions Berger, R H., (1982,	Soil properties of the International Tundra Biome sites. Brown, J., et al, [1974, p.27-48] MP 1043	MP 2186 Extraction solvents for determination of volatile organics in
Measurements of airborne-snow concentration Lacombe,	Upland forest and its soils and litters in interior Alaska. Troth, J.L., et al, [1976, p 33-44] MP \$67	soil Jenkins, T.F., et al. [1987, 26p] SR 87-22
J., (1982, p 225-281) MP 1563 Airborne-Snow Concentration Measuring Equipment. La-	Wastewater reuse at Livermore, California. Uiga, A, et al. (1976, p 511-531) MP 870	Determining explosive residues in soil. Jenkins, T.F., et al. (1988, 46p) CR 88-08
combe, J., (1982, p 17-46) MP 1981 Snow and fog particle size measurements Berger, R.H.,	Land treatment of wastewater. Murrmann, R.P., et al,	Modeling the transport of chromium (VI) in soil columns. Selim, H.M., et al. (1989, p 996-1004) MP 2679
(1982, p 47-58) MP 1982 Snow particle morphology in the seasonal snow cover. Col-	Reclamation of wastewater by application on land Iskandar,	lon-pairing RP-HPLC method for determining tetrazene in water and soil Walsh, M.E., et al. (1989, p. 159-179)
beck, S.C., [1983, p.602-609] MP 1688 SNOW-ONE-B data report. Bates, R.E., ed., [1983.	IK, et al. (1976, 15p) Wastewater renovation by a prototype slow infiltration land	MP 2593 Retention of elements by soils Buchter, B, et al. (1989)
284p j SR 83-16	treatment system Iskandar, I.K., et al, [1976, 44p.] CR 76-19	p. 370-379 MP 2570 Analytical methods for determining nitroguanidine in soil and
Characterization of snow for evaluation of its effect on elec- tromagnetic wave propagation. Berger, R.H., (1983,	Urban waste as a source of heavy metals in land treatment [skandar, I.K., 1976, p 417-432] MP 977	water. Walsh, M E., (1989, 27p) SR 89-35
p 35-42; MP 1648 Attenuation and backscatter for snow and sleet at 96, 140, and	Effects of wastewater application on forage grasses Palazzo,	Soil classification Foundations on permafrost, US and USSR design and prac-
225 GHz. Nemarich, J., et al. [1984, p 41-52] MP 1864	Examining antarctic soils with a scanning electron micro-	tice. Fish, A.M., [1983, p 3-24] MP 1682 Soil compaction
Catalog of smoke/obscurant characterization instruments. O'Brien, H.W., et al, (1984, p.77-82) MP 1865	scope. Kumai, M., et al. (1976, p 249-252) MP 931 Reclamation of acidic dredge soils with sewage sludge and	Consolidating dredged material by freezing and thawing. Chamberlain, E.J., (1977, 94p) MP 978
Performance of microprocessor-controlled snow crystal repli- cator. Koh, G, [1984, p 107-111] MP 1866	lime Palazzo, A.J., [1977, 24p] SR 77-19 Effects of wastewater on the growth and chemical composi-	Enclosing fine-grained soils in plastic moisture barriers. Smith, N., (1978, p 560-570) MP 1089
Forward-scattering corrected extinction by nonspherical par-	tion of forages Palazzo, AJ, [1977, p 171-180] MP 975	Densification by freezing and thawing of fine material dredged from waterways. Chamberlain, E.J., et al. (1978.
ticles. Bohren, C.F., et al. [1984, p 261-271] MP 1870	UV radiational effects on: Martian regolith water. Nadeau, P.H., [1977, 89p] MP 1072	p 622-628) MP 1103 Increasing the effectiveness of soil compaction at below-freez-
Forward-scattering corrected extinction by nonspherical par- ticles Bohren, C.F., et al., (1985, p.1023-1029) MP 1958	Land treatment of wastewater at Manteca, Calif, and Quincy,	ing temperatures Haas, W M, et al. (1978, 58p.)
What becomes of a winter snowflake. Colbeck, S.C., 1985,	Washington. Iskandar, I K, et al. [1977, 34p.] CR 77-24	Construction of an embankment with frozen soil. Botz, J.J.
p 312-215 ₁ MP 2060 Proceedings, Vol 1, [1986, 369p ₁ SR 86-15	Methodology for nitrogen isotope analysis at CRREL. Jenkins, T.F., et al. [1978, 57p] SR 78-08	et al. (1980, 105p) SR 80-21 Soil freezing response influence of test conditions. McCabe.
Snow-smoke interaction Hogan, A.W, et al., [1988, p 497- 506] MP 2607	NMR phase composition measurements on moist soils. Tice, A R., et al. [1978, p 11-14] MP 1210	E.Y. et al. [1985, p 49-58] MP 1990 Freeze thaw consolidation of sediments, Beaufort Sea, Alas-
Application of aerosol physics to snow research Hogan, A.W., (1989, p 201-207) MP 2756	NO3-N in percolate water in land treatment Iskandar, I K et al., [1978, p.163-169; MP 1148	ka Lee, H.J., et al., [1985, 83p] MP 2025 Soil composition
Snowmelt	Nitrogen behavior in land treatment of wastewater, a simplified model. Selim, H.M., et al., (1978, p 171-179)	Soil properties of the International Tundra Biome sites. Brown, J. et al. (1974, p 27-48) MP 1043
S C, et al. (1973, p 242-257) MP 1025	MP 1149 Overview of existing land treatment systems Iskandar, I.K.	Tundra environment at Barrow, Alaska. Bunnell, F.L., et al.
Tundra environment at Barrow, Alaska. Bunnell, F.L., et al. (1975, p.73-124) MP 1050	[1978, p.193-200] MP 1150	Antarctic soil studies using a scanning electron microscope
Effects of radiation penetration on snowmelt runoff hydro- graphs Colbeck, S.C., [1976, p.73-82] MP 948	Uptake of nutrients by plants irrigated with wastewater Clapp, C.E., et al. (1978, p 395-404) MP 1151	Tundra and analogous soils Everett, K.R., et al. (1981,
Energy balance and runoff from a subarctic snowpack. Price, A.G., et al. (1976, 29p) CR 76-27	Performance of overland flow land treatment in cold climates Jenkins, T.F., et al. (1978, p.61-70) MP 1152	p 139-179; MP 1405 VHF electrical properties of frozen ground near Point Barrow.
Computer routing of unsaturated flow through snow Tucker, W.B., et al. (1977, 44p) SR 77-10	Adaptability of forage grasses to wastewater irrigation Palazzo, A J, et al. (1978, p.157-163) MP 1153	Alaska Arcone, SA, et al. (1981, 18p) CR 81-13 Model for dielectric constants of frozen soils Oliphant, JL.
Snow accumulation, distribution, melt, and runoff. Colbeck, S.C., et al., [1979, p.465-468] MP 1233	Simulation of the movement of conservative chemicals in soil solution. Nakano, Y, et al. (1978, p 371-380)	[1985, p 46-57] MP 1926 Retention and release of metals by soils—evaluation of sever-
Case study: fresh water supply for Point Hope. Alaska.	MP 1156 Waste water reuse in cold regions. Iskandar, I.K., (1978,	al models Amacher, M.C. et al. [1986, p 131-154] MP 2186
Tundra lakes as a source of fresh water Kipnuk, Alaska.	p 361-368; MP 1144	Comparison of extraction techniques for munitions residues in soil Jenkins, TF, et al. (1987, p 1326-1331)
Bredthauer, S.R., et al. (1979, 16p) SR 79-30 Watershed modeling in cold regions. Stokely, J.L., (1980,	Kinetics of denitrification in land treatment of wastewater. Jacobson, S, et al. (1979, 59p) SR 79-04	MP 2350 Determining nitroaromatics and nitramines in water. Jen
241p; MP 1471 Use of Landsat data for predicting snowmelt runoff in the	Spray application of wastewater effluent in Vermont Cassell, E.A., et al. [1979, 38p] SR 79-06	kins, T.F., et al. [1988, 36p] SR 88-23
upper Saint John River basin Merry, CJ, et al. 1983. p 519-5331 MP 1694	Soil characteristics and climatology during wastewater ap- plication at CRREL. Iskandar, ! K., et al. (1979, 82p)	Chromatographic determination of nitroaromatic residues in soil Jenkins, T.F., et al. (1989, p. 890-899) MP 2584
Hydrologic aspects of ice jams Calkins, DJ, [1986, p 603-609] MP 2116	SR 79-23	Unfrozen water contents of undisturbed and remolded Alas-
Forecasting of snowmelt runoff using water temperature data Pangburn, T., 1987, p 108-113, MP 2398	sium Palazzo, A J, et al. (1979, p 309-312) MP 1228	kan silt, Tice, A.R., et al. [1989, p.103-111] MP 2683
Snow hydrology in the upper Yamuna basin, India Malho- tra, R.V., et al. [1988, p 84-93] MP 2633	Nitrogen transformations in land treatment Jenkins, T.F., et al., 1979, 32p 1 SR 79-31	Soil creep In-plane deformation of non-coaxial plastic soil Takagi. S
Snowmelt increase through albedo reduction Colbeck, S.C.	Prototype wastewater land treatment system Jenkins, TF.	(1978, 28p) CR 78-07 Steady in-plane deformation of noncoaxial plastic soil
[1988, 11p] SR 88-26 Thermal response of downhill skis Warren, GC, et al.	Enzyme kinetic model for nitrification in soil amended with	Takagi, S., (1979, p. 1049-1072) MP 1244 Kinctic nature of the long term strength of frozen soils. Fish
(1989, 40p) CR 89-23 Water and suspended solids discharge during showmelt	CR 80-01	A.M., (1980, p.95-108) MP 1450
Chacho, E.F. Jr., [1990, p 167-173] MP 2706 Snowstorms	Schm, H.M., et al. (1980, 49p) CR 80-12	ct al (1982, p 194-206) MP 1495
SNOW-ONE-A, Data report Aitken, GW, ed., 1982. 641p1 SR 82-08	Dynamics of NH4 and NO3 in cropped soils irrigated with wastewater. Iskandar, I K, et al. (1980, 20p.)	Deformation and failure of frozen soils and ice due to stresses Fish, A.M., [1982, p.419-428] MP 155;
Synoptic weather conditions during snowfall, Dec. 1981-Feb 1982. Bilello, M.A., [1982, p.9-42] MP 1555	SR 80-27	Field tests of a frost-heave model Guymon, G.L., et al (1983, p.409-414) MP 165
Meteorology Bates, R.E. (1982, p 43-180) MP 1560	(1980, 9p) MP 1362	Creep behavior of frozen silt under constant uniaxial stress Zhu, Y, et al. (1983, p 1507-1512) MP 180:
Airborne snow and fog distributions Berger, R. H., (1982, p. 217-223) MP 156.		Foundations on permafrost, US and USSR design and prac- tice fish, AM, [1983, p.3-24] MP 168:
Northwest snowstorm of 15-16 December 1981, Bates R.E., (1983, p.19-34) MP 175:	Modeling N transport and transformations in soils Sclim,	Thermodynamic model of soil creep at constant stresses and
Proceedings, Vol 1, (1986, 369p) SR 86-13	H M , et al. (1981, p.233-241) MP 1440	strains. Fish, A.M., (1983, 18p.) CR 85-3.

Soil creep (cont.) Creep behavior of frozen silt under constant uniaxial stress	Neumann solution applied to soil systems Lunardini, V.J., (1980, 7p.) CR 80-22	Evaluation of the X-ray radiography efficiency for heaving and consolidation observation. Akagawa, S., (1988, p.23-
Zhu, Y., et al. (1984, p.33-48) MP 1807 Thermodynamic model of creep at constant stress and con-	Some approaches to modeling phase change in freezing soils Hromadka, T.V., II, et al., [1981, p.137-145]	28 ₁ MP 2376 Freezing a temporary roadway for transport of a 3000 ton
stant strain rate. Fish, A.M., (1984, p 143-161) MP 1771	MP 1437 Effect of freezing and thawing on resilient modulus of granu-	dragline. Maishman, D., et al. (1988, p.357-365) MP 2378
Tertiary creep model for frozen sands (discussion). Fish,	lar soils Cole, D.M., et al., [1981, p.19-26] MP 1484	Contaminant transport in freezing soils. Ayorinde, O.A., et al., [1988, 29p.] MP 2514
Frozen ground physics Fish, A.M., (1985, p.29-36)	Comparative evaluation of frost-susceptibility tests Cham-	New freezing test for determining frost susceptibility,
MP 1928 Creep and strength behavior of frozen silt in uniaxial compres-	CRREL frost heave test, USA Chamberlain, E.J., et al.	Electrical freezing potential of soils Kelsh. D.J., et al.
sion. Zhu, Y., et al. (1987, 67p) CR 87-10	(1981, p.55-62) MP 1499 Ice segregation in a frozen soil column Guymon, G L., et	(1988, 9p) CR 88-10 Relationship between freezing and water content in sandy
Shape of creep curves in frozen soils and polycrystalline ice. Fish, A.M., [1987, p 623-629] MP 2329	al, (1981, p.127-140) MP 1534 Frost susceptibility of soil, review of index tests. Chamber-	loam. Black, P.B., et al. [1988, 37p] CR 88-26
State of the art, mechanical properties of frozen soil Sayles, F.H., (1988, p.143-165) MV 2377	lain, EJ, (1981, 110p) M \$1-02	Chemical aspects of soil freezing Henry, K, (1988, 8p) CR 88-17
Some peculiarities of creep behavior of frozen silt Fish. A.M., (1989, p 721-724) MP 2601	Numerical solutions for a rigid-ice model of secondary frost heave O'Neill, K, et al. (1982, 11p) CR 82-13	State of water in freezing soil Black, P.B., (1989, 7p.) CR 89-03
Soil erosion	Comparison of unfrozen water contents measured by DSC and NMR. Oliphant, J L., et al, [1982, p.115-121]	Freezing and thawing of soils in cylindrical coordinates.
Placer River Silt—an intertidal deposit caused by the 1964 Alaska earthquake Ovenshine, A.T., et al., [1976, p. 151-	MP 1594	Physical changes in clays due to frost action Chamberlain,
162) MP 2410 Revegetation and erosion control of the Trans-Alaska Pipe-	Freezing of soil with surface convection. Lunardini, V.J., [1982, p 205-212] MP 1595	E.J., (1989, p. 863-893) MP 2595 Ice-water partition coefficients for RDX and TNT Taylor,
line. Johnson, L.A., et al. (1977, 36p) SR 77-08	Initial stage of the formation of soil-laden ice lenses Takagi, S, 1982, p 223-2323 MP 1596	S. (1989, 10p) CR 89-00
Human-induced thermokarst at old drill sites in northern Alaska Lawson, DE, et al. (1978, p 16-23)	Frost susceptibility of soil, review of index tests Chamber-	Freezing technique for in-situ treatment of contaminated soils Ayorinde, O A, et al. (1989, p 489-498)
MP 1254 Revegetation along roads and pipelines in Alaska Johnson,	lain, E.J., (1982, 110p.) MP 1557 Frost heave model Hromadka, T.V., II, et al., (1982, p.1-	MP 2515 Soil freezing and soil water in sandy loam. Black, P.B., et al,
L A., (1980, p 129-150) MP 1353	10) MP 1567 Transport of water in frozen soil, Part 1 Nakano, Y, et al.	(1989, p 2205-2210) MP 2577 Steady growth of ice layer in freezing soils. Nakano, Y.,
Revegetation along the trans-Alaska pipeline, 1975-1978. Johnson, A.J., (1981, 115p.) CR 81-12	[1982, p 221-726] MP 1629	(1990, p 207-226) MP 2695
Modifications of permafrost, East Ournalik, Alaska. Law- son, D.E., (1982, 33p.) CR 82-36	Freezing of semi-infinite medium with initial temperature gradient. Lunardini, V.J., [1983, p.649-652]	X-ray photography of the frozen fringe of freezing soil. Akagawa, S., [1990, 69p] SR 90-05
Reservoir bank erosion caused and influenced by ice cover	MP 1583 Freezing and thawing: heat balance integral approximations.	Proceedings [1990, 318p] SR 90-01 Predicting unfrozen water content behavior of a soil Black,
Gatto, L.W., [1982, 26p] SR \$2-31 Bank recession of Corps of Engineers reservoirs. Gatto,	Lunardini, V J. (1983, p 30-37) MP 1597 Effects of ice on the water transport in frozen soil. Nakano,	PB, et al. (1990, p 54-60) MP 2677
L.W., et al. (1983, 103p) SR 83-30 Erosion of perennially frozen streambanks. Lawson, DE,	Y, et al. (1983, p 15-26) MP 1601	Transport of water due to a temperature gradient in unsaturated frozen clay Nakano, Y, et al. (1990, p.57-75)
(1983, 22p) CR 83-29	Frost heave of saline soils. Chamberlain, E.J., (1983, p. 121- 126) MP 1655	MP 2701 Comparison of four volatile organic compounds in frozen and
Tanana River monitoring and research studies near Fairbanks, Alaska Neill, CR, et al. (1984, 98p + 5 ap-	Investigation of transient processes in an advancing zone of freezing McGaw, R, et al. (1983, p 821-825)	unfrozen silt. Taylor, S, et al. (1990, 9p) SR 90-13
pends. ₁ SR 84-37 Chena Flood Control Project and the Tanana River near Fair-	MP 1663	Case study of potential causes of frost heave. Henry, KS, (1990, 35p) SR 90-09
banks, Alaska Buska, JS, et al. (1984, 11p + figs.) MP 1745	Boundary integral equation solution for phase change prob- lems O'Neill, K. (1983, p.1825-1850) MP 2093	Unfrozen water content and hydraulic conductivity of frozen soil Black, P.B. (1990, 7p.) CR 90-05
Bank recession of the Tanana River, Alaska. Gatto, L.W.,	Simple model of ice segregation using an analytic function to model heat and soil-water flow. Hromadka, TV, II, et al.	Soil mechanics
[1984, 59p] MP 1746 Bank recession and channel changes of the Tanana River.	1984, p. 99-104; MP 2104 Frost action and its control Berg, R.L., ed. (1984, 145p.)	Segregation freezing as the cause of suction force for ice lens formation. Takagi, S. (1978, 13p) CR 78-04
Alaska Gatto, L.W., et al. (1984, 98p) MP 1747 Erosion analysis of the Tanana River, Alaska Collins, C.M.,	MP 1704	Resilient response of two frozen and thawed soils Chamber- lain, E J, et al. (1979, p 257-271) MP 1176
(1984, 8p. + figs.) MP 1748	Designing for frost heave conditions Crory, F.E., et al. (1984, p. 22-44) MP 1705	Dynamic testing of free field stress gages in frozen soil Aitk-
Bank erosion, vegetation and permafrost, Tanana River near Fairbanks Gatto, L.W., [1984, 53p] SR 84-21	Survey of methods for classifying frost susceptibility Chamberlain, E.J., et al. (1984, p. 104-141) MP 1707	en, G W., et al. (1980, 26p) SR 80-30 Soil infiltration on land treatment sites Abele. G., et al.
Vegetation recovery in the Cape Thompson region. Alaska Everett, K.R., et al. (1985, 75p.) CR 85-11	Freezing of a semi-infinite medium with initial temperature	[1980, 41p] SR 80-34 Laboratory and field use of soil tensiometers above and below
Soil formation	gradient. Lunardini, V.J. (1984, p 103-106) MP 1740	0 deg C Ingersoll, J. (1981, 17p) SR 81-07
Tundra and analogous soils Everett, KR et al. (1981, p. 139-179) MP 1405	Heat and moisture transfer in frost-heaving soils Guymon, G.L., et al., [1984, p. 336-343] MP 1765	Prediction of explosively driven relative displacements in rocks Blouin, S.E., (1981, 23p.) CR 81-11
Cold room studies on frost susceptible soils (1950 25p)	Freezing of soil with phase change occurring over a finite temperature zone Lunardini, V.J., [1985, p.38-46]	Site investigations and submarine soil mechanics in polar regions Chamberlain, E.J., [1981, 18p] SR 81-24
ACFEL MP BL 1 Soil freezing	MP 1854	Frost susceptibility of soil, review of index tests. Chamber- lain, E.J., 11981, 110p 1 M 81-01
Remote-reading tensiometer for use in subfreezing tempera-	Automated soils freezing test Chamberlain, E.J., (1985, 5p.) MP 1892	Frost susceptibility of soil, review of index tests. Chamber
tures McKim, H.L. et al. (1976, p. 31-45) MP 897 Calculating unfrozen water content of frozen soils McGaw.	Soil freezing response influence of test conditions McCabe, E.Y., et al. (1985, p. 49-58) MP 1990	Review of methods for generating synthetic seismograms
R, et al. (1976, p 114-122) MP 899 Periodic structure of New Hampshire silt in open-system	Ground freezing for management of hazardous waste sites Sullivan, J.M., Jr., et al., (1985, 15p.) MP 2030	Peck, L., (1985, 39p.) CR 85-10 Evaluation of selected frost-susceptibility test methods
freezing McGaw, R. (1977, p 129-136) MP 902	Potential use of artificial ground freezing for contaminant	Chamberlain, E.J., [1986, 51p.) CR-86-14 Acoustic-to-seismic coupling through a snow layer. Peck
Consolidating dredged material by freezing and thawing Chamberlain, E.J., [1977, 94p] MP 978	immobilization Iskandar, I.K., et al. (1985, 10p.) MP 2029	L., (1987, p.47-55) MP 2294
Segregation freezing as the cause of suction force for ice lens formation Takagi, S., [1978, p.45-51] MP 1081	Literature review effect of freezing on hazardous waste sites Iskandar, I K, et al. (1985, p.122-129) MP 2028	Recent research on acoustic to seismic coupling Albert D.G., (1987, p. 223-225) MP 2418
Segregation freezing as the cause of suction force for ice lens	Model of freezing front movement Hromadka, T.V., II, et al. [1985, 9p] MP 2077	Soil microbiology Nitrification inhibitor in land treatment of wastewater in cold
Fundamentals of ice lens formation Takagi, S., (1978,	Natural electrical potentials that arise when soils freeze.	regions Elgawhary, S.M., et al. (1979, 25p.) SR 79-11
p 235-242 ₁ MP 1173 Thermal and creep properties for frozen ground construction	Yarkin, I.G., [1986, 24p] SR 86-12 Corps of Engineers Land Treatment Research and Develop-	Analysis of water in the Martian regolith Anderson, D.M.
Sanger, F.J., et al., (1978, p. 95-117) MP 1624 Resiliency of subgrade soils during freezing and thawing	ment program — Iskandar, I.K., [1986, p 17-18] MP 2149	et al. (1979, p. 33-38) MP 1405 Arctic ecosystem the coastal fundra at Barrow, Alaska
Johnson, T.C., et al. (1978, 59p.) CR 78-23	Freezing effect on waste contaminants Iskandar, IK.	Brown, J. ed. (1980, 571p) MP 1355
Thermal and creep properties for frozen ground construction Sanger, F.J. et al. (1979, p. 311-337) MP 1227	(1986, 33p) SR 86-19 Heat transfer in a freezing shaft wall Liandi, F. (1986,	Crude oil spills on subarctic permafrost in interior Alaska Johnson, L.A., et al., [1980, 67p] CR 80-25
Construction and performance of membrane encapsulated soil layers in Alaska Smith, N., [1979, 27p]	24p ₁ CR 86-08 Resilient moduli of soil specimens in the frozen and thawed	Soil microbiology Bosatta, E, et al. [1981, p.38-44] MP 1753
CR 79-16	states Johnson, T.C., et al., [1986, 62p.] CR 86-12 Evaluation of selected frost-susceptibility test methods	Effect of soil temperature on nitrification kinetics Parker L.V., et al. (1981, 27p.) SR 81-33
Low temperature phase changes in moist, briny clays. Anderson, D.M. et al. (1980, p 139-144). MP 1330	Chamberlain, E.J., (1986, 51p.) CR-86-14	Soil physics
Frost heave in an instrumented soil column Berg R.L. et al. [1980, p.211-221] MP 1331	Classification and laboratory testing of artificially frozen ground. Sayles, F.H., et al., (1987, p.22-48)	Freeze thaw effect on the permeability and structure of soils Chamberlain, E.J. et al. (1978, p. 31-44) MP 1080
Frost heave model based upon heat and water flux. Guy- mon, G.L., et al., (1980, p. 253, 262). MP 1333	MP 2227 Tracking freezing front movement using boundary element	Freeze thaw effect on the permeability and structure of soils Chamberlain, E.J. et al. [1979, p.73-92] MP 122:
Adsorption force theory of frost heaving Takagi, S. (1980.	method Hromadka, T.V., II, [1987, 58p.] SR 87-08	Functional analysis of the problem of wetting fronts Naka
p 57-81; MP 1334 Overconsolidation effects of ground freezing Chamberlain,	Ground freezing controls hazarde is waste Iskandar, I K. MP 2270 MP 2270	no, Y. (1980) p 314-3181 MP 130 Measurements of ground resistivity Arcone, S.A. (1982)
E.J. (1980, p.325-337; MP 1452 Numerical solutions for rigid tee model of secondary frost	Recent research on acoustic to seismic coupling. Albert, D.G., 1987, p. 223-225] MP 2418	p 92-110 ₁ MP 1512 Ground dielectric properties Arcone, S.A., et al., [1982,
heave O'Neill, K, et al. (1980, p.656-669) MP 1454	Fyperimental methods for decontaminating soils by freezing Ayorinde, O.A., et al., (1988, 12p.) MP 2513	11p ₃ CR #2-00
Field studies of membrane encapsulated soil layers with addi-	Soil freezing and unfrozen water content. Lunardini, V.J.	Laboratory measurements of soil electric properties between 0.1 and 5 GHz Delaney, A.J., et al., (1982, 12p.) CR 82-11
tives Exton. R.A., et al., (1980, 46n) SR 80-33	-1988, 21n s CR ##-02	1.H #2-11

Horizontal infiltration of water in porous materials. Nakano,	Chena River Lakes Project revegetation study—three-year	Waste heat utilization through soil heating McFadden, T.
Y., (1982, p.156-166) MP 1840 In-situ thermal conductivity measurements. Atkins, R.T.,	summary. Johnson, L.A., et al. [1981, 59p]	et al. (1980, p 105-120) MP 1363 Approximate solution to Neumann problem for soil systems.
(1983, 38p) MP 2214	Revised procedure for pavement design under seasonal frost	Lunardini, V.J., et al, [1981, p 76-81] MP 1494
Use of radio frequency sensor for snow/soil moisture water	conditions Berg, R, et al. (1983, 129p) SR 83-27	Effect of soil temperature on nitrification kinetics Parker, L.V., et al. (1981, 27p.) SR \$1-33
content measurement. McKim, H.L., et al, [1983, p.33-42] MP 1689	Performance of a thermosyphon with an inclined evaporator and vertical condenser. Zarling, J.P., et al., 1984, p.64-	L.V., et al, (1981, 27p.) SR 81-33 CO2 effect on permafrost terrain. Brown, J. et al, (1982,
In-situ thermoconductivity measurements. Faucher, M,	68 ₁ MP 1677	30p) MP 1546
(1986, p.13-14) MP 2137	Stabilization of fine-grained soil for road and airfield con- struction. Danyluk, L.S. 1986, 37p SR 86-21	Field tests of a frost-heave model Guymon, G.L., et al.
Tensile strength of frozen silt Zhu, Y., et al. [1987, 23p] CR 87-15	SOIL STRENGTH	(1983, p. 409-414) MP 1657 Relationships between estimated mean annual air and perma-
Modeling the transport of chromium (VI) in soil columns	Freezing process and mechanics of frozen ground Scott,	frost temperatures in North-Central Alaska Haugen,
Selim. H.M., et al. (1989, p 996-1004) MP 2670	R.F., (1969, 65p) M II-D1 Soil strength	R.K., et al. [1983, p 462-467] MP 1658
Simple and economical thermal conductivity measurement system. Atkins, R.T., (1989, p 108-116) MP 2566	Evaluation of MESL membrane—puncture, stiffness, temper-	Natural ground temperatures in upland bedrock terrain, in- terior Alaska. Collins, C.M., et al. §1988, p. 56-60;
Low-temperature effects on systems for composting explo-	ature, solvents Sayward, J.M., (1976, 60p)	MP 2360
sives-contaminated soils. Ayorinde, O A., et al. (1989, 18p) SR 89-38	CR 76-22 Baseplate design and performance mortar stability report.	Soil tests
Sell pollation	Aitken, G.W., (1977, 28p) CR 77-22	Viking GCMS analysis of water in the Martian regolith. Anderson, D.M., et al. (1978, p. 55-61) MP 1195
Urban waste as a source of heavy metals in land treatment.	Repetitive loading tests on membrane enveloped road sec-	Small-scale testing of soils for frost action. Sayward, J M.,
Iskandar, I.K., (1976, p. 417-432) MP 977 Explosives in soils and sediments Cragin, J.H., et al., (1985,	tions during freeze thaw. Smith, N., et al. (1977, p.171- 197) MP 962	[1979, p 223-231] MP 1309 Soil tests for frost action and water migration. Sayward,
11p ₁ CR 85-15	Resiliency in cyclically frozen and thawed subgrade soils.	Soil tests for frost action and water migration. Sayward, J.M., (1979, 17 p.) SR 79-17
Explosive residues in soil. Jenkins, T.F., et al. (1985, 33p)	Grouting of soils in cold environments: a literature search	Determining explosive residues in soil Jenkins, T.F., et al.
SR 85-22 Effect and disposition of TNT in a terrestrial plant. Palazzo.	Johnson, R. (1977, 49p) SR 77-42	(1988, 46p.) CR 88-98 Thawing soil strength measurements for predicting vehicle
A.J., et al. (1986, p.49-52) MP 2098	Electromagnetic survey in permafrost Sellmann, P.V., et al.	performance. Shoop, S.A., [1989, 18p] MP 2749
TNT in a terrestrial plant. Palazzo, A.J., et al. (1986, 17p)	[1979, 7p] SR 79-14 Effect of freezing and thawing on resilient modulus of granu-	Soil texture
CR 86-15 Companson of extraction techniques for munitions residues	lar soils. Cole, D.M., et al. (1981, p. 19-26)	Enclosing fine-grained soils in plastic moisture barriers. Smith, N., 1978, p.560-5701 MP 1069
in soil Jenkins, T.F., et al. (1987, p.1326-1331)	MP 1484	Smith, N., (1978, p.560-570) MP 1009 Kinetic nature of the long term strength of frozen soils Fish,
MP 2350	Testing shaped charges in unfrozen and frozen silt in Alaska. Smith, N., 1982, 10p.; SR 82-02	A M , (1980, p.95-108) MP 1450
Development of an analytical method for explosive residues in soil. Jenkins, T.F., et al. (1987, 51p.) CR 87-07	Seasonal soil conditions and the reliability of the M15 land	Soil trafficability
Sorption of chemical agents and simulants. Leggett, D.C.	mine Richmond, P.W., et al. (1984, 35p) SR 84-18	Effects of low ground pressure vehicle traffic on tundra. Abele, G, et al. (1978, 63p) SR 78-16
(1987, 15p) SR 87-18	Mapping resistive seabed features using DC methods. Sell- mann, P.V., et al. (1985, p 136-147) MP 1918	Snow pads for pipeline construction in Alaska Johnson,
Preliminary development of a fiber optic sensor for TNT. Zhang, Y., et al. (1988, 16p) SR 88-04	Arctic mobility problems Abele, G. (1987, p 267-269)	PR, et al. (1980, 28p) CR 80-17
Development of analytical methods for military-unique com-	MP 2421	Evaluating trafficability. McKim, H.L., [1986, p 237-239] MP 2662
pounds. Walsh, M.E., et al., [1988, p.370-380] MP 2454	Thawing soil strength measurements for predicting vehicle performance Shoop, S.A. (1989, 18p.) MP 2749	Vehicle mobility on thawing soils Shoop, S.A., 1989,
Determining explosive residues in soil. Jenkins, T.F., et al,	Soil structure	16p ₁ SR 39-31
[1988, 46p] CR 88-08	Proposed size classification for the texture of frozen earth	Soil water Ionic migration and weathering in frozen Antarctic soils.
Effects of temperature and species on TNT injury to plants. Palazzo, A.J., et al., (1988, 7p.) SR 88-16	materials McGaw, R. [1975, 10p] MP 921 Evaluation of MESL membrane—puncture, stiffness, temper-	Ugolini, F.C. et al. [1973, p 461-470] MP 941
Palazzo, A.J., et al. (1988, 7p.) SR 48-16 Analytical method for determining tetrazene in soil. Walsh,	ature, solvents. Sayward, J.M., [1976, 60p]	Prediction of unfrozen water contents in frozen soils from
M E., et al, (1988, 22p) SR 88-15	CR 76-22	liquid determinations. Tice, A.R., et al. (1976, 9p.) CR 76-08
Determining nitroaromatics and nitramines in water Jen- kins, T.F., et al. [1988, 36p] SR 88-23	Regionalized feasibility study of cold weather earthwork Roberts, W.S. [1976, 190p] SR 76-02	Impact of urban wastewater reuse in cold regions on land
kins, T.F., et al. (1988, 36p) SR 48-23 Ice-water partition coefficients for RDX and TNT. Taylor,	Periodic structure of New Hampshire silt in open-system	treatment systems Iskandar, I.K., (1976, 32p.) MP 2452
S. [1989, 10p] CR 89-08	freezing McGaw, R., (1977, p 129-136) MP 902 Freeze thaw effect on the permeability and structure of soils.	On the origin of pingos-a comment Mackay. J.R. 1976.
Determination of explosive residues in soil. Part 3 Bauer, C.F., et al. (1989, 89p) CR 89-09	Chamberlain, E.J., et al. (1978, p.31-44) MP 1080	p 295-298 ₁ MP 916
C.F., et al, (1989, 89p.) CR 89-09 Low concentration measurement capability in trace analysis	Freeze thaw effect on the permeability and structure of soils	Remote-reading tensiometer for use in subfreezing tempera- tures McKim, H L., et al. (1976, p 31-45) MP 897
Grant, C.L., et al. (1989, 21p) SR 89-20	Chamberlain, E.J., et al. (1979, p. 73-92) MP 1225 Electron microscope investigations of frozen and unfrozen	Colloquium on Water in Planetary Regoliths, Hanover, N.H.
Comments on "Modeling adsorption/desorption kinetics of pesticides in a soil suspension" Leggett, D.C., [1989,	bentonite. Kumai, M., [1979, 14p.] CR 79-28	Oct 5-7, 1976. (1977, 161p) MP 911
p 231 ₁ MP 2532	Soil-water potential and unfrozen water content and tempera- ture Xu, X, et al. (1985, p. 1-14) MP 1932	Mars soil-water analyzer instrument description and status. Anderson, D.M., et al., [1977, p.149-158] MP 912
Analytical methods for detecting military-unique compounds Jenkins, T.F., et al. (1989, p. 13-14) MP 2713	Ground motion induced by an acoustic pulse, and its winter-	Enclosing fine-grained soils in plastic moisture barriers.
Jenkins, T.F., et al. (1989, p 13-14) MP 2713 Well casings for monitoring trace organics in ground water.	time variations Peck, L., [1988, p.361-385]	Smith, N. (1978, p 560-570) MP 1009
Parker, L.V., et al. (1989, 29p.) CR 89-18	MP 2597 Microstructure of frozen soils examined by SEM. Kumai.	Fundamentals of ice lens formation. Takagi, S., (1978, p.235-242) MP 1173
Retention of elements by soils Buchter, B, et al. (1989, p 370-379) MP 2570	M., (1988, p 390-395) MP 2361	Simplified method for monitoring soil moisture Walsh, JE.,
p 370-379; MP 2570 Analytical methods for determining nitrogramidine in soil and	Effect of freeze-thaw cycles on soils Chamberlain, E., et al. (1990, p 145-155) MP 2678	et al. (1978, p 40-44) MP 1194 Construction and performance of platinum probes for meas-
water. Walsh, M E. (1989, 27p) SR 89-35	(1990, p 145-155) MP 2678 Soil surreys	urement of redox potential Blake, B J, et al. (1978, 8p)
Chromatographic determination of nitroaromatic residues in	Tundra soils on the Arctic Slope of Alaska Everett, K.R.,	SR 78-27
soil Jenkins, T.F., et al. [1989, p.890-899] MP 2586	et al. (1982, p 264-280) MP 1552 Frozen strength characterization of NH&S test sites in Mon-	Increasing the effectiveness of soil compaction at below-freezing temperatures Haas, W.M., et al. (1978, 58p.)
Environmental transformation of nitroaromatics and nitra- mines Walsh, M.E., (1990, 21p.) SR 90-02	tana Chamberlain, E.J. et al. (1988, var. p.)	SR 78-25
mines Walsh, ME, (1990, 21p) SR 90-02 Fate and transport of contaminants in frozen soils Ayo-	MP 2617	Construction and performance of membrane encapsulated soil layers in Alaska Smith, N., [1979, 27p]
rinde, O.A. et al. (1990, p 202-211) MP 2679	SOIL TEMPERATURE Heat exchange at the ground surface Scott, R.F., 1964,	CR 79-16
Surface changes in well casings exposed to organic pollutants Taylor, S, et al. (1990, 14p) SR 90-07	49p plus append j M II-A1	Water movement in a land treatment system of wastewater by
Comparison of four volatile organic compounds in frozen and	Soil temperature	overland flow Nakano, Y, et al. (1979, p 185-206) MP 1285
unfrozen silt. Taylor, S. et al. (1990, 9p.) SR 90-13	Piles in permafrost for bridge foundations Crory, F.E., et al. (1967, 41p.) MP 1411	Analysis of water in the Martian regolith Anderson, D.M.,
Soil pressure Segregation-freezing temperature as the cause of suction	Abiotic overview of the Tundra Biome Program, 1971	et al. (1979, p. 33-38) MP 1409 Survey of methods for soil moisture determination
force Takagi, S. [1977, p.59-66] MP 901	Weller, G. et al. [1971, p.173-181] MP 906 Prediction and validation of temperature in tundra soils	Schmugge, T.J., et al (1979, 74p.) MP 1639
Ground pressures exerted by underground explosions John-	Brown, J., et al. [1971, p 193-197] MP 907	Frost heave in an instrumented soil column Berg, R.L. et
son, P.R., [1978, p.284-290] MP 1520 Summary of the adsorption force theory of frost heaving	Computer simulation of the snowmelt and soil thermal regime	al, (1980, p. 211-221) MP 1331 Watershed modeling in cold regions Stokely, J.L., (1980,
Takagi, S., (1980, p.233-236) MP 1332	at Barrow, Alaska Outcalt, S 1, et al., (1975, p 709-715) MP 857	241p) MP 1471
Soil stabilization Thermoinsulating media within embankments on perennially	Selected climatic and soil thermal characteristics of the	Review of techniques for measuring soil moisture in situ Mckim, H.L., et al., [1980, 17p] SR 80-31
frozen soil Berg. R L., [1976, 161p] SR 76-03	Prudhoe Bay region Brown, J. et al. (1975, p.3-12) MP 1054	Field studies of membrane encapsulated soil layers with addi-
Utilization of sewage studge for terrain stabilization in cold	Surface temperature data for Atkasook, Alaska summer 1975	tives Eaton, R.A., et al. (1980, 46p) SR 80-33
regions Gaskin, D.A., et al., [1977, 45p.] SR 77-37. Grouting silt and sand at low temperatures. Johnson, R.,	Haugen, R.K., et al., [1976, 25p] 5R 76-01 Oil spills on permafrost Collins, C.M., et al., [1976, 18p]	Soil hydraulic conductivity and moisture retention features Ingersoll, J. (1981, 11p.) SR 81-02
(1979, p 937-950) MP 1078	SR 76-15	Some approaches to modeling phase change in freezing soils
Sewage sludge for terrain stabilization, Part 2 Gaskin, DA.	kotzehue hospital a case study Crory, F.E., [1978]	Hromadka TV, II et al. (1981, p.137-145) MP 1437
et al. (1979, 36p) SR 79-28 Utilization of sewage studge for terrain stabilization in cold	p 342-359 ₁ MP 1084 Thermal properties and regime of wel tundra soils at Barrow,	Laboratory and field use of soil tensiometers above and below
regions Pt 3 Rindge, S.D., et al, (1979, 33p)	Alaska McGaw, R., et al., (1978, p.47-53)	0 deg C Ingersoll, J. (1981, 17p) SR 81-07
SR 79-34 Field studies of membrane encapsulated soil layers with addi-	MP 1096 Geophysics in the study of permafrost Scott, W.J., et al.	Modeling N transport and transformations in soils Selim, H.M., et al. (1981, p.233-241) MP 1440
tives Eaton, R.A. et al. (1980, 46p.) SR 80-33	(1979, p.93-115) MP 1266	Hydraulic characteristics of the Deer Creek I ake land treat-
Plant growth on a gravel soil, greenhouse studies Palazzo,	Removal of organics by overland flow Martel, C.J., et al.	ment site during wastewater application. Abele G et al.
A.J. et al. (1981, 8p.) SR 81-64	(1980, 9p) MP 1362	(1971, 17p) CR 81-07

Soil water (cont.)	Soil infiltration on land treatment sites. Abele, G., et al. [1980, 41p] SR 80-36	Geochemistry of freezing brines Thurmond, V.L., et al.
Simulating frost action by using an instrumented soil column. Ingersoil, J., et al. (1981, p 34-42) MP 1485	Results from a mathematical model of frost heave. Guymon,	(1987, 11p) CR 87-13 Ice surface hydrolysis of disopropylfluorophosphate (DFP)
Comparative evaluation of frost-susceptibility tests. Chan-	G L., et al. (1981, p.2-6) MP 1483	Leggett, D.C., [1987, p 809-815] MP 2457
berlain, E.J., [1981, p 42-52] MP 1486 Method for measuring enriched levels of deuterium in soil	Ice segregation in a frozen soil column. Guymon, G.L., et al., [1981, p 127-140] MP 1534	Sound transmission Audibility within and outside deposited snow. Johnson, J.E.,
water. Oliphant, J.L., et al. (1982, 12p) SR 82-25	Mobility of water in frozen soils. Lunardini, V.J., et al.	(1985, p 136-142) MP 1960
Relationship between ice and unfrozen water in frozen soils. Tice, AR, et al. (1983, p 37-46) MP 1632	(1982, c15p.) MP 2012 Horizontal infiltration of water in porous materials. Nakano,	Analysis of acoustical features of laboratory grown sea ice. Stanton, T.K., et al. [1986, p.1486-1494] MP 2222
Wetting fronts in porous media. Nakano, Y., (1983, p.71-	Y., (1982, p.156-166) MP 1840	Observations of low-frequency acoustic-to-seismic coupling
78 ₁ MP 1720 Effect of loading on the unfrozen water content of silt Oli-	Transport of water in frozen soil, Part 1. Nakano, Y., et al. [1982, p 221-226] MP 1629	in the summer and winter. Albert, D.G., et al. (1989, p. 352-359) MP 2654
phant, J L., et al. (1983, 17p) SR 83-18	Effects of ice on the water transport in frozen soil. Nakano,	Acoustic pulse propagation above grassland and snow Al-
Soil-vater diffusivity of unsaturated frozen soils at subzero temperatures. Nakano, Y., et al, [1983, p.889-893]	Y., ct al, (1983, p.15-26) MP 1601	bert, D G., et al. [1990, p 93-100] MP 2573 Sound waves
MP 1664	Water migration due to a temperature gradient in frozen soil Oliphant, J.L., et al. [1983, p.951-956] MP 1666	Acoustic-to-seismic coupling through a snow layer. Peck,
Use of radio frequency sensor for snow/soil moisture water content measurement. McKim, H L., et al, 1983, p 33-	Frozen soil-water diffusivity under isothermal conditions.	L., (1987, p.47-55) MP 2294
42 ₁ MP 1689	Nakano, Y., et al. (1983, 8p.) CR 83-22 Two-dimensional model of coupled heat and moisture trans-	Sounding Some characteristics of grounded floebergs near Prudhoe Bay,
Boundary value problem of flow in porous media. Nakano, Y., [1983, p.205-213] MP 1721	port in frost heaving soils Guymon, G L., et al, [1984,	Alaska. Kovacs, A., et al, (1976, p 169-172)
Experimental measurement of channeling of flow in porous	p.91-98; MP 1678 Simple model of ice segregation using an analytic function to	MP 1118 Grounded floebergs near Prudhoe Bay, Alaska Kovacs, A.,
media Oliphant, J.L., et al., [1985, p.394-399] MP 1967	model heat and soil-water flow. Hromadka, T.V. II, et al.	et al, (1976, 10p) CR 76-34
Phase equilibrium in frost heave of fine-grained soil. Naka-	(1984, p.99-104) MP 2104 Effects of ice content on the transport of water in frozen soils.	US/USSR Weddell Polynya expedition, Upper air data, 1981. Andreas, E L., (1983, 288p) SR 83-13
no, Y., et al. (1985, p 50-68) MP 1896	Nakano, Y., et al, [1984, p 28-34] MP 1841	Impulse radar sounding of level first-year sea ice from an
Hydraulic properties of selected soils. Ingersoll, J., et al. (1985, p 26-35) MP 1925	Role of heat and water transport in frost heaving of porous soils Nakano, Y., et al. [1984, p 93-102] MP 1842	icebreaker Martinson, C.R., (1985, 9p.) SR 85-21. Airborne measurement of sea ice th'ckness and subice bath-
Frost heave of full-depth asphalt concrete pavements. Zom-	Deuterium diffusion in a soil-water-ice mixture. Oliphant.	ymetry. Kovacs, A., et al., [1988, p.111-120]
erman, I., et al. (1985, p 66-76) MP 1927 Soil-water potential and unfrozen water content and tempera-	J.L., et al, (1984, 11p) SR 84-27	MP 2345 Coastal subsea permafrost and bedrock observations using de
ture. Xu, X, et al. [1985, p 1-14] MP 1932	Transport of water in frozen soil. Nakano, Y., et al. (1984, p.172-179) MP 1819	resistivity. Sellmann, P.V., et al. (1989, 13p)
Evaluating trafficability. McKim, H L., (1985, p.474-475) MP 2023	Water migration in frozen clay under linear temperature	CR 89-13 Sea ice thickness measurement. Kovacs, A., et al. (1989,
Evaluating trafficability. McKim, H.L., (1986, p.237-239)	gradients. Xu, X., et al, (1985, p 111-122) MP 1934 Experimental study on factors affecting water migration in	p.394-424 ₁ MP 2693
MP 2662 Measurement of the unfrozen water content of soils: a com-	frozen morin clay. Xu, X , et al, (1985, p 123-128)	Ice strength estimates from submarine topsounder data. DiMarco R, et al, [1989, p.425-426] MP 2691
parison of NMR and TDR methods Smith, MW., et al,	MP 1897 Thawing of frozen clays Anderson, D.M., et al., (1985, p.1-	Airborne sea ice thickness sounding Kovacs, A., et al,
(1988, p.473-477) MP 2363 Relationship between freezing and water content in sandy	9) MP 1923	[1990, p 225-229] MP 2737
loam. Black, PB, et al. (1988, 37p) CR 88-26	fon and moisture migration and frost heave in freezing Morin clay. Qiu, G, et al. (1986, p.1014) MP 1970	South Georgia Soil properties of the International Tundra Biome sites.
Unfrozen water content of soils. Smith, M W., et al, [1988, 11p.] CR 88-18	Transport of water in frozen soil 6. Effects of temperature.	Brown, J. et al. [1974, p 27-48] MP 1043
Chemical aspects of soil freezing. Henry, K , [1988, 8p]	Nakano, Y., et al. [1987, p.44-50] MP 2213	Tundra and analogous soils Everett, K.R., et al. (1981, p 139-179) MP 1405
CR 88-17	Model of heat and soil-water flow coupled by soil-water phase change. Hromadka, T.V., II, [1987, 124p]	South Shetland Islands
Determining nitroaromatics and nitramines in water. Jen- kins, T.F., et al. (1988, 36p) SR 88-23	SR 87-09	Tundra and analogous soils Everett, K.R., et al. (1981, p 139-179) MP 1405
Unfrozen water contents of six antarctic soil materials And-	Tracking freezing front movement using boundary element method. Hromadka, T.V., II, 1987, 58p 1 SR 87-08	Spaceborne photography
erson, D.M., et al. (1989, p 353-366) MP 2470 Monitoring pavement performance in seasonal frost areas	Factors affecting water migration in frozen soils Xu, X., et	Applications of remote sensing in New England McKim. H.L., et al. (1975, 8p. + 14 figs and tables) MP 913
Berg, R.L., (1989, p.10-19) MP 2564	al, [1987, 16p] CR 87-09 Geotextiles and a new way to use them. Henry, K., [1988,	H.L., et al. (1975, 8p. + 14 figs and tables) MF 913 Circulation and sediment distribution in Cook Inlet, Alaska.
Data acquisition, first the FERF then the world. Knuth. K.V., [1989, p.136-138] MP 2567	p 214-222 ₁ MP 2525	Gatto, L.W. (1976, p 205-227) MP 895
New approach for sizing rapid infiltration systems (discussion	Observations of moisture migration in frozen soils during thawing Cheng, G, et al. (1988, p. 308-312)	Islands of grounded sea ice Kovaes, A. et al. [1976, 24p] CR 76-04
and closure) Reed, S.C., et al. (1989, p.879-882) MP 2712	MP 2373	Land use and water quality relationships, eastern Wisconsin.
Soil freezing and soil water in sandy loam Black, P.B., et al.	Rate of water transport due to temperature gradients in frozen soils. Nakano, Y, et al. (1988, p.412-417) MP 2362	Haugen, R.K., et al., (1976, 47p.) CR 76-30 Antarctic sea ice dynamics and its possible climatic effects.
(1989, p 2205-2210) MP 2577 Hydraulic conductivity and unfrozen water content of frozen	State of water in freezing soil. Black, P.B. (1989, 7p.)	Ackley, S.F., et al., (1976, p.53-76) MP 1378
silt. Black, P.B., et al. (1990, p 323-329) MP 2551	Fate and transport of contaminants in frozen soils Ayo-	Skylab imagery: Application to reservoir management in New England McKim, H L., et al. (1976, 51p.)
Proceedings (1990, 318p) SR 90-01 Predicting unfrozen water content behavior of a soil Black,	rinde, O.A., et al. (1990, p. 202-211) MP 2679	SR 76-07
P.B., ct al. (1990, p 54-60) MP 2677	Unfrozen water content and hydraulic conductivity of frozen soil Black, P.B., (1990, 7p.) CR 90-05	Environmental analyses in the Kootenai River region. Montana McKim, H L, et al. [1976, 53p] SR 76-13
Soil water migration	Soils	Visual observations of floating ice from Skylab Campbell,
Segregation-freezing temperature as the cause of suction force. Takagi, S., (1977, p 59-66) MP 901	Geobotanical atlas of the Prudhoe Bay region, Alaska	WJ, et al. [1977, p 353-379] MP 1263 Landsat data for watershed management Cooper, S, et al.
Mathematical model to predict frost heave Berg, R L., et al.,	Walker, D.A. et al. [1980, 69p] CR 80-14 Effects of a tundra fire on soil and vegetation Racine, C.	[1977, c150p] MP 1114
(1977, p 92-109) MP 1131 Moving boundary problems in the hydrodynamics of porous	(1980, 21p) SR 80-37	1977 tundra fire in the Kokolik River area of Alaska Hall, DK, et al. [1978, p 54-58] MP 1125
media Nakano, Y. (1975, p 125-134) MP 1343	Introduction to abiotic components in tundra Brown, J. [1981, p 79] MP 1432	Water resources by satellite McKim, H.L., (1978, p 164-
Freeze thaw effect on the permeability and structure of soils Chamberlain, E.J., et al., (1978, p. 31-44) MP 1080	Solar radiation	169 ₁ MP 1090 Estuarine processes and intertidal habitats in Grays Harbor,
Segregation freezing as the cause of suction force for ice lens	Tunden en tremment at Barrow, Alaska Bunnell, F.L., et al., 1975, n.73-1241 MP 1050	Washington a demonstration of remote sensing techniques.
formation. Takagi. S., (1978, p.45-51) MP 1081 Load tests on membrane-enveloped road sections Smith.	Effect : radiation penetration on snowmelt runoff hydro-	Gatto, L.W., [1978, 79p] CR 78-18 Remote sensing for land treatment site selection Merry,
N , et al. (1978, 16p) CR 78-12	graphia Colbeck, S.C., [1976, p.73-82] MP 948 Light-colored surfaces reduce thaw penetration in permafrost	CJ, (1978, p 107-119) MP 1146
Evaluation of the moving boundary theory Nakano, Y. (1978, p.142-151) MP 1147	Berg, R.L., et al. [1977, p 86-99] MP 954	1977 tundra fire at Kokolik River, Alaska Hall, D.K., et al, [1978, 11p] SR 78-10
Simulation of the movement of conservative chemicals in soil	Near-infrared reflectance of snow-covered substrates O'- Brien, H.W., et al. [1981, 17p] CR 81-21	Mapping of the LANDSAT imagery of the Upper Susitna
solution Nakano. Y, et al. [1978, p 371-380] MP 1156	Brien, H W., et al. [1981, 17p] CR 81-21 Surface meteorology US/USSR Weddell Polynya Expedition.	River Gatto, L.W., et al. (1980, 41p) CR 80-04 Sea ice the potential of remote sensing Weeks, W.F.
Heat and moisture flow in unsaturated soils O'Neill, K.	1931. Andreas, E L., et al. (1983, 32p) SR 83-14	(1981, p 39-48) MP 1468
[1979, p 304-309] MP 1259 Small-scale testing of soils for frost action Sayward, J M.	On the decay and retreat of the ice cover in the summer MIZ. Maykut, G.A., (1984, p. 15-22) MP 1780	Antaretic sea ice microwave signatures Comiso, J.C. et al. (1984, p.662-672) MP 1668
(1979, p 223-231) MP 1309	Approach to snow propagation modeling Koh, G. (1984)	Use of SPOT HRV data in the Corps of Engineers dredging
Soil tests for frost action and water migration Sayward, J.M., (1979, 17 p.) SR 79-17	p 247-259; MP 1869 Shortwave radiation and open water in models of sea ice	program Merry, C.J., et al., (1988, p 1295-1299) MP 2528
Freeze thaw effect on the permeability and structure of soils	decay Perovich, D.K., et al. (1990, p. 242-246)	Satellite remote sensing in Arctic for 1990's Weeks, W.F.,
Chamberlain, E.J., et al., [1979, p.73-92] MP 1225 Mathematical model to correlate frost heave of pavements	MP 2759 Solid phases	et al. (1989, p.510-530) MP 2699
Berg, R L., et al. (1980, 49p) CR 80-10	Simulation of planar instabilities during solidification Sul-	Spacecraft Progress report on ERTS data on Arctic environment And-
Functional analysis of the problem of wetting fronts Naka- no, Y. (1980, p. 314-318) MP 1307	livan, J M., Jr., et al. (1987, p.81-111) MP 2585 Solutions	erson, D.M., et al. [1972, 3p] MP 991
Summary of the adsorption force theory of frost heaving	Nose shape and L D ration, and projectile penetration in	Near real time hydrologic data acquisition utilizing the LANDSAT system. Mckim, H.L., et al., (1975, p. 200-
Takagi, S., (1980, p. 233-236) MP 1332 Frost heave model based upon heat and water flux. Guy-	frozen soil Richmond, P.W., (1980, 21p.) SR 80-17 Transport equation over long times and large spaces	211 ₃ MP 1055
mon, G L., et al. (1980, p 253-262) MP 1333	O'Neill, K., (1981, p 1665-1675) MP 1497	Remote sensing plan for the AIDJE's main experiment. Weeks, W.F., et al. (1975, p. 21-48) MP 862
Adsorption force theory of frost heaving Takagi, S (1980, p 57-81) MP 1334	Ice crystal growth in subcooled NaCl solutions Sullivan, J.M., Jr., et al., (1985, p. 527-532) MP 2100	Descing a satellite communication antenna Hanamoto, B.
Overconsolidation effects of ground freezing Chamberlain,	Polyvinyl chloride well casings for ground water monitoring	Potential using of the space shuttle external tank Ferrick,
E.J., (1980, p.325-337) MP 1452	Parker, L.V., et al. (1986, p.92-98) MP 2171	M.G., et al. (1982, 305p.) CR 82-25

Arctic and Antarctic communications. Rosenberg, T.J., ed. [1987, 29p] MP 2322	Science program for an imaging radar receiving station in Alaska, Weller, G, et al. (1983, 45p.) MP 1884	Classification and laboratory testing of artificially frozen ground. Sayles, F.H., et al. (1987, p. 22-48)
Multiband imaging systems. McKim, H.L., et al. (1990, 10p) SR 90-15	Statistical analysis Midwinter temperature regime and snow occurrence in Ger-	MP 2227 Hopkinson pressure bar to measure strain rates of materials.
Specific heat	many. Bilello, M.A., et al. (1978, 56p.) CR 78-21	Dutta, P.K., et al. (1988, p 885-903) MP 2517
Thermal diffusivity of frozen soil. Haynes, F.D., et al. [1980, 30p] SR 80-38	Break-up dates for the Yukon River; Pt. 1 Rampart to White- horse, 1896-1978. Stephens, C.A., et al. [1979, e50]	Effects of temperature and structure of ice on its flexural strength. Gow, AJ, et al., [1988, 43p.] CR 88-06
Comparison of unfrozen water contents measured by DSC and NMR. Oliphant, J.L., et al. (1982, p 115-121)	leaves ₁ MP 1317 Break-up dates for the Yukon River, Pt.2 Alakanuk to Tana-	Triaxial compressive strength of frozen soils under constant strain rates Zhu, Y, et al, [1988, p 1200-1205b]
MP 1594	na. 1883-1978 Stephens, C A , et al. (1979, c50 leaves)	MP 2371
Spectra Atmospheric turbulence measurements at SNOW-ONE-B	MP 1318 Cost-effective use of municipal wastewater treatment ponds	Comparison of the compressive strength of antarctic frazil ice and laboratory-grown columnar ice Richter-Menge, J.A.,
Andreas, E.L., (1983, p 81-87) MP 1846 Water quality monitoring using an airborne spectroradiome-	Reed, S.C., et al. (1979, p 177-200) MP 1413 Regional climatic trends in northern New England Haugen,	et al. (1990, p.79-84) MP 2731 Strains
ter. McKim, H.L., et al, (1984, p 353-360)	R.K. et al. (1988, p 64-71) MP 2748	Remote sensing program required for the AIDJEX model
MP 1718 Observations of volcanic tremor at Mount St. Helens volcano	Application of aerosol physics to snow research. Hogan, A.W., [1989, p 201-207] MP 2756	Weeks, W.F., et al. (1974, p 22-44) MP 1940 Effect of temperature on the strength of frozen silt Haynes,
Fehler, M., [1984, p 3476-3484] MP 1770 Spectra and cospectra of atmospheric turbulence over snow	Steam	F.D., et al. [1977, 27p] CR 77-03 Application of the Andrade equation to creep data for ice and
Andreas, E.L., [1986, p 219-233] MP 2661	Long distance heat transmission with steam and hot water Aamot, H.W.C. et al. (1976, 39p.) MP 938	frozen soil Ting, J M, et al. (1979, p 29-36) MP 1802
Spectral measurements in a disturbed boundary layer over snow. Andreas, E.L., [1987, 41p] CR \$7-21	Measuring unmetered steam use with a condensate pump- cycle counter. Johnson, P.R., (1977, p.434-442)	Volumetric constitutive law for snow under strain Brown,
Kolmogorov Constants for temperature, humidity, and refrac- tive index spectra. Andreas, E.L., [1988, p. 2399-2406]	MP 957 Losses from the Fort Wainwright heat distribution system	R L., [1979, 13p] CR 79-20 Acoustic emissions from polycrystalline ice St Lawrence,
MP 2437	Phetteplace, G., et al. [1981, 29p] SR 81-14	WF, et al. (1982, p 183-199) MP 1524
Spectrophotometers Observations of the ultraviolet spectral reflectance of snow	Steel structures Extending the useful life of DYE-2 to 1986, Part 1 Tobias-	Relationship between creep and strength behavior of ice at failure. Cole, D.M., (1983, p. 189-197) MP 1681
O'Brien, H.W., [1977, 19p] CR 77-27 Spectroradiometers	son. W, et al. (1979, 15p) SR 79-27	Effect of stress application rate on the creep behavior of poly- crystalline ice. Cole, D.M., [1983, p 454-459]
Water quality measurements at Lake Powell, Utah. Merry,	Extending the useful life of DYE-2 to 1986 Tobiasson, W, et al. (1980, 37p) SR 80-13	MP 1671
C.J., [1977, 38p] SR 77-28 Spectroscopy	Field tests of the kinetic friction coefficient of sea ice. Tatin- claux, J.C., et al. [1985, 20p] CR \$5-17	Variation of ice strength within and between multiyear pres- sure ridges in the Beaufort Sea. Weeks, W.F., (1984,
Correlation and quantification of airborne spectrometer data	Laboratory and field studies of ice friction coefficient Tatin-	p.134-1391 MP 1680 Static determination of Young's modulus in sea ice Richter-
to turbidity measurements at Lake Powell, Utah. Merry, C.J., (1970, p 1309-1316) MP 1271	claux, J.C., et al. (1986, p 389-400) MP 2126 Stefan problem	Menge, J.A., [1984, p 283-286] MP 1789
Remote sensing of water quality using an airborne spec- troradiometer. McKim, H L., et al., [1980, p.1353-1362]	Phase change around a circular pipe Lunardini, VJ. [1980, 18p] CR 80-27	MIZEX 83 mesoscale sea ice dynamics: initial analysis. Hibler, W.D., III, et al. (1984, p. 19-28) MP 1811
MP 1491 Effects of volume averaging on spectra measured with a hy-	Deforming finite elements with and without phase change	Rheology of glacier ice
grometer. Andreas, E.L., (1981, p 467-475)	Lynch, D.R., et al. (1981, p.81-96) MP 1493 Phase change around insulated buried pipes: quasi-steady	Deteriorated building panels at Sondrestrom, Greenland Korhonen, C., [1985, p.7-10] MP 2017
Optical engineering for cold environments Aitken, G.W.	method. Lunardini, V.J., (1981, p 201-207) MP 1496	Strain rate effect on the tensile strength of frozen silt. Zhu,
ed, [1983, 225p] MP 1646 Characterization of snow for evaluation of its effect on elec-	Heat conduction with phase changes Lunardini, V.J.	Y., et al. (1985, p. 153-157) MP 1898 Frozen ground physics Fish, A.M., (1985, p. 29-36)
tromagnetic wave propagation Berger, R.H. (1983,	[1981, 14p] CR 81-25 Freezing of semi-infinite medium with initial temperature	MP 1928
Landsat-4 thematic mapper (TM) for cold environments.	gradient, Lunardini, V.J. (1983, p 649-652) MP 1583	Exact solution for melting of frozen soil with thaw consolida- tion. Lunardini, V.J., (1987, p.97-102) MP 2191
Gervin, J.C., et al. (1983, p.179-186) MP 1651 Wildlife habitat mapping in Lac qui Parle, Minnesota. Mer-	Freezing and thawing heat balance integral approximations. Lunardini, V.J., 1983, p.30-373 MP 1597	Strain-rate and grain-size effects in ice Cole, D.M., (1987, p. 274-280) MP 2311
ry, C.J., et al. (1984, p 205-208) MP 2085 Evaluation of SPOT HRV simulation data for Corps of Engi-	Two-dimensional heat conduction phase change Albert,	Stratification
neers applications McKim, H L., et al. (1985, p 61-71)	M.R., et al. (1983, p.85-110) MP 2161 Freezing of a semi-infinite medium with initial temperature	Stratified debris in Antarctic ice cores. Gow, A.J. et al. [1979, p. 185-192] MP 1272
MP 2184 Single fiber measurements for remote optical detection of	gradient. Lunardini, V.J. (1984, p 103-106) MP 1740	Stratigraphy Drilling and cering of frozen ground in northern Alaska,
TNT. Zhang, Y., et al. (1989, 7p.) SR 89-18 Spillways	Stefan problem in a finite domain Takagi, S. (1985, 28p.)	Spring 1979. Lawson, D E., et al, [1980, 14p] SR 80-12
Reduced winter leakage in gates with J-seals Rand, J.H. et	SR 85-08 Approximate analytical solution of a Stefan's problem in a	Stream flow
Stability	finite domain Takagi, S. (1988, p. 245-266) MP 2384	Drainage network analysis of a subarctic watershed Bred- thauer, S.R., et al. (1979, p. 349-359) MP 1274
Movement study of the trans-Alaska pipeline at selected sites Ueda, H.T., et al. (1981, 32p) CR 81-04	Thin ice growth. Ashton, G.D., [1989, p. 564-566] MP 2657	Watershed modeling in cold regions Stokely, J L., (1980, 241p.) MP 1471
Assessment of hydraulic structures in a stream after seasonal ice run. Calkins, D.J., et al. [1989, 12p] MP 2744	Storms	Clearing ice-clogged shipping channels Vance, G.P.,
Investigation into the post-stable behavior of a tube array in	Synoptic meteorology during the SNOW-ONE-A Field Ex- periment Bilello, M.A., (1983, 80p.) SR 83-10	Analysis of velocity profiles under ice in shallow streams
cross-flow Lever, J.H., et al. [1989, p.457-465] MP 2561	Synoptic meteorology, crystal habit, and snowfall rates in Northeastern snowstorms Ryerson, C.C., et al., (1989,	Calkins, D.J., et al. [1981, p.94-111] MP 1397 Flow velocity profiles in ice-covered shallow streams Cal-
Stabilization Wastewater stabilization pond linings Middlebrooks, E.J.	p 335-345 ₃ MP 2599	kins, D.J., et al. (1982, p.236-247) MP 1540
et al. (1978, 116p) SR 78-28	Strain measurement Small-scale strain measurements on a glacter surface. Col-	Runoff from a small subarette watershed, Alaska Chacho, E.F., et al., [1983, p.115-120] MP 1654
Ice sheet retention structures Perham, R.E., (1983), 33p.; CR 83-30	beck, S.C., et al. (1971, p.237-243) MP 993 Strain measuring instruments	Snow hydrology in the upper Yamuna basin, India Malho- tra, RV, et al. (1988, p.84-93) MP 2633
Standards Measuring mechanical properties of ice Schwarz, J., et al.	Waterproofing strain gages for low ambient temperatures	Assessment of hydraulic structures in a stream after seasonal ice run Calkins, D.J., et al., [1989, 12p] MP 2744
(1981, p 245-254) MP 1556	Garfield, D.E., et al. (1978, 20p.) SR 78-15 Verification tests for a stiff inclusion stress sensor Cox.	Seasonal distribution of low flow events in New Hampshire
Ground snow loads for structural design Ellingwood, B. et al. (1983, p.950-964) MP 1734	GFN, et al. (1987, p. 81-88) MP 2223 Hopkinson pressure bar to measure strain rates of materials	streams with emphasis on the winter period Melloh, R.A., [1990, p 47-53] MP 2681
Changes coming in snow load design criteria Tobiasson, W., (1989, p. 413-418) MP 2612	Dutta, PK, et al. (1988, p 885-903) MP 2517	Streams
STATIC LOADS	Strain tests Investigation of ice forces on vertical structures. Hirayama,	Lidar detection of leads in arctic sea ice Schnell, R.C., et al., [1990, p. 119-123] MP 2733
Ice pressure on engineering structures Michel, B. 1970, 71p ₁ MHI-BIb		
Static loads Bearing capacity of floating ice plates Kerr, A.D., £1976.	K , et al. (1974, 153p) MP 1041	Strength
	K. et al. (1974, 153p) MP 1041 Effect of temperature and strain rate on the strength of poly- crystalline ice Haynes, FD. (1977, p. 107-111)	Strength State of the art of ship model testing in ice Vance, G.P., 41981, p.693-7061 Wance, G.P., MP 1573
p 229-268 ₁ MP 884	K, et al. [1974, 153p] MP 1041 Effect of temperature and strain rate on the strength of polycrystalline ice Haynes, F.D. [1977, p.107-111], MP 1127 Axial double point-load tests on snow and ice Kovaes, A.	Strength State of the art of ship model testing in ice Vance, G.P., MP 1573 Model tests in ice of a Canadian Coast Guard R-class ice-breaker Tatinelaux, J.C., 1984, 24p.; SR 84-06
Acoustic emissions from polycrystalline ice St. Lawrence, W. F., et al., {1982, 15p.} CR #2-21	K. et al. [1974, 153p.] MP 1041 Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D. [1977, p.107-111] MP 1127 Avial double point-load tests on snow and ice. (1978, 11p.) CR 78-01	Strength State of the art of ship model testing in ice [1981, p.693-706] Model tests in ice of a Canadian Coast Guard R-class ice- breaker Tatinclaux, J.C., 1984, 24p.; Stress concentration
Acoustic emissions from polycrystalline ice W.F., et al. (1982, 15p.) Mechanical properties of multi-year sea ice Testing tech-	K. et al. [1974, 153p.] Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D. [1977, p.107-111], Mp. 1127 Axial double point-load tests on snow and ice. Koyaes, A. [1978, 11p.] Polycrystalline ice mechanics. Hooke, R. L., et al. [1979, 16p.] Mp. 1207	Strength State of the art of ship model testing in ice Vance, G.P., (1981, p.693-706) MP 1573 Model tests in ice of a Canadian Coast Guard R-class ice-breaker Tatinclaux, J.C., (1984, 24p.) SR 84-06 Stress concentration Flewural strength of ice on temperate lakes (low, A.J., et al., (1978, 14p.) CR 78-09
Acoustic emissions from polycrystalline ice W.F., et al., 1982, 15p.; Mechanical properties of multi-year sea ice niques Mellor, M., et al., (1984, 39p.) Effect of oscillatory loads on the bearing capacity of floating	K. et al. [1974, 15]p.] MP 1041 Effect of temperature and strain rate on the strength of polycrystalline ite. Haynes, FD. [1977, p. 107-111], MP 1127 Axial double point-load tests on snow and ite. Kovaes, A. (1978, 11p.) Polycrystalline ice mechanics. Hooke, R. L., et al. [1979, 16p.) Volumetric constitutive law for snow under strain. Brown, R. L., [1979, 13p.) CR 79-20.	Strength State of the art of ship model testing in ice (1981, p. 693-706) MP 1573 Model tests in ice of a Canadian Coast Guard R-class ice- breaker Tatinclaux, J.C., (1984-24p.) SR 84-06 Stress concentration Flexural strength of ice on temperate lakes (1978, 14p.) CR 78-09 Stress strain diagrams Resiliency of sift under asphalt during freezing and thawing
Acoustic emissions from polycrystalline ice W.F., et al., [1982, 15p.] Mechanical properties of multi-year sea ice niques Mellor, M. et al., [1984, 39p.] Effect of oscillatory loads on the bearing capacity of floating ice covers Kerr, A.D., et al., [1987, p. 219-224] MP 2216	K. et al. [1974, 153p.] MP 1041 Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D., [1977, p.107-111], MP 1127 Avail double point-load tests on snow and ice. (1978, 11p.) CR 78-01 Polycrystalline ice mechanics. Hooke, R.L., et al., [1979, 16p.) MP 1207 Volumetric constitutive law for snow under strain. Brown.	Strength State of the art of ship model testing in ice (1981, p.693-706) MP 1573 Model tests in ice of a Canadian Coast Guard R-class icebreaker Tatinclaux, J.C., [1984, 24p.] SR 84-06 Stress concentration Flexural strength of ice on temperate lakes (10w, A.J., et al., (1978, 14p.) CR 78-09 Stress strain diagrams Resiliency of silt under asphalt during freezing and thawing Johnson, J.C., et al., (1978, p.662-668) MP 1106
Acoustic emissions from polycrystalline ice WF., et al., [1982, 15p] Mechanical properties of multi-year sea ice niques Mellor, M., et al., [1984, 39p] Effect of oscillatory loads on the bearing capacity of floating ice covers. Kerr. A.D., et al., [1987, p. 219-224] MP. 2216 Static stability	K. et al. [1974, 15]p.] MP 1041 Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, FD. [1977, p. 107-111] Axial double point-load tests on snow and ice. Kowaes, A. (1978, 11p). CR 78-01 Polycrystalline ice mechanics. Hooke, R. L., et al. [1979, 16p). While the strain from the strain Brown, R. L., [1979, 13]p.] CR 79-20 Asphalt concrete for cold regions. Dempsey, B.J., et al. [1980, 55p.] CR 80-05 Mechanical properties of polycrystalline ice. Hooke, R. L., et	Strength State of the art of ship model testing in ice (1981, p. 693-706) MP 1573 Model tests in ice of a Canadian Coast Guard R-class ice-breaker Tatinclaux, J.C., 1984, 24p. SR 84-06 Stress concentration Flexural strength of ice on temperate lakes (1978, 14p.) CR 78-09 Stress strain diagrams Resiliency of sift under asphalt during freezing and thawing Johnson, J.C., et al., 1978, p. 662-6681 MP 1106 Polycrystalline ice mechanics Hooke, R.L., et al., 1979, 16p.1 MP 1207
Acoustic emissions from polycrystalline ice W.F., et al., [1982, 15p] Mechanical properties of multi-year sea ice niques Mellor, M., et al., [1984, 39p] Effect of oscillatory loads on the bearing capacity of floating ice covers. Kerr, A.D., et al., [1987, p. 219-224, MP 2216 Static stability Baseplate design and performance mortar stability report Artken, G.W., [1977, 28p] CR 77-22	K. et al. [1974, 153p.] Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D., [1977, p.107-111] Avail double point-load tests on snow and ice. Kovaca, A. (1978, 11p.) Polycrystalline ice mechanics. Hooke, R. L., et al., [1979, 16p.] Volumetric constitutive law for snow under strain. Brown, R. L., [1979, 13p.] Asphalt concrete for cold regions. Dempsey, B.J., et al., [1980, 55p.] CR. 80-05 Mechanical properties of polycrystalline ice. Hooke, R. L., et al., [1980, p. 263-275]. Strain measurements on dumbbell specimens. Mellor, M.,	Strength State of the art of ship model testing in ice [1981, p. 693-706] MP 1573 Model tests in ice of a Canadian Coast Guard R-class ice- breaker Tainiclaux, J.C., [1984, 24p.] SR 84-06 Stress concentration Flexural strength of ice on temperate lakes Gow. A.J., et al., [1978, 14p.] CR 78-09 Stress strain diagrams Resiliency of silt under asphalt during freezing and thawing Johnson, J. C., et al., [1978, p. 662-668] MP 1106 Polycrystalline ice mechanics Hooke, R.L., et al., [1979, 16p.] Grouting silt and sand at loas temperatures [1979, p. 947-920] MP 1078
Acoustic emissions from polycrystalline ice W.F., et al., [1982, 15p.] Mechanical properties of multi-year sea ice niques Mellor, M., et al., [1984, 39p.] Effect of oscillatory loads on the bearing capacity of floating tee covers. Kerr, A.D., et al., [1987, p. 219-224] MP 2216 Static stability Baseplate design and performance mortar stability report Aitken, G.W., [1977, 28p.] CR 77-22 Stations Scientists visit Kolyma Water Balance Station in the U.SSR	K. et al. [1974, 153p.] MF 1041 Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D. [1977, p107-111] Axial double point-load tests on snow and ice. (Novaes, A. (1978, 11p.) CR 78-01 Polycrystalline ice mechanics. Hooke, R. L., et al., [1979, 15p.) Volumetric constitutive law for snow under strain. Brown, R.L., [1979, 13p.) Asphalt concrete for cold fegions. Dempsey, B.J. et al., [1980, 55p.] CR 80-05 Mechanical properties of polycrystalline ice. Hooke, R. L., et al., [1980, p 263-275]. MF 1328	Strength State of the art of ship model testing in ice [1981, p.693-706] MP 1573 Model tests in ice of a Canadian Coast Guard Relais ice-breaker Tatinclaux, J.C., 1984, 24p.; SR 84-06 Stress concentration Flexural strength of ice on temperate lakes [Gow, A.J., et al., (1978, 14p.) Stress strain diagrams Resiliency of silt under asphalt during freezing and thaving Johnson, J.C., et al., [1978, p.662-668] MP 1106 Polycrystalline ice mechanics Hooke, R.L. et al., [1979, 10p.] Grouting silt and sand at load temperatures Johnson, R.
Acoustic emissions from polycrystalline ice WF., et al., (1982, 15p.) Mechanical properties of multi-year sea ice niques Mellor, M., et al., (1984, 39p.) Effect of oscillatory loads on the bearing capacity of floating ice covers. Kerr, A.D., et al., (1987, p. 219-224) MP 2216 Static stability Baseplate design and performance mortar stability report Aitken, G.W., (1977, 28p.) CR 77-22 Stations Scientists visit Kolyma Water Balance Station in the USSR Slaughter, C.W., et al., (1977, 66p.) SR 77-15	K. et al. [1974, 153p.] Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D., [1977, p.107-111] Avial double point-load tests on snow and ice. Kovacs, A. (1978, 11p.) Polycrystalline ice mechanics. Hooke, R. L., et al., [1979, 16p.] Yolumetric constitutive law for snow under strain. Brown, R. L., [1979, 13p.] Asphalt concrete for cold fegions. Dempsey. BJ, et al., [1980, 55p.] GR 80-05 Mechanical properties of polycrystalline ice. Hooke, R. L., et al., [1980, p.263-275]. Strain measurements on dumbbell specimens. Mellor, M., [1983, p.75-77]. Preliminary examination of the effect of structure on the compressive strength of ice samples from multi-year pressure.	Strength State of the art of ship model testing in ice (1981, p. 693-706) Mind 1973 Model tests in ice of a Canadian Coast Guard R-class ice- breaker Tainclaux, J.C., (1984, 24p.) SR 84-06 Stress concentration Flexural strength of ice on temperate lakes Giow, A.J., et al., (1978, 14p.) CR 78-09 Stress strain diagrams Resiliency of silt under asphalt during freezing and thawing Johnson, J.C., et al., (1974, p. 662-668) MP 1106 Polycrystalline ice mechanics Hooke, R.L., et al., (1979, 16p.) Grouting silt and sand at loss temperatures April 207 Acoustic emission response of snow. St. Lawrence, W.F., (1970, p. 907-216) MP 1078 Acoustic emission response of snow. St. Lawrence, W.F., (1980, p. 209-216) MP 1366 Strength of frozen sili ax a function of ice content and dry unit
Acoustic emissions from polycrystalline ice W.F., et al., [1982, 15p.] Mechanical properties of multi-year sea ice niques Mellor, M., et al., [1984, 39p.] Effect of oscillatory loads on the bearing capacity of floating tee covers. Kerr, A.D., et al., [1987, p. 219-224] MP 2216 Static stability Baseplate design and performance mortar stability report Aitken, G.W., [1977, 28p.] Stations Scientists visit Kolyma Water Balance Station in the U.SSR	K. et al. [1974, 153p.] MF 1041 Effect of temperature and strain rate on the strength of polycrystalline ice. Haynes, F.D. [1977, p107-111] Axial double point-load tests on snow and ice. [1978, 11p.] CR 78-01 Polycrystalline ice mechanics. Hooke, R. L., et al., [1979, 15p.] MP 1207 Volumetric constitutive law for snow under strain. Brown, R.L., [1979, 13p.] Asphalt concrete for cold fegions. Dempsey, B.J. et al., [1980, 55p.] CR 80-05 Mechanical properties of polycrystalline ice. Hooke, R. L., et al., [1980, p 263-275] MP 1328 Strain measurements on dumbbell specimens. [1980, p 75-77] Pteliminary examination of the effect of structure on the com-	Strength State of the art of ship model testing in ice (1981, p.693-706) MP 1573 Middl tests in ice of a Canadian Coast Guard Relats ice-breaker Tatinclaux, J.C., 1984, 24p.) SR 84-06 Stress concentration Flexural strength of ice on temperate lakes (1984, 14p.) CR 78-09 Stress strain diagrams Resiliency of silt under asphalt during freezing and thawing Johnson, I.C., et al., 10°8, p.602-668, MP 1106 Polyerystalline ice mechanics. Hooke, R.L. et al., (1979, 10p.) Grouting silt and sand at low temperatures (1979, p.937-950), MP 1078 Acoustic emission response of show St. Lawrence, WF, (1980, p.209-216), MP 1366

Stress strain diagrams (cont.) Constitutive relation for the deformation of snow. St. Law-	in-ice calibration tests for an elongated, uniaxial brass ice stress sensor. Johnson, J.B., (1985, p. 244-249)	Oil pooling under sea ice. Kuvacs, A. (1979, p.310-323) MP 1289
rence, W.F., et al. (1981, p 3-14) MP 1370	MP 1859	Physical properties of sea see and under-ice current orienta-
Cyclic loading and fatigue in ice. Mellor, M., et al. (1981,	Effect of size on stresses in shear flow of granular materials,	tion, Kovacs, A., et al. [1980, p.109-153] MP 1323
p.41-53 ₃ MP 1371	Pt 2. Shen, H H., [1985, 20p] CR 85-03 Creep of a strip footing on ice-rich permafrost. Sayles, F H.,	Measurement of the shear stress on the underside of simulated see covers. Calkins, D.J., et al. (1980, 11p.)
lce behavior under constant stress and strain. Mellor, M. et al. (1982, p.201-219) MP 1525	(1985, p 29-51) MP 1731	CR 90-24
Glacier mechanics. Mellor, M. [1982, p 455-474]	Kadluk ice stress measurement program Johnson, J.B., et al.	Electromagnetic subsurface measurements. Dean, A.M., Jr.,
MP 1532	[1985, p 88-100] MP 1899 Experience with a biaxial ice stress sensor Cox, G F N.	(1981, 19p) SR 81-23
Polycrystalline see creep in relation to applied stresses. Cole, D.M., [1983, p 614-621] MP 1582	(1985, p 252-258) MP 1937	Geophysics of subglacial geology at Dye 3, Greenland, Jezek, K.C., et al. (1985, p.105-110) MP 1941
Stress/strain/time relations for ice under uniaxial compres-	Constitutive relations for a planar, simple shear flow of rough	Airborne electromagnetic sounding of sea ice thickness and
sion. Mellor, M., et al., [1983, p.207-230] MP 1587	disks. Shen, H.H., et al., (1985, 17p) CR 85-20	sub-ice bothymetry. Kovacs, A , et al., [1987, p.289-311]
Creep behavior of frozen silt under constant uniaxial stress. Zhu, Y., et al, (1983, p 1507-1512; MP 1805	Repeated load triaxial testing of frozen and thawed soils. Cole, D.M., et al., 1985, p.166-170; MP 2068	MP 2532 Subgrade preparation
Zhu, Y., et al. (1983, p 1507-1512) MP 1805 Compressive strength of frozen silt Zhu, Y., et al. (1984,	Static and dynamic ice loads on the Yamachiche Bend lightpi-	Influence of insulation upon frost penetration beneath pave-
p 3-15 ₁ MP 1773	er, 1984-86 Frederking, R., et al., [1986, p.115-126] MP 2389	ments. Eaton, R.A., et al, (1976, 41p) SR 76-06
Creep model for constant stress and constant strain rate.	Verification tests for a stiff inclusion stress sensor Cox,	Repetitive loading tests on membrane enveloped road sec-
Fish, A.M., [1984, p.1009-1012] MP 1766 Thermodynamic model of creep at constant stress and con-	G F N., ct al. (1987, p 81-88) MP 2223	tions during freeze thaw Smith, N., et al. (1977, p 171- 1971 MP 962
stant strain rate. Fish, A.M., [1984, p. 143-161]	Rock stress measurements by wire stressmeter at high temper-	Winter earthwork construction in Upper Michigan. Haas,
MP 1771	atures. Dutta, P.K., et al. [1987, p.43-58] MP 2447 Verification tests of the surface integral method for calculat-	W.M., et al. (1977, 59p.) SR 77-40
Grain size and the compressive strength of ice. Cole, D.M., £1985, p 220-2261 MP 1858	ing structural ice loads. Johnson, J B , et al. (1988, p.449-	Effects of subgrade preparation upon full depth pavement performance in cold regions. Eaton, R.A., [1978, p 459-
Creep and strength behavior of frozen silt in uniaxial compres-	456 ₁ MP 2353	473 ₁ MP 1007
sion. Zhu, Y., et al. (1987, 67p) CR 87-10	Mukluk ice stress measurement program Cox, G F.N., et al., [1988, p 457-463] MP 2354	Load tests on membrane-enveloped road sections. Smith,
State of the art: mechanical properties of frozen soil. Sayles,	Ice stress measurements around offshore structures. John-	N, et al. (1978, 16p.) CR 78-12
F.H., [1988, p 143-165] MP 2377 Performance of laminated composites in cold Dutta, P.K.	son, J.B., (1988, p.55-59) MP 2611	Freeze thaw loading tests on membrane enveloped road sec- tions. Staith, N., et al. [1978, p 1277-1285]
et al. (1988, p 269-281) MP 2433	Structural analysis Structural evaluation of porous pavement in cold climate.	MP 1158
Frozen strength characterization of NH&S test sites in Mon-	Eaton, R.A., et al., (1980, 43p) SR 80-39	Design of airfield pavements for seasonal frost and permafrost conditions. Berg, R.L., et al., (1978, 18p.) MP 1189
tana. Chamberlain, E.J., et al. (1988, var. p.) MP 2617	STRUCTURES	conditions. Berg, R L., et al. (1978, 18p.) MP 1189 Construction of temporary airfields in NPRA. Crocy, F.E.,
Uniaxial tension/compression tests on ice-preliminary re-	lee pressure on engineering structures. Michel, B., (1970,	(1978, p.13-15) MP 1253
sults. Cole, D.M., et al., [1989, p.37-41] MP 2482	71p ₁ M III-Bib Structures	Full-depth pavement considerations in seasonal frost areas.
Cycle loading of saline ice: initial experimental results.	De-icing using lasers. Lane, J.W., et al. (1976, 25p.)	Eaton, R.A., et al. (1979, 24p.) MP 1188
Cole, D.M., (1990, p 265-271) MP 2581 Stresses	CR 76-10	Subgrade soils Resiliency in cyclically frozen and thaned subgrade soils.
Statistical variations in Arctic sea ice ridging and deformation	lee cover forces on structures. Kerr, A.D., (1978, p.123-	Chamberlain, E.J., et al. [1977, p.229-281] MP 1724
rates. Hibler, W.D., III, (1975, p.J1-J16) MP 850	134) MP 879 Cost of ice damage to shoreline structures during navigation.	Effect of freeze-than cycles on resilient properties of fine-
Interpretation of the tensile strength of ice under triaxial	Carey, K.L., [1980, 33p] SR 80-22	grained soils. Johnson, T.C., et al. (1978, 1992) MP 1002
stress. Nevel, D.E., et al. (1976, p.375-387) MP 996	Icing on structures. Minsk, L.D., (1980, 18p.)	Resiliency of subgrade soils during freezing and thawing.
Interpretation of the tensile strength of ice under triaxial	Force measurements and analysis of river ice break up	Johnson, T.C., et al. (1978, 592) CR 78-23
stresses. Nevel, D.E., et al. [1976, 9p.] CR 76-05	Deck, D.S. (1982, p.303-336) MP 1739	Resilient response of two frozen and thawed soils. Chamber- lain, E.J., et al., (1979, p.257-271) MP 1176
Compressibility characteristics of compacted snow Abele, G., et al., (1976, 47p.) CR 76-21	Uniform snow loads on structures. O'Rourke, M.J., et al.	Isin, E.J., et al. (1979, p.257-271) MP 1176 Freeze thaw effect on resident properties of fine soils. John-
Creep theory for a floating see sheet Nevel, D.E., (1976,	(1982, p 2781-2798) MP 1574	son, T.C., et al. (1979, p.247-276) MP 1226
98p.; SR 76-84	Buckling loads of floating ice on structures. Sodhi, D.S., et al., (1983, p. 260-265) MP 1626	Pavement deflection after freezing and thawing. Chamber-
Resilient response of two frozen and thawed soils. Chamber- lain, E.J., et al. (1979, p 257-271) MP 1176	Experiments on ice ride-up and pile-up Sodhi, D.S., et al.	lam, E.J., (1981, 10p.) CR 81-15
Photoelastic instrumentation-principles and techniques.	(1983), p 266-270 ₁ MP 1627	Effect of freezing and thawing on resilient modulus of granu- lar soils. Cole, D.M., et al. (1981, p.19-26)
Roberts, A., et al. (1979, 153p) SR 79-13	Atmospheric icing of structures. Minsk, LD, ed. (1983), 366p.; SR 83-17	MP 1484
Some results from a linear viscous model of the Arctic ice	lee action on two cylindrical structures. Kato, K., et al.	Full-depth and granular base course design for frost areas. Exton, R.A., et al., 1983, p.27-39; MP 1492
cover. Hibler, W.D., III, et al., (1979, p.293-304) MP 1241	(1923, p.159-166) MP 1643	E>ton, R.A., et al. (1953, p. 27-39) MP 1492 Laboratory tests and analysis of thermosyphons with inclined
Extending the useful life of DYE-2 to 1986, Part 1. Tobias-	Ice sheet retention structures. Perham, R. L., (1984, p.339- 348) MP 1832	evaporator sections. Zarking, J.P., et al, (1985, p. 31-37)
son, W., et al. [1979, 15p] SR 79-27	Crushing ice forces on cylindrical structures. Morris, C.E.,	MP 1653
Snow studies associated with the sideways more of DYE-3 Tobiasson, W., [1979, p.117-124] MP 1312	et al. [1954, p.1-9] MP 1834	Freeze thaw tests of road and airfield subgrade soils. Cole. D.M., et al., [1987, 36p.] CR 87-02
fee thickness-tensile stress relationship for load-bearing ice.	Secondary stress within the structural frame of DYE-3 1978- 1983 Leda, H.T., et al. (1984, 44p.) SR 84-26	Determination of frost penetration by soil resolving measure-
Johnson, P.R., (1980, 11p.) SR 80-09	Transfer of meteorological data from mountain-top sites.	ments. Atkins, R.T., (1989, p.87-100) MP 2565
Extending the useful life of DYE-2 to 1986 Tobiasson, W., et al. (1980, 37p.) SR 80-13	Govoni, J.W., et al. (1986, 6p.) MP 2107	Subgrades
Adsorption force theory of frost heaving. Takagi, S., (1980,	Meteorological instrumentation for characterizing atmo- spheric icing. Bates, R.E., et al. (1987, p.23-36)	Pavement recycling using a heavy buildozer insented pulver- irer Eaton, R.A., et al., [1977, 12p. + appends 2
p.57-81 ₁ MP 1334	MP 2276	SR 77-36
Some promising trends in ice mechanics Assur, A., [1930]	lee detector measurements compared to meteorological data	Heat transfer of a thermosyphon Zarling, J.P., et al., p192, p. 79-84; MP 2190
p 1-15 ₁ MP 1300 Propagation of stress waves in alpine snow Brown, R L.	Tucker, W.B., et al. (1987, p.31-37) MP 2277 Working group on see forces—4th state-of-the-art report	Heat transfer performance of commercial thermosyphoas
[1980, p.235-243] MP 1367	Timen, G W., ed. (1989, 385p.) SR 29-05	with inclined evaporator sections. Haynes, F.D., et al.,
Dynamic testing of free field stress gages in frozen soil Aitk-	Ice-induced vibrations of structures Sodhi, D.S., (1989,	(1918, p.275-250) MP 2320
en, G.W., et al. (1980, 26p.) SR 80-30 Kinetic nature of the long term strength of frozen soils Fish.	p 189-221) MP 2492	Thermal stabilization of permateus with thermospheas. Latling, J.P., et al., §1990, p.323-3283 MP 2583
A.M., (1980, p.95-108) MP 1450	Development and design of sludge freezing beds. Martel, CJ, [1989, p 799-803] MP 2556	Sublimation
Preliminary results of ice modeling in the East Greenland	Subarctic landscapes	Subjunction and its control in the CRREL permutent tunnel
area Tucker, W.B., et al. [1981], p.867-878; MP 1458	Utility distribution systems in Iceland Aamot, HWC.	Johansen, N.I., (1981, 12p.) SR 81-06 Submarines
Macroscopic view of snow deformation under a vehicle	[1976, 63p] SR 76-05 Revegetation in arctic and subarctic North America—a litera-	Surfacing submannes through see Assur, A., (1984, p. 309).
Richmond, P.W., et al. (1981, 20p) SR 81-17	ture review Johnson, L.A., et al., (1976, 32p.)	311 ₁ MP 1996
Sea see drag laws and boundary layer during rapid melting McPhee, M.G., [1982, 17p.] CR 82-04	CR 76-15	DOD floating see problems. Cos. G.F.N., (1957, p.151)
Acoustic emissions from polycrystalline ice St. Lawrence,	Land treatment of wastewater at a subarctic Alaskan location. Sletten, R.S., et al., §1976, 21p.; MP 868	154 ₁ MP 2414 Proceedings (1919, 4*5p _{.1} NR 19-39
W.F., et al., (1982, p.183-199) MP 1524	Biological restoration strategies in relation to nutrients at a	ler strength estimates from submanne togrounder data
Deformation and failure of frozen soils and see due to stresses Fish, A.M., [1982, p.419-428] MP 1553	subarctic site in Fairbanks, Ataska – Johnson, L.A., [1978, p.400-466] – MP 1100	In Marco R. et al. [1989, p. 225-126; MP 2691
Stress measurements in sec. Cos. GFN, et al. (1981).	Subglacial drainage	Sobrea permatrust
31p. ₃ CR #3-23	Depth of water-filled crevasses of glaciers. Weertman, J.	Delineation and engineering characteristics of permatrost beneath the Beaution Sea. Sellmann, P.V., et al., (1976).
Relationship between creep and strength behavior of see at failure. Cole, D.M., §1983, p.189-1971. MP 1681	(1973, p 139-145) MP 1846	2 jalrensi /in 1322
failure Cole, D.M., (1983, p. 189-19"). MP 1681 Effect of stress application rate on the creep behavior of poly	Diamictons at the margin of the Matanuska Glacier, Alaska Lawson, D.E., (1981), p. 78-841 MP 1462	Operational report 19% I SACRREL 1 SGS values perma-
crystalline see Cole, D.M., [1921, p.454,459]	Sub-see channels and frazil bars, Tanana River, Alaska	front program Beaufort Sea, Alaska Sellmann, P.V., et al., 1976, 20p.; SR 76-12
MP 1671	Lawson, D.E., et al. (1986) p.465-474, MP 2129	Delineation and engineering characteristics of perjustions
Evaluation of a bearial ice stress sensor Cox, GFN, (1984, p.349-361) MP 1836	Johnshiaups from Stranding Lake, Maska (especially the	beneath the Beaufert Sea. Sellmann, P.V., et al. (1984).
Preliminary investigation of thermal ice pressures. Cos.	1982 events - Sturm, M., et al., (1989, 19p.) MP 2520	p 53 60 ₃ MV 919. Drineston and engineering characteristics of permittent
GFN, (1984, p. 221-229) MP 1788	Jokulhlaup involving a potholed glacier in Ak. Sturm, M.,	beneath the Beautier Sea. Sellmann, P.S., et a. 31977,
On the theology of a broken are field due to flor collision. Shen, H., et al., [1984, p. 29-34] MP 1812	et al. (1990), p 105-126; MP 2708 Subglacial observations	\$ 134.24. ²
Secondary stress within the structural frame of DYF 1 19"s	Investigation of see islands in Babbage Bight - Kovaes, A. et	Defineation and engineering characteristics of provalent beneath the Beaulier Sea. Selimon #3 et al. (1977).
1983. Ueda, H.T., et al. (1914, 44p.) SR 84-26	al. 117:1. 46 kayes; MP 1381	#353-395 ₁ Mir 1074

Delineation and engineering characteristics of permatrost beneath the Beaufort Sea. Sellmann, P.V., et al. [1977.	Nubsurface investigations: Subsurface explorations or remarking or as. Cass, LR , Ir	trapilizations of surface energy in n e adhesion. Itagaki, K., §1983, p.41-48)
p.432-440j 1977 CRREL-USOS permafrost program Beaufort Sea, Alas-	[1959, p.31-41] AFP 885 Scientic exploration is cold reported the thillsberger, 11.	Climatic factors in cold regions surface conditions. Biletto, M.A., (1985, p.508-5)7; M.P. 1961
ks, operational report. Sellmann, P.V., et al, (1977, 199.) SR 77-41	(1972, 138p.) M 11-A2m Remote sensing of mass to be a paratus rost along pipelines	Field tests of the kinstic friction coefficient of sea ice. Tailncianx, J.C. at al. (1985, 20p.) CR 85-17
Delineation and engineering characteristics of permafrost beneath the Beaufort Nea. Sellmann, P.V., et al., 1977, p.518-521) MP 1201	in Alaska: Kovarr, A., et al. [1971] 1.268-279] MIP 1175	Development of the unsurfaced roads cating methodology. Baton, R.A., (1988, 13p.) 82 88-65
Chemistry of interstitial water from subsea permafrost, Prudhoo Bay, Alaska. Iskandar, I.K., et al, [1978, p.92-	Asymmetric flows application to the zero below ice jams. Glogita, M., et al., (1981, p.34.2-350) MP 17.33 Distortion of model constraint radar pulses in complex die-	Nurface roughness Remote sensing program required for the AIDJEX model. Weeks, W.F., et al., [1974, p.22-44] MP 1040
981 MP 1385 Engineering properties of submarine permafront near Pruthoe	lectries. Arcone, 5.A., [198], p.855-564 MP 1472 Radar profiling of buried reflectors and the groundwater table	Thickness and roughness variations of arctic multiyear sea ice.
Bay. Chamberlain, B.J., et al, 11978, p.629-635; MP 1104	Sellmann, P.V., at al. (1984, 1994) CR 83-11 Analysis of wide-angle reflection and refraction measure-	Ackley, S.P., et al. (1976, 25p.) See ice roughness and flow geometry over continental shelves.
Geochemistry of subsea permafrost at Produce Bay, Alaska, Page, F.W., et al. [1978, 70p.] SR 78-14	ments. Morey, R v., et al. (1985, 5.33-60) MP 1983	Weeks, W.P., et al, (1977, p.32-41) MP 1163 Sea ice ridging over the Alaskan continental shelf. Tucker,
Permafrost beneath the Beaufort Sea. Sellmann, P.V., et al. (1978, p.50-74) MP 1206	SUBSURFACE STRUCTURES Foundations and substructed extracted extracted extracted from Mellor, M.,	W.B., et al, [1979, 24p.] CR 79-08 Sea lee ridging over the Alaskan continental shelf. Tucker,
Permafrost beneath the Beaufort Sea, near Prudhoe Bay, Alaska. Sellmann, P.V., et al, [1979, p.1481-1493]	(1969, 54p.) M 111-A2c Subsurface structures	W.B., et al. (1979, p.4885-4897) MP 1240 Measurement of the shear stress on the underside of simulated
MP 1211 Penetration tests in aubsea permafrost, Prudhoe Bay, Alaska.	On the origin of ping is in a comment. Mackay, J.R., (1976, p.295-298)	ice covers. Calkins, D.J., et al, [1980, 11p.] CR 80-24
Blouin, S.E., et al, [1979, 45p.] CR 79-07 Determining subses permafrost characteristics with a cone	Block finition from detenations of bursed near-surface explosive arrays. Blouin, 8.33, (1980, 629.) CR 80-26	Analysis of velocity profiles under ice in shallow streams. Calkins, D.J., et al., [1981, p.94-111] MP 1397
penetrometerPrudhoe Bay, Alaska. Blouin, S.E., et al, 1979, p.3-161 MP 1217	Supercooled clouds	Asymmetric flows: application to flow below ice jams. Clugus, M., et al. (1981, p.342-350) MP 1733
Subsea permafrost study in the Beaufort Sea, Alaska. Sell- mann, P.V., et al, [1979, p.207-213] MP 1591	Wet precipitation in subfraczing air helow a cloud influences radar backscattering. Colbeck, S.C., (1987, p.135-144) MP 2207	Modeling pressure ridge buildup on the geophysical scale. Hibler, W.D., 111, g1982, p.141-155; MP 1890
Distribution and properties of subsea permafrost of the Beaufort Sea. Selimann, P.V., et al. [1979, p.93-115]	Supercooled fog	Comment on 'Water drag coefficient of first-year sea ice' by M.P. Langleben. Andreas, E.L., et al, (1983, p.779-782)
MP 1287 Permafrost distribution on the continental shelf of the Beau-	Compressed air seeding of supercodled fog. Hicks, J.R., (1976, 9p.)	MP 1577 Constitutive relations for a planar, simple shear flow of rough
fort Sea. Hopkira, D.M., et al, [1979, p.135-141] MP 1288	Use of comprehend air for supercocled fog dispersal. Weinstein, A.I., et al. (276, p.1226-1231) MP 1614	disks. Shen, H.H., et al. (1985, 17p.) CR 85-20 Laboratory and field atudies of ice friction coefficient. Tating
Permafrost beneath the Beaufort Sea: near Prudhoe Bay, Alaska. Sellmann, P.V., et al, [1980, p.35-48]	Laboratory studies of compressed dir seeding of supercooled fog. Hicks, J.R., ct al., [1977, 19p] SR 77-12	claux, J.C., et al. [1986, p.389-400] MP 2126 Roughness and transfer coefficients over snow and sea ica.
MP 1346 Features of permafrost beneath the Beaufort Sca. Sellmann.	Ice crystal formation and supercooled for dissipation. Kumai, M., (1982, p.579-587) MP 1539	Andreas, E.L., (1986, 19p.) CR 86-09 Rating unsurfaced roads. Eaton, R.A., et al. (1987, 34p.)
P.V., et al. (1980, p.103-110) MP 1344 Distribution and features of bottom sediments in Alaskan	Mechanical ice release from high-speed rotors. Itagaki, K., (1983, 8p.) CR 83-26	SR 87-15 Measurement of the path-averaged turbulent surface heat
constal waters. Sellmann, P.V., [1980, 50p.] SR 80-15	Self-shedding of accreted ice from high-speed rotors. Itaga- ki, K., (1987, p.95-100) MP 2278	flux. Andreas, E.L., (1988, p.219-220) MP 2526 Two-wavelength method of measuring puth-averaged turbu-
Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance. Tice, A.R., et al. (1980,	Supercooled water Apparent anomaly in freezing of ordinary water. Swinzow,	lent surface heat fluxes. Andreas, E.L., (1989, p.280-292) MP 2648
p.400-412; MP 1412 Characteristics of permafrost beneath the Beaufort Sea. Sell-	G.K., [1976, 23p] CR 76-20 Frazil ice formation in turbulent flow. Müller, A., et al.	Radar backscattering from artificially grown sea ice. Bredow, J., et al, [1989, p.259-264] MP 2667
mann, P.V., et al. (1981, p.125-157) MP 1428 Delineation and engineering of subsea permafrost, Beaufort	(1978, p.219-234) MP 1135 Supercooling	Surface structure Airborne E-phase resistivity surveys of permafrost. F Seil-
Sea. Sellmann, P.V., et al. [1981, p.137-156] MP 1600	Heat and mass transfer from freely felling drops at low temperatures. Zurling, J.P., (1980, 14p.) CR 80-18	mann, P.V., et al. (1974, p.67-71) MP 1046 Light-colored surfaces reduce thaw penetration in permafrost.
Foundations of structures in polar waters. Chamberlain, E.J., (1981, 16p.) SR 81-25	Phase equilibrium in frost heave of fine-grained soil. Naka- no, Y., et al, 11985, p.50-68; MP 1896	Borg, R.L., et al., [1977, p.86-99] MP 954 Surface temperature
Site investigations and submarine soil mechanics in polar regions. Chamberlain, E.J., (1981, 189.) SR 81-24	Frazil ice in rivers and streams. Daly, S.F., (1987, p.19-26) MP 2381	Measuring building R-values for large areas. Flanders, S.N., et al. (1981, p.137-138) MP 1388
Understanding the Arctic sea floor for engineering purposes, [1982, 141p.] SR 83-25	International Symposium on Cold Regions Heat Transfer, 1989, 11989, 314p.; MP 2636	Translent heat flow and surface temperatures of a built-up roof. Korhonen, C., 1983, 20p.; SR 83-22
Subsea permafrost in Harrison Bay, Alaska. Neave, K.G., et al, 1982, 62p.; CR 82-24	Time estimation for maximum superscoling in dynamic frazilice formation. Daly, S.F., et al. (1989, 13p.)	Effect of color and texture on the surface temperature of
Scismic velocities and subsea permafrost in the Beaufort Sea, Alaska. Neave, K.G., et al, (1983, p.894-898)	SR 89-26 Supersaturation	asphalt concrete pavements. Berg, R.L., et al, (1983, p.57-61) MP 1652
MP 1665 Determining distribution patterns of ice-bonded permafrost in	lee crystal morphology and growth rates at low supersatura- tions and high temperatures. Colbeck, S.C., (1983,	Increased heat flow due to snow compaction: the simplistic approach. Colbeck, S.C., [1983, p.227-229] MP 1693
the U.S. Beaufort Sea from seismic data. Neave, K.G., et al. [1984, p.237-258] MP 1839	p.2677-2682 ₁ MP 1537 Supports	Time-lapse thermography: a unique electronic imaging ap-
Subsea permafrost distribution on the Alaskan shelf. Sell- mann, P.V., et al., (1984, p.75-82) MP 1852	Flexural strength of ice on temperate takes. Gow, A.L. et al. (1978, 14p.) CR 78-09	plication. Marshall, S.J., et al, [1984, p.84-88] MP 2103
Mapping resistive seabed features using DC methods. Sell- mann, P.V., et al., 1985, p.136-147; MP 1918	Pressure buildup at permafrost pile supports induced by freezeback. Ayorinde, O.A., (1989, p.236-251)	New method of measuring the snow-surface temperature. Andreas, E.L., [1986, p.139-156] MP 2166
Seismic surveys of shallow subsea permafrost. Neave, K.G., et al., (1985, p.61-65) MP 1954	MP 2467 Surface drainage	thermal measurements in snow. Jordan, R., et al., (1986, p.183-193) MP 2660
Galvanic methods for mapping resistive scabed features. Sellmann, P.V., et al., (1985, p.91-92) MP 1985	Land treatment of wastewaters Reed, S.C., et al., (1974, p.12-13) MP 1036	Low pressure weather systems in and around Norwegian waters. Bileito, M.A., (1986, p.53-66) MP 2181
Preeze thaw consolidation of sediments, Beaufort Sea, Alaska. Lee, H.J., et al., [1985, 83p.] MP 2025	Land treatment of wastewaters for rural communities. Reed, S.C., et al. 1975, p.23-391 MP 1399	Blistering of built-up roof membranes: pressure measurements. Korhonen, C., (1987, 22p.) SR 86-29
Monitoring seasonal changes in seafloor temperature and salinity. Selimann, P.V., et al., 1986, p.110-1141	Solving problems of ice-blocked dramage facilities. Carey, K.L., (1977, 17p.) SR 77-25	Surfactants Using bleach mixture for decontamination at low tempera-
MP 2147 D.C. resistivity along the coast at Prudhoe Bay, Alaska. Sell-	Drainage facilities of airticlds and heliports in cold regions. Lobacz, E.F., et al., (1981, 56p.)	tures. Walsh, M.E., et al. (1989, 13p.) SR 89-33 Surveys
mann, P.V., et al, (1988, p.988-993) MF 2366 Coastal aubsea permafrost and bedrock observations using de	Development of the unsurfaced roads rating methodology. Eaton, R.A., (1988, 13p.) SR 88-05	Water detection in coastal plains using helicopter-borne short pulse radar. Arcone, S.A., et al. £1989, 25p.;
resistivity. Sellmann, P.V., et al. (1989, 13p.) CR 89-13	Hydraulic model of overland flow on grass covered slopes. Adrian, D.D., et al, (1989, p.569-578) MP 2710	CR 89-07 Suspended sediments
Subsidence	Jökulhlaup involving a potholed glacier in AK. Sturm, M., et al. (1990, p.125-126) MP 2708	Correlation and quantification of airborne spectrometer data to turbidity measurements at Lake Powell, Utah, Merry,
Environmental consequences of 1964 Alaska carthquake in Portuge, Alaska. Ovenshine, A.T., et al., 1974, p.3-9, MP 2409	SURFACE FEATURES Effects of permafrost on engineering Steams, S.R., 1966,	C.J., 11970, p.1309-1316; MP 1271 Baseline data on tidal flushing in Cook Inlet, Alaska. Gatto.
Slumping failure of an Alaskan earth dam. Collins, C.M., et al., (1977, 21p.) SR 77-21	77p.; M I-A2 Surface migration	L.W., (1973, 11p.) Remote sensing of water quality using an airborne spec-
Human-induced thermokarst at old drill sites in northern Alaska. Lawson, D.B., et al, [1978, p.16-23]	Camp Century survey 1986 — Gundestrap, N.S., et al. (1987, p.281-288)	troradiometer. McKim, H.L., et al., (1980, p.1353-1362) MP 1491
NIP 1254	Surface properties CRREL instrumented vehicle for cold regions mobility meas-	lce distribution and water circulation, Kachemak Bay, Alanka. Clatto, L.W., [1982, p.421-435] MP 1569
Near-infrared reflectance of snow-covered substrates. O'- Brien, H.W., et al. [1981, 17p.] CR 81-21	urements. Bisiscell, G.L., (1982, 110.) MP 1515 Heat fluxes, humidity profiles, and surface humidity. An-	Water quality monitoring using an airborne spectroradiometer. McKim, H.L., et al., (1984, p.353-360) MP 1718
Subsurface drainage Solving problems of ice-blocked drainage facilities. Carey,	dreas, E.L., 1982, 18p.j. CR 82-12 Freezing of soil with surface convection. Lunardini, V.J.,	Use of SPOT HRV data in the Corps of Engineers dredging
K.L., [1977, 17p4] SR 77-25 Drainage and frost action criteria for a payoment design.	(1982, p. 205-212) CRREL instrumented vehicle hardware and software	program. Merry, C.J., et al, ¿1988, p.1295-1299; MP 2828 Water and suspended solids discharge during anowment.
Berg, R.L., 11979, 51p.; HR 79-15		Chacho, E.E., Jr., 21990, p.167-1731 MP 2705

Synoptic meteorology	Heat transfer in cold climates Lunardini, V.J., [1981,	Study on the tensile strength of ice as a function
Synoptic meteorology during the SNOW-ONE field experiment. Bilello, M.A., (1981, 55p ₁ SR 81-27	731p 3 MP 1435 Variation of ice strength within and between multiyear pres-	Strain measurements on dumbbell specimens
Synoptic weather conditions during snowfall Dec. 1981-Feb	sure ridges in the Beaufort Sca Weeks, W.F., 1984, p 134-139, MP 1680	(1983, p 75-77) Mechanical properties of multi-year sea ice
1982. Bilello, M.A., [1982, p.9-42] MP 1559 Synoptic meteorology during the SNOW-ONE-A Field Ex-	Aquatic plant growth in relation to temperature and unfrozen	niques Mellor, M., et al. [1984, 39p]
periment. Bilello, M.A., (1983, 80p.) SR 83-10 Site-specific and synoptic meteorology. Bates, R.E., (1983,	water content Palarzo, A J, et al. [1984, 8p] CR 84-14	Tensile strength of multi-year pressure ridge ser Cox, G F.N, et al. (1985, p 186-193)
p.13-80 ₁ MP 1845	Cold-temperature characterization of polymer concrete. Bigl, S.R., [1986, 46p.] MP 2521	Strain rate effect on the tensile strength of frozi
New England mountain icing climatology. Ryerson, C.C., [1988, 35p] CR 88-12	Parameter Tecting the kinetic friction of ice Akkok, M.	Y, et al. [1985, p.153-157] Mechanical properties of multi-year pressure t.
Synoptic meteorology, crystal habit, and snowian	Influence of thermal cycling on fiber composites Dutta.	Richter-Menge, J.A., [1985, p.244-251] Resistance of elastic rock to the propagation of t
Northeastern snowstorms Ryerson, CC, et al. (1989, p.335-345) MP 2599	P.K., et al, (1988, p.141-147) MP 2435	Peck, L., et al. (1985, p 7827-7836)
Synoptic meteorology during the SNOW IV Field Experiment. Bilello, M.A., et al. (1989, p.5-12) MP 2640	Resilient modulus determination for frost conditions Chamberlain, E.J., et al. (1989, p. 320-333) MP 2569	Tensile strength of multi-year pressure ridge set Cox, G.F.N., et al, [1985, p. 375-380]
Systems analysis	Low-temperature effects on systems for composting explo- sives-contaminated soils Ayorinde, O A, et al. [1989.	Microstructure and the resistance of rock to ter
Systems study of snow removal 'nsk, LD, (1979, p 220- 225) MP 1237	18p ₁ SR 89-38	Peck, L., et al. (1985, p 11,533-11,546) Tensile strength of frozen silt Zhu, Y., et al.
Taiga Natural ground temperatures in upland bedrock terrain, in-	Strength of soils and rocks at low temperatures. Sellmann, PV., (1989, p 189-190) MP 2685	28 ₁ Tensile strength of frozen silt Zhu, Y., et al, t
terior Alaska Collins, C.M., et al. (1988, p. 56-60)	Temperature gradients Subsca permafrost study in the Beaufort Sea, Alaska. Sell-	•
Tanks (combat vehicles)	mann, P.V., et al. (1979, p 207-213) MP 1591	Strain energy failure criterion for S2 freshwater. Cole, D.M., [1988, p. 206-215]
Change in orientation of artillery-delivered anti-tank mines in	Arctic Ocean temperature, salinity and density, March-May 1979 McPhee, M.G., (1981, 20p.) SR 81-05	Results from indentation tests on freshwater D.S., et al. [1988, p 341-350]
Review of antitank obstacles for winter use Richmond,	Using sea ice to measure vertical heat flux in the ocean	Uniaxial tension/compression tests on ice-pr
P.W., (1984, 12p.) CR 84-25 Tank E/O sensor v 'em performance in winter an overview	Freezing of semi-infinite medium with initial temperature	sults Cole, D.M., et al. [1989, p. 37-41] Fiber composite materials in an arctic environn
Lacombe, J., et _ [1985, 26p] MP 2073	gradient. Lunardini, V.J., (1983, p 649-652) MP 1583	P.K., (1989, p.216-225) TENSILE STRENGTH
Use and application of PRESTO in Snow-III West. Stallings, E.S., et al, 1986, p.11-24; MP 2658	Theory of metamorphism of dry snow. Colbeck, S.C.,	Mechanical properties of sea ice Weeks, W.F.
After-action report—Reforger '85 Liston, R A., ¿1986, 20p.) SR 86-22	[1983, p 5475-5482] MP 1603 Freezing of a semi-infinite medium with initial temperature	80p.; Tensile strength
Antitank obstacles for winter use. Richmond, P.W., 1988,	gradient. Lunardini, V.J., (1984, p 103-106) MP 1740	Investigation of ice forces on vertical structures
11p. ₁ SR 88-19 Tanks (containers)	Vegetation and environmental gradients of the Prudhoe Bay	K, et al, (1974, 153p.) Interpretation of the tensile strength of ice t
Potential icing of the space shuttle external tank Ferrick,	region, Alaska Walker, D A, (1985, 239p) CR 85-14	stress Nevel, D.E., et al, [1976, p 375-387]
M.G., et al. (1982, 305p) CR 82-25 Multifrequency passive microwave observation of saline ice	Rate of water transport due to temperature gradients in frozen soils Nakano, Y., et al., [1988, p 412-417] MP 2362	Interpretation of the tensile strength of ice t
grown in a tank. Grenfell, T.C. et al. (1988, p 1687- 1690) MP 2459	Temperature measurement	stresses. Nevel. D.E. et al. (1976, 9p) Effect of temperature on the strength of frozen s
Telecommunication	Improved millivolt-temperature conversion tables for copper constantan thermocouples 32F reference temperature	F D., et al. (1977, 27p)
Transfer of meteorological data from mountain-top sites. Govoni, J.W., et al. [1986, 6p] MP 2107	Stallman, PE, et al. (1976, 66p) SR 76-18 1977 CRREL-USGS permafrost program Beaufort Sea, Alas	Tensile stress Depth of water-filled crevasses of glaciers V
Arctic and Antarctic communications. Rosenberg, T.J., ed. (1987, 29p.) MP 2322	ka, operational report. Schmann, P.V., et al. (1977, 19p)	(1973, p 139-145) Concentrated loads on a floating ice sheet.
Telemetering equipment	SR 77-41 The maj properties and regime of wet tund; a soils at Barrow.	(1977, p 237-245)
Vibration analysis of a DEW Line station. Haynes, F.D., et al, 1988, p.1513-1518, MP 2341	Alaska. McGaw, R., ct al, [1978, p 47-53] MP 1096	Flexural strength of ice on temperate lakes [1977, p 247-256]
Detection of coarse se liment movement using radio transmit-	Thermal scanning systems for detecting building heat loss	Terminology
ters. Chacho, E.F., Jr., e. al, (1989, p. 367-373(B)) MP 2752	Grot, R.A., et al. [1978, p.B71-B90] MP 1212 Permafrost ceneath the Beaufort Sea Sellmann, P.V., et al.	Sea acc conditions in the Arctic Weeks, V p 173-205;
Temperature Kolmogorov Constants for temperature, humility and refrac-	(1978, p. 50-71) MP 1206 Distribution and properties of subsea permafrost of the Beau-	Terrain identification Arctic and subarctic environmental analysis thi
tive index spectra. Andreas, E.L., 1988, p 2399-2406; MP 2417	fort Sea Scilmanu, PV, et al. (1979, p.93-115) MP 1287	1 intagery Anderson, D M, et al. (1972, p
International Symposium on Cold Regions Heat Transfer,	Drifting bany measurements on Weddell Sea pack ice Ack-	Computer modeling of terrain modifications in t
1989, (1989, 314p.) MP 2536 TEMPERATURE DISTRIBUTION	ley, S.F., [197°, p.106-108; MP 1339 Thermal observations of Mt. St. Helens before and during	subarctic Outcalt, S1, et al, [1977, p 24-32
Geology and physiography of cold regions Stearns, S.R. [1905, 40p] M.I-A1	eniption St Lawrence, W.F., et al. (1980, p. 1526-1527) MP 1482	Hydrologic modeling from Landsat land McKim, H I., et al, [1984, 19p]
Characteristics of the cold regions Gerdel, R.W., (1950,	Free water measurements of a snowpack. Fisk, D J., 1983.	Filtering and classification routines in land
51p j M I-A Temperature distribution	p 173-176; MP 1758 Thermal emittance of diathermanous materials Munis,	Merry, C.J., et al. (1988, p. 57-58) Multiband imaging systems McKim, H.L. (
Freezing of soil with phase change occurring over a firste	R H, et 21, [1984, p 209-220] MP 1863	10p) TEST EQUIPMENT
te; spriature zone. Lunardini, V J., [1985, p.38-46] MP 1854	Liquid water mass fraction of snow measured by alcohol solu- tion Fish, DJ, (1948, p 538-541) MP 2245	Cold room studies on frost susceptible soils. [1
Temperature effects Heat exchange at the ground surface. Scott. R.F., [1964.]	Alcohol calorimetry for measuring the liquid water fraction of snow Fisk, D in [1987, p 163-166] MP 2261	Tests
49p. flus append.1 MTI-A1	Seaffocs temperature and thermal conductivity Serimann,	Thermal scanning systems for detecting builds
Climatology of the cold regions of the northern nemisphere. II. Wilson, C, [1969, 158p] M I-A3u	Ski motion and there al response Warren, GC, et al,	Grot, R.A., et al. [1978, p.B71-B90] Frost susceptibility of soil, review of index test:
Effect of temperature on the strength of frozen silt. Haynes. F.D., et al. (1977, 27p.) CR 77-03	[1989, p 223-225] MP 2745 Snow-syrface temperature analysis Botes, R.E., et al.	Jain, E.J., [1982, 110p.] Observations of moisture migration in frozen
Abnormal internal friction peaks in single-crystal ice. Stall-	(,)89, p 1/ ₂)-116 ₁ MP 2753	thawing Cheng, G. et al. (1988, p 308-312
man, P.E., et al. (1977, 15p ₁ SR 77-23) Ice accretion on ships Itagaki, K. (1977, 22p ₁)	Remote water-temperature measurement Daly, S, (1989, 6p.) MP 2722	Wheeled versus tracked vehicle snow mobility
SR 77-27 Effect of temperature and strain rate on the strength of poly-	Data orquisition first the FERF then the world Knuth, KV, (1989, p.136-138) MP 2567	Green, C.E., et al. (1989, 19p.) Fracture toughness of columnar freshwater ic
crystaltine ice Haynes, F.D. (1977, p.107-111)	Satelate da, a collection platforms for temperature measure-	D L et al. (1989, p 7-20)
MP 1127 Temperature effects in compacting an asphaic concrete over-	ments Daly, S.F., et al. [1989, 14p] SR 89-37 Temperature variations	Vondestructive evaluation of moisture imgration material Ayorinde, OA (1989) p.111-121
lay. Eaton, R.A., et al. (1978, p.146-158) MP 1083 Thermal and load associated distress in pavements. John-	Apparent aromaly in freezing of ordinary water Swinzow, GK, (1976, 23p) CR 76-20	Thaw consolidation
son, T.C., et al. (1978, p.403-437) MP 1209	Tensile properties	Overconsolicated sediments in the Beaufort Sea
Effect of temperature on the strength of snow-ice flaynes. F.D., (1978, 25p.) CR 78-27	infect of temperature on the strength of snow-ice. Haynes, F.D., [1978, 25p.] CR 78-27	lam, L.J., (1978, p.24-29) Exact solution for melting of frozen soil with the
Laboratory experiments on icing or retaiting blades. Ackley,	Temperature effect on the umaxial strength of ice Hayres,	tion Lunardini V j [1987, p 97-102] Thaw depth
River ice. Ashton G.D. (1979, p 38-45; MP 1178	Asphalt concrete for end regions Dempsey, BJ, et al.	Approach 193ds Orcenland 1955 program [19
Low temperature phase changes in mort, E. ny clays Anderson, D.M., et al. (1980, p.139-144) MP 1370	(i) 80, 550 j. CR 80-05 fee thickness-tensile str. is relationship for load-bearing ice	Prediction and validation of temperature in
Fracture behavio of ice in Charpy impact testing Itagaki.	Johnson, P.R., (1980, 11p.) SR 80-09	Brown J. et al. (1971, p 193-197;
K., et al. (1980, 13p) CR 80-13 Unfrezen water contents of subtrarine permafrost determined	Review of techniques for measuring soil moisture in situ. Mckim, H.L., et al. (1980-17p.) SR 80-31	Fight colored surfaces reduce than benetration a Berg, R.L., et al., (1977, p.86,00).
by nuclear magnetic resonance Tice, A R et sl 1986, p 400-412; MP 1412	I aboratory and fiel t use of soil tensiometers also c and below 0 deg C Ingersoll, J. 1981, 17p 1 SR 81-07	1977 tundra fire in the Kokolik River area of A DK, et al. [1978, p \$4-\$8]
Field cooling rates of asphalt concrete overlays at low temper-	Measuring mechanical properties of ice Schwarz, J. et al.	1977 prodra fire at Kokolik River Alaska Hal
stutes Eaton, R.A., et al. (1980, 11p.) CR 80-30	(1981, p.245-254) MP 1556	(1978, 11p)

Haul Road performance and associated investigations in Alas-	Het transfer characteristics of thermosyphons with inclined	Measuring thermal performance of building envelopes nine
ka. Berg, R.L., (1980, p.53-100) MP 1351	evaporator sections Haynes, F.D., et al. [1986, p 285-	case studies Flanders, S.N., [1985, 36p] CR 85-07
Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L.A., et al. [1980, 67p] CR 90-29	292 ₁ MP 2034 Soil freezing and unfrozen water content Lunardini, V.J.,	Deteriorated building panels at Sondrestrom, Greenland. Korhonen, C., [1985, p.7-10] MP 2017
Long-term active layer effects of crude oil spilled in interior	[1988, 27p] CR 88-02	Roof moisture surveys, yesterday, today and tomorrow.
Alaska. Collins, C.M., (1983, p 175-179) MP 1656	Effect of variable thermal properties on freezing with an un- frozen water content. Lunardini, V.J., (1988, p 1127-	Tobiasson, W., et al. (1985, p 438-443 + figs) MP 2040
Comparison of two-dimensional domain and boundary inte- gral geothermal models with embankment freeze-thaw field	1132 ₁ MP 2370	Heat flow sensors on walls-what can we learn Flanders,
data. Hromadka, T.V., II, et al, [1983, p 509-513]	Seafloor temperature and thermal conductivity. Sellmann,	S N , (1985, p.140-149) MP 2042
MP 1659	P.V. et al. (1989, 19p) CR 89-01 Review of pure conduction with freezing Lunardini, V J.	Measured and expected R-values of 19 building envelopes.
Recovery and active layer changes following a tundra fire in northwestern Alaska. Johnson, L., et al, [1983, p 543-	(1989, p 27-32) MP 2638	Flanders, S.N., 11985, p. 49-57, MP 2115 Vapor drive maps of the U.S.A. Tobiasson, W., et al., 11986,
547 ₁ MP 1660	Heat conduction in snow. Yen, Y.C., [1989, p 21-32]	7p + graphs; MP 2041
Developing a thawing model for sludge freezing beds. Mar-	MP 2546	In-situ assessment of two retrofit insulations Flanders, S.N.,
tel, C.J., (1988, p 1426-1430) MP 2372 Thaw weakening	Simple and economical thermal conductivity measurement system. Atkins, R.T., [1989, p.108-116] MP 2566	(1986, p.32-44) MP 2172 Measuring building R-values with thermography and heat flux
Mobility of water in frozen soils. Lunardini, V.J., et al,	Thermal response of downhill skis Warren, G.C., et al,	sensors Flanders, S N, [1987, 29p.] SR 87-06
[1982, c15p] MP 2012	(1989, 40p) CR 89-23	Measured insulation improvement potential for ten U.S.
Frost heave of full-depth asphalt concrete pavements. Zom- erman, I., et al. r1985, p 66-76; MP 1927	Thermal diffusion Computer simulation of the snowmelt and soil thermal ' ,e	Army buildings Flanders, S.N., [1987, p.202-220] MP 2327
erman, I., et al, [1985, p 66-76] MP 1927 Frost action predictive techniques an overview of research	at Barrow, Alaska Cutcalt, SI, et al. (1975, p 709-715)	Wetting of polystyrene and urethane roof insulations
results. Johnson, T.C., et al. (1986, p. 147-161)	MP 857	Tobiasson, W., et al, [1988, p 421-430] MP 2011
MP 2267	Infrared thermography of buildings Munis, R.H., et al. (1977, 17p.) SR 77-29	Comparison of insulated and noninsulated pavements tler, M, et al, (1989, p 367-378) MP 2471
Deformation of pavements during freeze thaw cycles Johnson, T.C, et al. (1986, 138p) CR 86-13	Suppression of river ice by thermal effluents. Ashton, G D,	Nondestructive evaluation of moisture migration in insulation
Thawing	(1979, 23p ₁ CR 79-30 Neumann solution applied to soil systems Lunardini, V.J.,	material Ayorinde, O.A., [1989, p 111-121] MP 2716
Conduction heat transfer with freezing/thawing Lunardini,	(1980, 7p) CR 80-22	Thermal pollution
V.J., [1987, p.55-64] MP 2304 Thawing rate	Thermal diffusivity of frozen soil. Haynes, FD, et al,	Thermal energy and the environment Crosby, R L, et al,
Exact solution for melting of frozen soil with thaw consolida-	[1980, 30p] SR 80-38	[1975, 3p. + 2p figs] MP 1480
tion. Lunardini, V.J., [1987, p 97-102] MP 2191	Cylindrical phase change approximation with effective thermal diffusivity Lunardini, V J, [1981, p.147-154]	Thermal pollution studies of French Creek, Eielson AFB, Alaska McFadden, T. (1976, 5p) CR 76-14
Theories Interpretation of the tensile scrength of ice under triaxial	MP 1438	River ice Ashton, G D , [1979, p.38-45] MP 1178
stresses Nevel, D.E., et al., (1976, 9p.) CR 76-05	Thermal drills	Suppression of river ice by thermal effluents. Ashton, G.D.,
Small communities result in greater satisfaction. Ledbetter,	General considerations for drill system design Mellor, M, et al, [1976, p 77-111] MP 856	(1979, 23p) CR 79-30 THERMAL PROPERTIES
C.B., (1977, 15p.) SR 77-36	1979 Greenland Ice Sheet Program. Phase 1: casing opera-	Snow as a material. Bader, H, et al, (1962, 79p)
In-plane deformation of non-coaxial plastic soil. Takagi, S, [1978, 28p.] CR 78-07	tion Rand, J H. [1980, 18p] SR 80-24	M II-B
Evaluation of the moving boundary theory Nakano, Y.	Portable hot water ice drill. Tucker, W.B., et al, 1986, p 549-564, MP 2202	Thermal properties Observation and analysis of protected membrane roofing sys-
(1978, p 142-151) MP 1147	Portable hot-water ice drill Ticker, W.B., et al, [1987,	tems. Schaefer, D, et al. (1977, 40p) CR 77-11
Steady in-plane deformation of noncoaxial plastic soil Takagi, S, (1979, p.1049-1072) MP 1248	p 57-64; MP 2236	Thermal and reep properties for frozen ground construction.
Snow-smoke interaction. Hogan, A.W., et al. (1988, p. 497-	Thermal effects Thermal energy and the environment Crosby, R L, et al.	Sanger, F.J., et al, [1978, p 95-117] MP 1624 Thermal and creep properties for frozen ground construction
506 ₁ MP 2607	(1975, 3p + 2p figs) MP 1480	Sanger, F.J., et al, [1979, p 311-337] MP 1227
Review of pure conduction with freezing Lunardini, V J. (1989, p 27-32) MP 2638	Mechanics of cutting and boring in permafrost Mellor, M., [1981, 38p] CR 81-26	Time constraints on measur is building R-values Flanders,
Thermal analysis	(1981, 38p) CR 81-26 Thermal expansion	S.N., [1980, 30p] CR 80-15 Comparison of two-dimensional domain and boundary inte-
Applications of thermal analysis to cold regions Sterrett,	Movement of coastal sea ice near Prudhoe Bay Weeks,	gral geothermal models with embankment freeze-thaw field
K.F., (1976, p.167-181) MP 890	W.F, et al, (1977, p 533-546) MP 1066	data Hromadka, T.V., 11, et al, [1983, p 509-513] MP 1659
Infrared thermography of buildings an annotated bibliography. Marshall, S J, (1977, 21p) SR 77-09	Nearshore ice motion near Prudhoe Bay, Alaska Tucker, W.B., et al., {1977, p 23-31; MP 1162	Emittance and interpretation of thermal images Munis,
Infrared thermography of buildings Munis, R.H, et al,	Thermal expansion of saline ice. Cox, G.F.N., (1983,	R H, et al. (1985, p.72-78) MP 1962
[1977, 21p.] SR 77-26	p 425-432; MP 1768 Thermal insulation	Thermal analysis of a shallow utilidor Phetteplace, G., et al., 1986, 10p MP 2021
H., drologic aspects of ice jams Calkins, D.J., [1986, p. 603-609] MP 2116	Thermoinsulating media within embankments on perennially	(1986, 10p) MP 2021 Roof blisters Physical fitness building, Fort Lee, Virginia.
Thermal conductivity	frozen soil. Berg, R.L., [1976, 161p] SR 76-03	Kothonen, C., et al. (1986, 15p) Sr 86-35
Formation of ice ripples on the underside of river ice covers	Influence of insulation upon frost penetration beneath pave- ments Eaton, R.A., et al., [1976, 41p.] SR 76-06	Thermal radiation Thermal emittance of diathermanous materials Munis,
Ashton, G.D., (1971, 157p) MP 1243 Evaluation of methods for calculating soil thermal conductivi-	Road construction and maintenance problems in central Alas-	R H, et al. [1984, p 209-220] MP 1863
ty. Farouki, O., [1972, 90p] CR 82-08	ka Clark, E.F., et al., (1976, 36p) SR 76-08	Emittance and interpretation of thermal images Munis,
Finite element model of transient heat conduction. Guy- mon, G L., et al., 1977, 167p. SR 77-38	Observation and analysis of protected membrane roofing systems Schaefer, D., et al., [1977, 40p] CR 77-11	R.H., ct al. (1985 p 72-78) MP 1962 Thermal regime
mon, G.L., et al., [1977, 167p] SR 77-38 Frost action in New Jersey highways Berg, R.L. et al.	Reinsulating old wood frame buildings with urea-formalde-	Environmental setting, Barrow, Alaska Brown, J. (1970,
[1978, 80p.] SR 78-09	hyde foam Tobiasson, W, et al, [1977, p.478-487] MP 958	p 50-64) MP 945
Thermal properties and regime of wet tundra soils at Barrow,	Mid-winter installation of protected memb. ane roofs in Alas-	Temperature and flow conditions during the formation of river icc. Ashton, G.D., et al., [1970, 12p]
Alaska McGaw, R., et al. (1978, p 47-53) MP 1096	ka Aamot, H W.C., (1977, 5p) CR 77-21	MP 1723
Roof response to using conditions Lane, J.W., et al., [1979,	Maintaining buildings in the Arctic Tobiasion, W., et al. [1977, p 244-251] MP 1508	Winter thermal structure and ice conditions on Lake Cham- plain Vermont Bates, R.E., (1976, 22p.) CR 76-13
40p; CR 79-17 Time constraints on measuring building R-values Flanders.	Effects of moisture and freeze-thaw on rigid thermal insula-	plain Vermont Bates, R.E., (1976, 22p.) CR 76-13 Winter thermal structure, ice conditions and climate of Lake
S.N., 1980, 30p 3 CR 80-15	tions Kaplar, C.W., (1978, p 403-417) MP 1085	Champlain Bates, R E. (1980, 26p) CR 80-02
Moisture gain and its thermal consequence for common roof	Cold climate utilities delivery design manual Smith, D.W., et al., 1979, c300 leaves; MP 1373	Crude oil spills on subarctic permafrost in interior Alaska Johnson, LA, et al. (1980, 128p) MP 1310
insulations Tobiasson, W, et al, [1980, p 4-16] MP 1361	Sultur foam as insulation for expedient roads Smith, N., et	Thermal observations of Mt St Helens before and during
Neumann solution applied to soil systems. Lunardini, V.J.,	al, [1979, 21p] CR 79-18	eruption St. Lawrence, W.F., et al. (1980, p.1526-1527)
(1980, 7p) CR 80-22	Moisture gain and its thermal consequence for common reof insulations. Tobiasson, W., et al. (1980, p.4-16)	Embankment dams on permafrost in the USSR Johnson,
Thermal diffusivity of frozen soil. Haynes, FD, et al. (1980, 30p.) SR 80-38	MP 1361	TC, ct al, [1980, 59p] SR 80-41
Heat conduction with phase changes Lunardini, VJ,	Losses from the Fort Wainwright heat distribution system Photteplace, G, et al., (1981, 29p.) SR 81-14	Measuring building R-values for large areas Flanders, S N.
(1981, 14p) CR 81-25	Phetteplace, G, et al. (1981, 29p) SR 81-14 Venting of built-up roofing systems Tobiasson, W, (1981,	et al. (1981, p.137-138) MP 1388 Some approaches to modeling phase change in freezing soils
Initial stage of the formation of soil-laden ice lenses. Takagi, S, (1982, p 223-232) MP 1596	p 16-21 ₁ MP 1498	Hromadka, TV, II, et al. (1981, p.137-145)
Computer models for two-dimensional steady-state heat con-	Roof moisture surveys Tobiasson, W et al. (1981, 18p.) SR 81-31	MP 1437
duction Albert, M.R., et al, [1983, 90p] CR 83-10	Moisture detection in roofs with cellular plastic insulation	Theory of thermal control and prevention of ice in rivers and lakes. Ashton, G.D., [1982, p.131-185] MP 1554
In-situ thermal conductivity measurements Atkins, R.T., [1983, 38p] MP 2214	Korhonen, C, et al. [1982, 22p] SR 82-07	Arctic thermal design Lunardini, V.J., (1985, p.70-75)
• • • •		
Solution of phase change problems. O'Neill, K. (1983)	Potential using of the space shuttle external tank Ferrick, M.G. et al. (1982, 305n). CR 82-25	MP 2167
Solution of phase change problems. O'Neili, K., (1983, p. 134-146) MP 1894	Potential using of the space shuttle external tank MG, et al. (1982, 305p) CR 82-25 Least life-cycle costs for insulation in Alaska Flanders.	Review of analytical methods for ground thermal regime cal- culations. Lunardini, V.J., (1985, p. 204-257)
p 134-146; MP 1894 Toward in-situ building R-value measurement. Flanders.	M G, et al. (1982, 305p) Least life-cycle costs for insulation in Alaska S N, et al. (1982, 47p) CR 82-25 Flanders, CR 82-27	Review of analytical methods for ground thermal regime cal- culations Lunardini, V.J., (1985, p.204-257) MP 1922
p 134-146) MP 1894 Toward in-situ building R-value measurement. S.N., et al. (1984, 13p) CR 84-01	MG, et al. [1982, 305p] Cast life-cycle costs for insulation in Alaska SN, et al. [1982, 47p) Infrared inspection of new roofs Kothonen, C, [1982,	Review of analytical methods for ground thermal regime cal- culations Lunardini, V J. (1985, p 204-257) MP 1922 Thermal stresses
p 134-146; MP 1894 Toward in-situ building R-value measurement. S.N., et al. (1984, 13p.) Status of numerical models for heat and mass transfer in frost-susceptible soils Berg, R.L., (1984, p 67-71)	M G , et al. (1982, 305p) CR 82-25 Least life-cycle coxts for insulation in Alaska S N , et al. (1982, 47p) Randers, Infrared inspection of new roofs Korhonen, C, (1982, 14p) Window performance in extreme cold Handers, S N , et al.	Review of analytical methods for ground thermal regime cal- culations Lunardini, V.J., (1985, p.204-257) MP 1922
p 134-146; MP 1894 Toward in-situ building R-value measurement. S.N., et al. (1984, 13p) Flatence. Status of numerical models for heat and mass transfer in frost-susceptible soils Berg, R.L., (1984, p 67-71) MP 1851	M G , et al. (1982, 305p) Least life-yele costs for insulation in Alaska S N , et al. (1982, 47p) Infrared inspection of new roofs Lap Window performance in extreme cold Lianders, S N , et al. (1982, 21p) CR 82-25 CR 82-25	Review of analytical methods for ground thermal regime cal- culations Lunardini, V.J., (1985, p. 204-257) MP 1922 Thermal stresses Thermal and load-associated distress in pavements son, T.C., et al., (1978, p. 403-437) Physical and thermal disturbance and protection of perma-
p 134-146; MP 1894 Toward in-situ building R-value measurement. S.N., et al. (1984, 13p.) Status of numerical models for heat and mass transfer in frost-susceptible soils Berg, R.L., (1984, p 67-71)	M G , et al. (1982, 305p) CR 82-25 Least life-cycle coxts for insulation in Alaska S N , et al. (1982, 47p) Randers, Infrared inspection of new roofs Korhonen, C, (1982, 14p) Window performance in extreme cold Handers, S N , et al.	Review of analytical methods for ground thermal regime calculations Lunardini, V.J., [1985, p. 204-257] MP 1922 Thermal stresses Thermal and load-associated distress in pavements Johnson, T.C., et al., [1978, p. 403-437] Physical and thermal disturbance and protection of permafrost Brown, J., et al., [1979, 42p.] SR 79-05
p 134-146; MP 1894 Toward in-situ building R-value measurement. S.N., et al. (1984, 13p) CR 84-01 Status of numerical models for heat and mass transfer in frost- susceptible soils Berg, R.L., (1984, p 67-71) MP 1851 Heating and cooling method for measuring thermal conduc- tivity M.Gaw, R., (1984, 8p) MP 1891 Theory of natural convection in snow Powers, D. et al.	M G , et al. (1982, 305p) Least life-yele costs for insulation in Alaska S N , et al. (1982, 47p) Infrared inspection of new roofs Window performance in extreme cold (1982, 21p) Thawing beneath insulated structures on permafrost Lunardini, V J , (1983, p 750-755) Can weit roof insulation be dried out Tobiasson, W., et al.	Review of analytical methods for ground thermal regime calculations. Lunardim, V.J., (1985, p. 204-257) MP 1922 Thermal stresses Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437) Physical and thermal disturbance and protection of permafort. Brown, J., et al., (1979, 42p) Ew temperature cracking susceptibility of asphalt concrete Janoo, V.C., et al., (1987, p. 397-415) MP 2233
p 134-146; MP 1894 Toward in-situ building R-value measurement. S.N., et al. (1984, 13p.) CR 84-01 Status of numerical models for heat and mass transfer in frost- susceptible soils Berg, R.L., [1984, p 67-71] MP 1851 Heating and cooling method for measuring thermal conduc- tivity M.Gaw, R., [1984, 8p.) MP 1891	M G , et al. (1982, 305p) CR 82-25 Least life-cycle costs for insulation in Alaska S N , et al. (1982, 47p) Randers, Idp) Kothonen, C , (1982, 14p) Window performance in extreme cold Handers, S N , et al. (1982, 21p) Thawing beneath insulated structures on permafrost Lunardim, V J , (1983, p 750-755) MP 1662	Review of analytical methods for ground thermal regime calculations. Lunardim, V.J., (1985, p. 204-257) Thermal stresses Thermal and load-associated distress in pavements. Johnson, T.C., et al., (1978, p. 403-437) Physical and thermal disturbance and protection of permafort. Brown, J., et al., (1979, 42p.) Low temperature cracking susceptibility of asphalt concrete.

Thermistors	Performance based tire specification system for military wheeled vehicles Blassdell, G L, (1985, p 277-280)	CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., (1982, 11p) MP 1515
USACRREL precise thermistor meter. Trachier, G.M., et al. (1985, 34p.) SR 85-26	MP 2101	Measurement of snow surfaces and tire performance evalua-
In-situ thermoconductivity measurements Faucher, M, (1986, p 13-14) Faucher, MP 2137	Measurement and evaluation of tire performance under win- ter conditions Blaisdell, G. L., (1985, p.198-228)	tion. Blassdell, G.L., et al., [1982, 7p.) MP 1516 Driving traction on ice with all-season and mud-and-snow
Determination of frost penetration by soil resistivity measure-	MP 2387 1STVS workshop on tire performance under winter condi-	radial tires Blaisdell, G.L., (1983, 22p.) CR 83-27
ments Atkins, R.T., [1989, p.87-100] MP 2565 Simple and economical thermal conductivity measurement	tions, 1983. (1985, 177p.) SR 85-15	G.L., (1985, p 9-20) MP 2044
system. Atkins, R.T., (1989, p.108-116) MP 2566 Thermocouples	Need for snow tire characterization and evaluation. Yong, R.N., et al., (1985, p 1-2) MP 2043	Field demonstration of traction testing procedures. Blais- dell, G L, (1985, p 176) MP 2046
Determination of frost penetration by soil resistivity measure-	Winter tire tests 1980-81 Blaisdell, GL, et al. (1985, p 135-151) MP 2045	Radial tire and traction aid performance on ice and in snow,
ments. Atking R.T. [1989, p 87-100] MP 2565 Data acquisition first the FERF then the world. Knuth,	Field demonstration of traction testing procedures. Blais-	Rogers, T., et al. (1986, 20p) SR 86-07 ice traction of tires Blaisdell, G.L., et al. (1986, 11p)
K.V., (1989, p.136-138) MP 2567	dell, G.L., (1985, p 176) MP 2046 Radial tire and traction aid performance on ice and in snow.	Vehicle mobility over snow Blaisdell, G.L., [1987, p 265-
Thermodynamic properties Thermodynamic deformation of wet snow Colbeck, S.C.	Rogers, T. et al. [1986, 20p.] SR 86-07 After-action report—Reforger '85 Liston, R.A., [1986,	266 ₁ MP 2420
(1976, 9p.) CR 76-44 Oxygen isotopes in the basal zone of Matanuska Glacier	20p ₁ SR 86-22	Instrumented vehicle for the measurement of mobility parameters Blaisdell, G.L., [1988, p. 377-388] MP 2486
Lawson, DE, et al, [1978, p 673-685] MP 1177	Ice traction of tires Blaisdell, G L, et al, [1986, 11p.] SR 86-39	Performance of an omni-directional wheel on snow and ice. Blaisdell, GS, [1989, 21p + appends] MP 2711
Documentation for a two-level dynamic thermodynamic sea- ice model. 11.bler, W D., 111, [1980, 35p] SR 80-08	Instrumented vehicle for the measurement of mobility parameters Blaisdell, G.L., [1988, p. 377-388] MP 2486	Thaving soil strength measurements for predicting vehicle
On modeling the Weddell Sea pack ice Hibler, W.D., III, et al, [1982, p 125-130] MP 1549	Topographic effects	performance. Shoop, S.A., [1989, 18p] MP 2749 Tractors
Thermodynamics	VLF airborne resistivity survey in Maine Arcone, S.A., [1978, p 1399-1417] MP 1166	Vehicles for freight-hauling and for science traverses in An-
Dynamic thermodynamic sea ice model. Hibler, W.D., III, (1979, p 815-846) MP 1247	Transverse velocities and ice jamming potential in a river	Evaluation of the Caterpillar Challenger tractor for use in
Analysis of water in the Martian regolith Anderson, D.M.,	bend Zufelt, J.E., (1988, p 193-207) MP 2476 TOPOGRAPHIC FEATURFS	Antarctica Blaisdell, G.L., et al. (1989, 12p + figs.) MP 2718
et al, (1979, p 33-3°), MP 1409 Thermodynamics: f snow metamorphism due to variations in	Geology and physiography of cold regions Steams, S.R., [1965, 40p] M I-AI	Trafficability
curvature Col'-eck, S.C., [1980, p 291-301] MP 1368	Climatology of the cold regions of the northern hemisphere,	Instrument for determining snow properties related to traffi- cability. Parrott, W.H., et al, (1972, p 193-204)
Modeling a varirole thickness sea ice cover. Hibler, W.D.,	I Wilson, C., (1967, 141p.) M I-A3a Topographic features	MP 886 Evaluation of an air cushion vehicle in Northern Alaska.
Introduction to the basic thermodynamics of cold capillary	Arctic environment and the Arctic surface effect vehicle. Sterrett, K F, [1976, 28p] CR 76-01	Abele, G, et al. [1976, 7p] MP 894 Effect of snow cover on obstacle performance of vehicles
systems Colbeck, S.C., (1981, 9p.) SR 81-06 Preliminary results of ice modeling in the East Greenland	Effect of snow cover on obstacle performance of vehicles	Hanamoto, B., (1976, p.121-140) MP 933
area. Ticker, WB, et al, [1981, p.867-878] MP 1458	Hanamoto, B, [1976, p 121-140] MP 933 Topological properties of some trellis pattern channel net-	Arctic transportation: operational and environmental evalua- tion of an air cushion vehicle in northern Alaska Abele,
Application of a numerical sea ice model to the East Green-	work* Mock, SJ, [1976, 54p] CR 76-46 River channel characteristics at selected ice jam sites in Ver-	G., et al. [1977, p 176-182] MP 985 Workshop on snow traction mechanics. 1979. Harrison,
land area Tucker, W.B., (1981, 109p.) MP 1535 Application of a numerical sea ice model to the East Green-	mont Gatto, L.W., (1978, 52p) CR 78-25	W.L., ed, [1981, 71p] SR 81-16
land area Tucker, W.B., [1982, 40p] CR 82-16	Ice-cored mounds at Sukakpak Mountain, Brooks Range Brown, J, et al, (1983, p.91-96) MP 1653	Application of energetics to vehicle trafficability problems. Brown, R.L., (1981, p 25-38) MP 1474
Physics of mathematical frost heave models a review. O'Neill, K, [1983, p 275-291] MP 1588	Extraction of topography from side-looking satellite systems —a case study with SPOT simulation data. Ungar, S.G.	Prediction methods for vehicle traction on snow W.L., [1981, p 39-46] Harrison, MP 1475
East Greenland Sea ice variability in large-scale model simulations. Walsh, J E, et al, [1984, p 9-14] MP 1779	et al, (1983, p 535-550) MP 1695	Field investigations of vehicle traction in snow. Harrison,
On the decay and retreat of the ice cover in the summer MIZ	Spatial analysis in recreation resource management Edwardo, H A, et al. (1984, p.209-219) MP 2084	W L. (1981, p.47-48) MP 1476 Shallow snow test results Harrison, W.L., (1981, p.69-71)
Maykut, G.A., [1984, p 15-22] MP 1780 Thermodynamic model of creep at constant stress and con-	Geographic features and floods of the Ohio River H.A., et al, 1984, p 265-281; Edwardo, MP 2083	MP 1478 Mobility bibliography Liston, N., comp. (1981, 313p.)
stant strain rate. Fish, A.M., (1984, p. 143-161) MP 1771	Terrain analysis from space shuttle photographs of Tibet	SR 81-29
Ice dynamics. Hibler, W.D., III, (1984, 52p) M 84-03	Kreig, R. A., et al., [1986, p.400-409] MP 2097 Topography	Vechicle mobility and snowpack parameters Berger, R.H., [1983, 26p] CR 83-16
Ice dynamics. Hibler, W.D., III, 1986, p 577-640;	Recent measurements of sea ice topography in the eastern Arctic Krabill, W.B., et al. (1990, p 132-136)	Evaluating trafficability McKim. H L, [1985, p 474-475] MP 2023
MP 2211 Thermal and size evolution of sea spray droplets Andreas.	MP 2735	Trailing-tire motion resistance in shallow snow Blaisdell,
E L., [1989, 37p] CR 89-11	Communication tower scing in the New England region.	G L. (1987, p.296-304) MP 2248 Transformations
Low-temperature effects on systems for composting explo- sives-contaminated soils Ayorinde, OA, et al. 1989.	Mulherin, N., et al, [1986, 7p] MP 2109 Atmospheric using on communication masts in New England	Modeling N transport and transformations in soils. Selim, H M, et al. (1981, p. 233-241) MP 1440
18p) SR 89-38 Thermokarst	Mulherin, N , (1986, 46p) CR 86-17	Modeling nitrogen transport and transformations in soils: 2.
Human-induced thermokarst at old drill sites in northern	ice removal from broadcast towers by low-frequency vibra- tions Mulherin, N.D., et al. [1988, 6p.] MP 2538	Validation iskandar, I K, et al. (1981, p 303-312) MP 1441
Alaska. Lawson, D E, et al, [1978, p 16-23] MP 1254	Tracked vehicles Effects of hovercraft, wheeled and tracked vehicle traffic on	Transmission Catalog of smoke/obscurant characterization instruments
Ttickness Sea ice growth, drift, and decay Hibler, W.D., III. (1980).	tundra Abele, G., (1976, p 186-215) MP 1123	O'Brien, H W., et al. (1984, p 77-82) MP 1865
p 141-209 ₁ MP 1298	Effect of snow cover on obstacle performance of vehicles Hanamoto, B., (1976, p 121-140) MP 933	Performance of microprocessor-controlled snow crystal repli- cator. Koh, G, [1984, p 107-111] MP 1866
Thickness gages Update on portable hot-water sea ice drilling Govoni, J.W.	Effects of low ground pressure vehicle traffic on tundra at Lonely, Alaska Abele, G, et al. [1977, 32p]	Impact of wet snow on visible, infrared and millimeter wave attenuation Bates, R.E. et al. [1988, p 523-535]
et al, 1989, p.175-178; MP 2479 Tibet	SR 77-31	MP 2608
Terrain analysis from space shuttle photographs of Tibet	R.L., (1979, 13p) CR 79-20	Transmission lines Undersea pipelines and cables in polar raters Mellor, M.
Kreig, R.A., et al. (1986, p 400-409) MP 2097 Tidal currents	Ecological impact of vehicle traffic on tundra. Abele, G. 1981, p 11-37 ₁ MP 1463	(1978, 34p) CR 78-22 lee accretion and aerodynamic loading of transmission lines
Baseline data on tidal flushing in Cook Inlet, Alaska Gatto, L.W., [1973, 11p] MP 1523	Long-term effects of off-road vehicle traffic on tundra terrain Abele, G, et al. (1984, p 283-294) MP 1820	Egelhofer, K.Z., et al. (1987, p 103-109) MP 2279
Baseline data on the oceanography of Cook Inlet, Alaska	Mobility working group report Blaisdell, G L, et al.	Transmissivity Snow-Two/Smoke Week VI field experiment plan Red-
Gatto, LW, [1976, 84p] CR 76-25 Estuarine processes and intertidal habitats in Grays Harbor,	(1987, p 273-274) MP 2423 Vehicles for freight-hauling and for science traverses in An-	field, R K, et al. (1984, 85p.) SR 84-19 Snow Symposium, 4th, Hanover, NH, Vol. 1 (1984, 433p.)
Washington, a demonstration of remote sensing techniques Gatto, L.W. [1978, 79p] CR 78-18	tarctica Mellor, M. (1988, Var p) MP 2504 Traction	SR 84-35
Remote sensing of water circulation in Grays Harbor, Wash-	Shallow snow performance of wheeled vehicles Harrison,	Approach to snow propagation modeling Koh, G., (1984, p 247-259) MP 1869
ington Gatto, LW, [1980, p 289-323] MP 1283 Time factor	W.L., [1976, p 589 614] MP 1130 Workshop on snow traction mechanics, 1979 Harrison.	Explosive obscuration sub-test results at the SNOW-TWO field experiment Ebersole, J.F., et al., [1984, p. 347-354]
Numerical simulation of atmospheric ice accretion Ackley, S.F., et al. (1979, p. 44-52) MP 1235	W.L., ed. [1981, 71p] SR 81-16 Snow measurements in relation to vehicle performance.	MP 1872
Tires	Harrison, W.L. (1981, p.13-24) MP 1473	SNOW III WEST field experiment report volume 1 La- combc, J, et al. (1988, 170p.) SR 88-28
Vehicle damage to tundra soil and vegetation Walker, D.A., et al. (1977, 49p) SR 77-17	Application of energetics to vehicle trafficability problems Brown, R.L., [1981, p 25-38] MP 1474	Transportation Arctic transportation operational and environmental evalua-
Effects of low ground pressure vehicle traffic on tundra Abele, G, et al. (1978, 63p.) SR 78-16	Prediction methods for vehicle traction on snow W.L., [1981, p.39-46] Harrison. MP 1475	tion of an air cushion vehicle in northern Alaska Abele, G. et al. (1977, p. 176-182) MP 985
CRREL instrumented vehicle for cold regions mobility meas-	Field investigations of vehicle traction in snow Harrison.	Operation of the CRREL prototype air transportable shelter.
urements Blaisdell, G.L., [1982, 11p] MP 1515 CRREL instrumented vehicle hardware and software.	W L., [1981, p 47-48] MP 1476 Vehicle tests and performance in snow Berger, R H, et al.	Flanders, S.N., (1980 73p.) SR 80-10 Cold regions testing of an air-transportable shelter Flan-
Blaisdell, G.L., (1983, 75p) SR 83-03 Driving traction on ice with all-season and mud-and-snow	(1981, p.51-67) MP 1477 Shallow snow test results Harrison, W. L. (1981, p.69-71)	ders, S.N., (1981, 20p.) CR 81-16 Mobility bibliography Liston, N., comp. (1981, 313p.)
radial tires Blaisdell, G.L., [1983, 22p] CR 83-27	MP 1478	SR 81-29
Radial tire demonstration Liston, R.A., (1985, p.281- 285; MP 2102	Shallow snow model for predicting vehicle performance Harrison, W.L., (1981, 21p.) CR 81-20	Brittleness of reinforced concrete structures under arctic con- ditions Kiyekäs, L., et al., [1986, 20p.] CR 86-02
,		

Vahiala mahilisu muar anam. Blaindall G.1 (1007 n.265	Tundra biome	Climatic and dendroclimatic indices in the discontinuous per-
Vehicle mobility over snow. Blaisdell, G.L., (1987, p.265-266) MP 2420	Tundra biome program. Brown, J, [1970, p.1278]	mafrost zone of the Central Alaskan Uplands Haugen,
Arctic mobility problems. Abele, G, [1987, p.267-269] MP 2421	MP 881 Tundra biome applies new look to ecological problems in	Ecological baseline on the Alaskan haul road. Brown, J., ed,
Trees (plants) Upland forest and its soils and litters in interior Alaska	Alaska. Brown, J., [1970, p.9] MP 880 Summary of the 1971 US Tundra Biome Program. Brown,	[1978, 131p.] SR 78-13 Effects of low ground pressure vehicle traffic on tundra.
Troth, J.L., et al, [1976, p.33-44] MP 867	J., [1972, p 306-313] MP 995	Abele, G., et al, [1978, 63p] SR 78-16 Plant recovery from Arctic oil spills. Walker, D.A., et al,
Wastewater applications in forest ecosystems McKim, H.L., et al., [1982, 22p.] CR 82-19	Case for comparison and standardization of carbon dioxide reference gases. Kelley, J.J., et al, [1973, p 163-181]	[1978, p 242-259] MP 1184
Trenching Some aspects of Soviet trenching machines. Mellor, M,	MP 964 Soil properties of the International Tundra Biome sites.	Tundra recovery since 1949 near Fish Creek, Alaska. Lawson, D.E., et al, [1978, 81p] CR 78-28
[1980, 13p.] SR 80-07	Brown, J., et al, [1974, p 27-48] MP 1043	Tunneling (excavation) Kinematics of axial rotation machines. Mellor, M. [1976,
Subsea trenching in the Arctic Mellor, M, (1981, p 843- 882) MP 1464	Ecological investigations of the tundra biome in the Prudhoe Bay Region, Alaska. Brown, J, ed, (1975, 215p)	45p ₃ CR 76-16
Ice gouge hazard analysis Lanan, G.A., et al. [1986, p.57-66] MP 2106	MP 1053 Tundra climate	Tunnels Some experiences with tunnel entrances in permafrost. Li-
Triaxial tests	Tundra environment at Barrow, Alaska. Bunnell, F.L., et al., [1975, p 73-124] MP 1050	nell, K.A., et al. (1978, p.813-819) MP 1107 Field dielectric measurements of frozen silt using VHF pulses.
Kinetic nature of the long term strength of frozen soils Fish, A.M., [1980, p.95-108] MP 1450	Tundra soils	Arcone, S.A., et al. (1984, p 29-37) MP 1774 Condensing steam tunnel heat sinks. Lunardini, V.J.,
Triaitrotoluene Vapor pressure of TNT by gas chromatography Leggett,	Word model of the Barrow ecosystem. Brown, J., et al, (1970, p 41-43) MP 943	(1986, 29p) SR 86-24
D.C., (1977, p 83-90) MP 915 Tundra	Synthesis and modeling of the Barrow, Alaska, ecosystem. Coulombe, H.N., et al, 1970, p 44-491 MP 944	Fox permafrost tunnel, a late Quaternary geologic record in central Alaska. Hamilton, T D, et al., 1988, p.948-9691
Abiotic overview of the Tundra Biome Program, 1971.	Environmental setting, Barrow, Alaska. Brown, J., [1970,	MP 2355 Turbidity
Weller, G., et al. [1971, p 173-181] MP 906 Ecological and environmental con-equences of off-road traf-	p.50-64; MP 945 Ecological effects of oil spills and seepages in cold-dominated	Correlation and quantification of airborne spectrometer data to turbidity measurements at Lake Powell, Utah Merry,
fic in northern regions Brown, J, [1976, p 40-53] MP 1383	environments. McCown, BH, et al, [1971, p.61-65] MP 905	CJ., (1970, p 1309-1316) MP 1271
Geoecological mapping scheme for Alaskan coastal tundra. Everett, K.R., et al. [1978, p 359-365] MP 1098	Prediction and validation of temperature in tundra soils Brown, J, et al, [1971, p.193-197] MP 907	Water quality measurements at Lake Powell, Utah. Merry, CJ., [1977, 38p] SR 77-28
1977 tundra fire at Kokolik River, Alaska Hall, D K., et al,	Proceedings 1972 Tundra Biome symposium (1972, 211p)	Use of SPOT HRV data in the Corps of Engineers dredging program. Merry, C J, et al, (1988, p 1295-1299)
[1978, 11p] SR 78-10 Human-induced thermokarst at old drill sites in northern	MP 1374 Pedologic investigations in northern Alaska. Tedrow, J.C.F.,	MP 2528 Turbulence
Alaska Lawson, D.E, et al. (1978, p 16-23) MP 1254	(1973, p.93-108) MP 1005	Measurements of refractive index spectra over snow An-
Tundra lakes as a source of fresh water. Kipnuk, Alaska	Micrometeorological investigations near the tundra surface. Kelley, J.J., [1973, p.109-126] MP 1006	dreas, E L., (1986, p.248-260) MP 2212 Atmospheric stability from scintillation measurements. An-
Bredthauer, S.R., et al, [1979, 16p] SR 79-30 Recovery of the Kokolik River tundra area, Alaska. Hall,	Soil properties of the International Tundra Biome sites. Brown, J., et al. (1974, p 27-48) MP 1043	dreas, E.L., (1988, p.2241-2246) MP 2386 On the micrometeorology of surface hoar growth on snow in
D.K, et al, 11979, 15p., MP 1638 Geobotanical atlas of the Prudhoe Bay region, Alaska.	Ecological investigations of the tundra biome in the Prudhoe	mountainous area Colbeck, S.C., [1988, p.1-12] MP 2359
Walker, D.A, et al, [1980, 69p] CR 80-14	Bay Region, Alaska. Brown, J, ed, [1975, 215p] MP 1053	Three-wavelength scintillation measurement of turbulent heat
Arctic ecosystem the coastal tundra at Barrow, Alaska Brown, J., ed, [1980, 571p] MP 1355	Selected climatic and soil thermal characteristics of the Prudhoe Bay region. Brown, J, et al. [1975, p.3-12]	fluxes Andreas, E.L., (1990, p.74-77) MP 2696 Turbulent boundary layer
Coastal tundra at Barrow. Brown, J., et al, [1980, p.1-29] MP 1356	MP 1054 Thermal properties and regime of wet tundra soils at Barrow,	Bulk transfer coefficients for heat and momentum over leads and polynyas. Andreas, E.L., et al., (1986, p.1875-1883)
Remote sensing of revegetation of burned tundra, Kokolik River, Alaska Hall, D.K. et al. (1980, p 263-272)	Alaska. McGaw, R., et al., [1978, p.47-53] MP 1096	MP 2187
MP 1391	Geoecological mapping scheme for Alaskan coastal tundra.	Spectral measurements in a disturbed boundary layer over snow Andreas, E.L., [1987, p 1912-1939] MP 2254
Road dust along the Haul Road, Alaska. Everett, KR, 1980, p 101-128; MP 1352	Everett, K.R., et al., [1978, p. 359-365] MP 1098 Fate of crude and refined oils in North Slope soils Sexstone,	Estimating averaging times for measurements of turbulence spectra Andreas, E.L., (1988, p 295-304) MP 2434
Effects of a tundra fire on soil and vegetation. Racine, C, (1980, 21p.) R80-37	A, et al, [1978, p 339-347] MP 1186	Turbulent exchange Carbon dioxide exchange in tundra vegetation Coyne, P.I.,
Summer air temperature and precipitation in northern Alaska	Tundra terrain Morphology of the North Slope Walker, H J., 1973, p 49-	et al. [1972, p.36-39] MP 1375
Tundra and analogous soils Everett, KR, et al. [1981,	52) MP 1004 Vehicle damage to tundra soil and vegetation Walker, D.A.	Turbulent heat flux from Arctic leads Andreas, E.L., et al. (1979, p 57-91) MP 1340
p 139-179; MP 1405 Analysis of processes of primary production in tundra growth	ct al, [1977, 49p.) SR 77-17 Tundra vegetation	Estimation of heat and mass fluxes over Arctic leads. Andreas, E.L., (1980, p 2057-2063) MP 1410
forms Tieszen, L.L., et al., [1981, p 285-356] MP 1433	Word model of the Barrow ecosystem. Brown, J., et al,	Condensate profiles over Arctic leads Andreas, E.L., et al., [1981, p 437-460] MP 1479
Point Barrow, Alaska, USA Brown, J., (1981, p.775-776) MP 1434	(1970, p 41-43) MP 943 Synthesis and modeling of the Barrow, Alaska, ecosystem	Turbulent flow
Stabilizing fire breaks in tundra vegetation. Patterson, W A .	Coulombe, H.N., et al, [1970, p 44-49] MP 944 Environmental setting, Barrow, Alaska Brown, J. [1970,	Formation of ice ripples on the underside of river ice covers Ashton, G.D., [1971, 157p] MP 1243
III, et al. (1981, p 188-189) MP 1804 Ecological impact of vehicle traffic on tundra Abele, G.	p 50-64 ₁ MP 945	Baseline data on the oceanography of Cook Inlet, Alaska Gatto, L. W., [1976, 84p.] CR 76-25
(1981, p 11-37) MP 1463 Tundra soils on the Arctic Slope of Alaska Everett, KR.	Carbon dioxide dynamics on the Arctic tundra ct al. (1971, p.48-52) Coyne. PI, MP 903	Frazil ice formation in turbulent flow Müller, A. et al. 1978, p 219-2341 MP 1138
ct al, [1982, p 264-280] MP 1552	Seasonal variations in plant nutrition in tundra soils McCown, BH, et al. (1971, p 55-57) MP 904	Turbulent heat transfer from a river to its ice cover Haynes,
Modifications of permafrost, East Oumalik, Alaska Law- son, D E, (1982, 33p) CR 82-36	Ecological effects of oil spills and seepages in cold-dominated	F.D., et al. (1979, 5p.) CR 79-13 Freezing in a pipe with turbulent flow Albert, M.R., et al.
Environmental mapping of the Arctic National Wildlife Ref- uge, Alaska Walker, D. A. et al. (1982, 59p. + 2 maps)	environments McCown, B H, et al. (1971, p.61-65) MP 905	(1983, p. 102-112) MP 1893 Spectra and cospectra of atmospheric turbulence over snow
CR 82-37 Recovery and active layer changes following a tundra fire in	Proceedings 1972 Tundra Biome symposium [1972, 211p] MP 1374	Andreas, E.L., (1986, p. 219-233) MP 2661 Evolution of frazil ice in rive, and streams, research and
northwestern Alaska Johnson, L, et al, [1983, p 543- 547] MP 1660	Carbon dioxide exchange in tundra vegetation Coyne, P1, et al, t1972, p.36-391 MP 1375	control Daly, S.F., [1987, p.11-16] MP 2303
Vegetation in two adjacent tundra habitats, northern Alaska.	Vegetative research in arctic Alaska. Johnson, P.L., et al.	Estimating turbulent surface heat fluxes over polar, marine surfaces Andreas, E.L., [1988, p. 65-68] MP 2448
Roach, D.A., (1933, p 359-364) MP 2064 U.S. tundra biome publication list. Brown, J. et al. (1983,	(1973, p.169-198) MP 1008 Tundra environment at Barrow, Alaska. Bunnell, F.L., et al.	U.S. Army CRREL Role of research in developing surface protection measures
29p ₁ SR 83-29 Sensitivity of vegetation and soil flora to seawater spills, Alas-	(1975, p 73-124) MP 1050 Ecological investigations of the tundra biome in the Prudhoe	for the Arctic Slope of Alaska Johnson, P.R., 1978, p 202-2051 MP 1068
ka Simmons, C.L., et al. [1983, 35p] CR 83-24	Bay Region, Alaska Brown, J. ed. (1975, 215p.) MP 1053	Cold Regions Research and Engineering Laboratory Frei-
Potential responses of permafrost to climatic warming Goodwin, C.W., et al. (1984, p. 92-105) MP 1710	Effects of hovercraft, wheeled and tracked vehicle traffic on	tag, DR, (1978, p 4-6) MP 1251 Corps of engineers seek ice solutions Frankenstein, GE.
Long-term effects of off-road vehicle traffic on tundra terrain Abele, G., et al., [1984, p.283-294] MP 1820	tundra Abele, G., [1976, p.186-215] MP 1123 Influence of grazing on Arctic tundra ecosystems Batzli,	(1987, p 5-7) MP 2219 Ultrasonic tests
Vegetation recovery in the Cape Thompson region, Alaska Everett, K.R., et al. (1985, 75p.) CR 85-11	G O., et al. [1976, p 153-160] MP 970 Energy balance and runoff from abarctic snowpack	Acoustic emissions in the investigation of avalanches St Lawrence, W.F., [1977, p VII/24-VII/33] MP 1630
Vegetation and environmental gradients of the Prudhoe Bay	Price, A G, et al. (1976, 29r CR 76-27	Ultrasonic measurements on deep ice cores from Antarctica
region, Alaska Walker, D.A., (1985, 239p) CR 85-14	Vehicle damage to tundra soil an cation Walker, D.A., et al. (1977, 49p) SR 77-17	Glow, A.J., et al. (1978, p.48-50) MP 1202 Ultravonic investigation on ice cores from Antarctica
Vegetation of Beechey Point, Alaska Walker, D.A., et al. (1987, 63p.) Walker, D.A., et al.	Effects of low ground vehicle traffic on tundra at et al. (1977, 32p)	Kohnen, H., et al. [1979, 16p] CR 79-10 Ultrasonic investigation on ice cores from Antarctica.
Disturbance and recovery of arctic Alaskan tundra terrain Walker, D.A., et al. [1987, 63p] CR 87-11	SR 77-31 1977 tundra fire in the Kokolik River area of Alaska Hall,	Kohnen, H., et al. (1979, p. 4865-4874) MP 1239 Ultrasonic tests of Byrd Station ice cores Gow, A.J., et al.
Vegetation recovery after tundra fires in northwestern Alaska	D K., et al. (1978, p 54-58) MP 1125	(1979, p 147-153) MP 1282
Racine, C., et al. (1987, p.461-469) MP 2374 D.C. resistivity along the coast at Prudhoe Bay, Alaska Sell-	Chemical composition of haul road dust and vegetation Is- kandar, I K., et al. (1978, p.110-111) MP 1116	Acoustic emission response of snow St Lawrence, W.F., (1980, p. 209-216) St Lawrence, W.F., MP 1366
mann, P.V., et al. (1988, p. 988-993) MP 2366 Effects of all terrain vehicles on tundra Racine, C., et al.	Thermal properties and regime of wet tundra soils at Barrow, Alaska McGaw, R., et al., [1978, p.47-53]	Ultraviolet radiation Observations of the ultraviolet spectral reflectance of snow
[1988, 12p] SR 88-17	MP 1096	O'Brien, H.W. (1977, 19p) CR 77-27

Underground facilities Experimental scaling study of an annular flow ice-water heat	Investigation of transient processes in an advancing zone of	Large mobile drilling rigs used along the Alaska pipeline
sink. Stubstad, J.M., et al, [1977, 54p.] CR 77-15	freezing. McGaw, R, et al, (1983, p.821-825) MP 1663	Sellmann, P.V., et al, (1978, 23p) SR 78-04 Specialized pipeline equipment. Hanamoto, B., (1978,
Design procedures for underground heat sink systems Stub- stad, J.M., et al. [1979, 1869 in var. pagns]	Soil-water diffusivity of unsaturated frozen soils at subzero temperatures Nakano, Y., et al, [1983, p 889-893]	30p) SR 78.65
SR 79-08 Comparative field testing of buried utility locators Bigl,	MP 1664 Water migration due to a temperature gradient in frozen soil	Environmental atlas of Alaska. Hartman, C.W., et al, (1978, 95p.) MP 1204
5.K., et al, [1984, 25p.] Mp 1977	Olipnant, J.L., et al. (1983, p.951-956) MP 1666	Geoecological mapping scheme for Alaskan coastal tundra. Everett, K R, et al, [1978, p 359-365] MP 1098
Detection of buried utilities Bigl, S.R., et al, [1984, 36p.] CR 84-31	Frozen soil-water diffusivity under isothermal conditions. Nakano, Y., et al., [1983, 8p] CR 83-22	Notes and quotes from snow and ice observers in Alaska.
Prevention of freezing of wastewater treatment facilities. Reed, SC, et al. (1985, 49p) SR 85-11	Modeling the resilient behavior of frozen soils using unfrozen water content. Cole, D.M. [1984, p.823-834]	Environment of the Alaskan Haul Road. Brown, J., (1980,
Locating buried utilities Bigl, S.R., (1985, 48p.) SR 85-14	Aquatic plant growth in relation to temperature and unfragen	p 3-52; MP 1350 Movement study of the trans-Alaska pipeline at selected sites.
Detecting underground objects/utilities Hironaka, M.C., et	water content. Palazzo, A.J., et al., [1984, 8p.]	Ueda, H.T., et al., [1981, 32p] CR 81-04 Climate of remote areas in north-central Alaska. 1975-1979
Underground pipelines MP 2281	Effects of salt on unfrozen water content in silt. Lanzhou.	summary. Haugen, R.K., [1982, 110p] CR 82-35
Phase change around insulated buried pipes quasi-steady method. Lunardini, V.J., (1981, p 201-207)	China Tice, A R., et al. [1984, 18p.] CR 84-16 Effects of magnetic particles on the unfrozen water content in	Guidebook to permafrost and its features, northern Alaska. Brown, J, ed, (1983, 230p) MP 1640
MP 1496	soils Tice, A.R., et al., [1984, p 63-73] MP 1790 Phase equilibrium in frost heave of fine-grained soil Naka-	Long-term active layer effects of crude oil spilled in interior Alaska Collins, C M., (1983, p.175-179, MP 1656
Transient analysis of heat transmission systems. Phette- place, G., (1981, 53p) CR 81-24	no, Y., et al. [1985, p.50-68] MP 1896	Relationships between estimated mean annual air and perma-
Heat losses from the central heat distribution system at Fort Wainwright. Phetteplace, G, t1982, p.308-3281	Effects of soluble salts on the unfrozen water content in silt Tice, A.R., et al. (1985, p. 99-109) MP 1933	frost temperatures in North-Central Alaska. Haugen, R.K., et al, (1983, p. 462-467) MP 1658
MP 2310	Model for dielectric constants of frozen soils Oliphant, J.L., (1985, p.46-57) MP 1926	Science program for an imaging radar receiving station in Alaska. Weller, G, et al. (1983, 45p) MP 1884
Approximate phase change solutions for insulated buried cyl- inders. Lunardini, V.J., [1983, p.25-32] MP 1593	Frozen ground physics Fish, A M, [1985, p 29-36]	Growth and flowering of tussocks in northcentral Alaska.
Computer models for two-dimensional steady-state heat conduction. Albert, M.R., et al. [1983, 90p] CR 83-10	Unfrozen water content in frozen ground Xu, X., et al,	Revegetation along pipeline rights-of-way in Alaska John-
Miligative and remedial measures for chilled ninelines in dis-	[1985, p 83-87] MP 1929 Soil-water potential and unfrozen water content and tempera-	son, L., (1984, p.254-264) MP 2113 Vegetation and environmental gradients of the Prudhoe Bay
continuous permafrost. Sayles, F.H. (1984, p 61-62) MP 1974	ture Xu, X., et al. (1985, p.1-14) MP 1932 Liquid water mass fraction of snow measured by alcohol solu-	region, Alaska Walker, D.A., [1985, 239p] CR 85-14
Radar investigations above the trans-Alaska pipeline near Fairbanks Arcone, S.A., et al, (1984, 15p)	tion risk, D.J., (1986, p.538-541) MP 2245	Glaciers and sediment. Bezinge, A, et al. [1986, p 53-69]
CR 84-27	Transport of water in frozen soil 6 Nakano, Y, et al. (1987, p 44-50) MP 2213	MP 2154 lce problems associated with rivers and reservoirs. Benson,
Simplified design procedures for heat transmission system piping Phetteplace, G., (1985, p.451-456) MP 1979	Alcohol calorimetry for measuring the liquid water fraction of snow Fisk, D.J., [1987, p.163-166] MP 2261	C, et al. [1986, p.70-98] MP 2155 Permafrost. Benson, C., et al. [1986, p.99-106]
Methods of build g on permanent snowfields Mellor, M.,	Intercomparison of snow cover liquid water measurement	MP 2156
(1968, 43p) M III-A2a	techniques Boyne, H.S., et al. [1987, p.167-172] MP 2262	Engineering surveys along the Trans-Alaska Pipeline. God- frey, R N., et al, (1986, 85p) SR 86-28
Investigation and exploitation of snowfield sites Mellor, M., (1969, 57p) MIII-A2b	Factors affecting water migration in frozen soils Xu, X., et al. [1987, 16p] Xu, X., et	Alaska synthetic aperture radar (SAR) facility project. Car- sey, F., et al. (1987, p.593-596) MP 2408
Underwater acoustics Acoustic waves incident on a conventor/or an acoustic	Comparison of snow cover liquid water measurement techniques. Boyne, H.S., et al. (1987, p.1833-1836)	Disturbance and recovery of arctic Alaskan tundra terrain.
Acoustic waves incident on a seawater/sea ice interface. Jezek, K.C., [1985, 10p] SR 85-10	MP 2283	Walker, D.A., et al, [1987, 63p] CR 87-11 Natural ground temperatures in upland bedrock terrain, in-
Ice strength estimates from submarine topsounder data DiMarco R, et al. [1989, p 425-426] MP 2691	Soil freezing and unfrozen water content Lunardini, V J. (1988, 23p.) CR 88-02	terior Alaska. Collins, C.M., et al., [1988, p.56-60] MP 2360
Underwater ice	Measurement of the unfrozen water content of soils a com- parison of NMR and TDR methods Smith, M.W. et al.	Investigations of dielectric properties of some frozen materi-
Field investigations of a hanging ice dam. Beltaos, S., et al. [1982, p.475-488] MP 1533	(1988, p 473-477) MP 2363 Effect of variable thermal properties on freezing with an un-	Use of off-road vehicles and mitigation of effects in Alaska
Eruptions from under-ice explosions Mellor, M., et al. 1988, 26p. SR 88-14	frozen water content. Lunardini, V.J., [1988, p.1127-	permafrost environments a review. Slaughter, C.W., et al, [1990, p 63-72] MP 2682
Development of an underwater frazil-ice detector Daly.	Unfrozen water content of soils Smith, M.W. et al. 1988.	Jökulhlaup involving a potholed glacier in AK Sturm, M., et al. [1990, p 125-126] MP 2708
Unfrozen water content	Unfrozen water content of undisturbed frozen silt. Tice,	-Alaska-Anchorage
Ionic migration and weathering in frozen Antarctic soils Ugolini, F.C., et al., (1973, p 461-470) MP 941	A.R., et al. (1988, 17p) CR 88-19 Unfrozen water contents of six antarctic soil materials And-	Alaska Good Friday carthquake of 1964. Swinzow, G.K., (1982, 26p.) CR 82-01
Depth of water-filled crevasses that are closely spaced. Rob-	crson, D.M., et al. (1989, p.353-366) MP 2470	—Alaska—Arctic National Wildlife Refuge Environmental mapping of the Arctic National Wildlife Ref-
in, G. de Q, et al. (1974, p 543-544) MP 1038 Electrical resistivity profile of permafrost Hockstra, P.,	Soil freezing and soil water in sandy loam Black, P.B., et al. (1989, p 2205-2210) MP 2577	uge, Alaska Walker, D.A., et al., (1982, 59p. + 2 maps)
[1974, p 28-34] MP 1045 Prediction of unfrozen water contents in frozen soils from	Unfrozen water contents of undervised - 1 - 11 1 4	—Alaska—Atkasook
inquid determinations Tice, A.R., et al. (1976, 9p)	MP 2683	Surface temperature data for Atkasook, Alaska summer 1975 Haugen, R.K., et al., [1976, 25p.] SR 76-01
Applications of thermal analysis to cold regions Sterrett,	Hydraulic conductivity and unfrozen water content of frozer silt. Black, P.B. et al. (1990, p.323-329) MP 2551	-Alaska-Barrow
K F., [1976, p 167-181] MP 890 Calculating unfrozen water content of frozen soils McGaw.	Predicting unfrozen water content behavior of a soil Black. P.B., et al. (1990, p 54-60) MP 2677	Word model of the Barrow ecosystem. Brown, J., et al. (1970, p.41-43) MP 943
K, ct al, (1976, p 114-122) Mp 800	Transport of water due to a temperature gradient in unsaturated frozen clay Nakano, Y. et al. (1990, p 57-75)	Synthesis and modeling of the Barrow, Alaska, ecosystem. Coulombe, H N., et al. [1970, p 44-49] MP 944
Determination of unfrozen water in frozen soil by pulsed nuclear magnetic resonance Tice. A R. et al. [1978,	MP 2701	Environmental setting, Barrow, Alaska Brown, J. (1970,
NMR phase composition measurements on most soils	Unfrozen water content and hydraulic conductivity of frozen soil Black, PB, [1990, 7p] CR 90-05	p 50-64; MP 945 Bibliography of the Barrow, Alaska, IBP ecosystem model.
Tice, A.R., et al. [1978, p.11-14] MP 1210 Low temperature phase changes in moist, briny clays. And	United Kingdom Utility distribution systems in Sweden, Finland, Norway and	Brown, J., [1970, p.65-71] MP 946 Tundra environment at Barrow, Alaska Bunnell, F.L., et al.
erson, D.M., et al. (1980, p.139-144) MP 1330	Fingland. Aamot, H.W.C. et al. (1976, 121p) SR 76-16	(1975, p /3-124) MP 1050
Frost heave in an instrumented soil column. Berg. R.L. et al, (1980, p.211-221) MP 1331	United States	Snowdrift control at ILS facilities in Alaska (1976, 41p.) Calkins, D.J., MP 914
Unfrozen water contents of submarine permafrost determined by nuclear magnetic resonance Tice, A.R., et al. (1980,	Snow and ice prevention in the United States Minsk, I. D., (1986, p. 37-42) MP 1874	Arctic ecosystem the coastal tundra at Barrow, Alaska, Brown, J., ed. (1980, 571p) MP 1355
p 400-412) MP 1412	Snowfall amounts and snow depths in Germany and NE USA.	Point Barrow, Alaska, USA Brown, J., (1981, p 775-776)
Some approaches to modeling phase change in freezing soils Hromadka, T.V., II, et al. (1981, p. 137-145)	US Federal arctic research. Devine, J.S. et al. (1989,	—Alaska—Beechey Point MP 1434
MP 1437 Relationship between the ice and unfrozen water phases in	p 65-74) MP 2671 —Alaska	Vegetation of Beechey Point, Alaska Walker, D.A., et al. (1987, 63p.) CR 87-05
1102cn 5011. Tice. A R., et al. (1982, 8p.) CR 82-15	Aluska Brown, J., (1970, p.9) MP 880	-Alaska-Caribou Creek
Snow calorimetric measurement at SNOW-ONE Fisk, D. (1982, p 133-138) MP 1986	Summary of the 1971 US Tundra Biome Program Brown.	Hydrology and climatology of a drainage basin near Fatr- banks, Alaska Haugen, R.K., et al. (1982, 34p)
Comparison of unfrozen water contents measured by DSC and NMR Oliphant, J.L., et al. [1982, p.115-121]	J. (1972, p.306-313) Radiation and evaporation heat loss during ice fog conditions	—Alaska—Central Alaskan Uplands
MP 1594	McFadden T. (1975, p. 18-27) MP 1051 Land treatment of wastewater at a subarctic Alaskan location	Climatic and dendroclimatic indices in the discontinuous per-
Liquid sampler Rand, J.H., [1982, 4 col.] MP 2334 Relationship between ice and unfrozen water in frozen soils	Stetten, R.S., et al. (1976, 21p.) MP 868	R K . ct al. [1978, p 392-398] MP 1099
Tice, A.R., et al. (1983, p.37-46) MP 1632 Free water meas irements of a snowpack. Fisk, DJ, (1983,	tion. Garfield. D.E., et al. (1977, 20p) SR 77-04	-Alaska-Chena River Debris of the Chena River McFadden, T. et al. (1976,
p 1/3-1/0) MP 1758	Land treatment of wastewater in subarctic Alaska Sletten, R.S., et al. (1977, p.533-547) MP 1268	14P1 CR 76-26
Effect of loading on the unfrozen water content of silt. Oli- phant, J.L., et al. (1983, 17p.) SR 83-18	Mid-winter installation of protected membrane roofs in Alas-	Ice breakup on the Chena River 1975 and 1976 McFadden, T, et al. [1977, 44p] CR 77-14
Ice-cored mounds at Sukakpak Mountain, Brooks Range	Maintaining buildings in the Arctic Tobiasson W . et al.	-Alaska-Cook Inlet Baseline data on tidal flushing in Cook Inlet, Alaska, Gatto,
MP 1653	(1977, p 244-251) MP 1508	LW. (1973, Hp) MP 1523

Circulation and sediment distribution in Cook Inlet, Alaska. Gatto, L.W., [1976, p.205-227] MP 895 -Alaska—Deadhorse	Dynamics of near-shore ice. Weeks, W.F., et al. (1976, p.9-34) MP 1380 Vehicle damage to tundra soil and vegetation. Walker, D.A.,	IowaSaylorville River Geographic information system for river basin. et al., [1987, p 265-269] MP 254
Snowdrift control at ILS facilities in Alaska. Calkins, D.J., 1976, 41p., MP 914 INITED STATES	et al, (1977, 49p.) SR 77-17 Movement of coastal sea ice near Prudhoe Bay. Weeks, W.F., et al, (1977, p.533-546) MP 1066	Maine Bedrock geology survey in northern Maine. Sellmann, P.V et al, [1976, 19p.] CR 76-3
-ALASKA-DONNELLY DOME Patterned ground in Alaska. Péwé, T.L., et al., [1969, 87p]	Study of a grounded floeberg near Reindeer Island, Alaska, Kovacs, A, (1977, 9p) MP 1751	-Maine-Allagash Investigation of an airborne resistivity survey conducted a
inited States -Alaska—Eielson AFB	Permafrost and active layer on a northern Alaskan road. Berg, R.L., et al, [1978, p.615-621] MP 1102 Determining subsea permafrost characteristics with a cone	very low frequency. Arcone, S.A., [1977, 48p.] CR 77-2 Snow cover and meteorology at Allagash, Maine, 1977-198
Thermal pollution studies of French Creek, Etelson AFB, Alaska. McFadden, T., [1976, 5p.] CR 76-14	penetrometer—Prudhoe Bay, Alaska. Blouin, S.E., et al. (1979, p.3-16) MP 1217	Bates, R., [1983, 49p] SR 83-2Maine-Portland
Alaska—Fairbanks Biological restoration strategies in relation to nutrients at a subarctic site in Fairbanks, Alaska Johnson, L.A., 1978,	Geobotanical atlas of the Prudhoe Bay region, Alaska, Walker, D.A, et al., [1980, 69p] CR 80-14 Structure of first-year pressure ridge sails in the Prudhoe Bay region. Tucker, W B., et al., [1984, p 115-135]	Description of the building materials data base for Portlan Maine. Merry, C.J., et al, [1986, 83p] SR 86-1—Maine—St. John River
p.460-466; MP 1100 Chena River Lakes Project revegetation study—three-year summary. Johnson, L A., et al., [1981, 59p] CR 81-18	MP 1837 Airborne electromagnetic sounding of sea ice thickness and sub-ice bathymetry Kovacs, A., et al., [1987, p 289-311]	Use of Landsat data for predicting snowmelt runoff in t upper Saint John River basin. Merry, C.J., et al, 1983 p 519-533, MP 16
Heat loss from the central heat distribution system, Fort Wainwright. Phetteplace, G, [1982, 20p] MP 1980	MP 2332 D.C. resistivity along the coast at Prudhoe Bay, Alaska Sell-	-Massachusetts-Boston Applications of remote sensing in the Boston Urban Studi Program, Parts I and II Merry, C.J., et al., [1977, 36p.]
Radar investigations above the trans-Alaska pipeline near Fairbanks. Arcone, S.A., et al. (1984, 15p.) CR 84-27	mann, PV, et al. [1988, p.988-993] MP 2366 —Alaska—Redoubt Mountain Recent glacier-volcano interactions on Mt. Redoubt, Alaska	-Michigan-Saginaw River
Preparation of geophysical borehole site with ground ice, Fairbanks, AK. Delaney, A.J., [1987, 15p] SR 87-07	Sturm, M., et al., [1988, 18p.] MP 2431 —Alaska—Strandline Lake	Hydrologic modeling from Landsat land cover dat McKim, H L., ct al, [1984, 19p] SR 84-6 MinnesotaLac qui Parle
Frost heave forces on H and pipe foundation piles Buska, IS, et al, [1988, p.1039-1044] MP 2367	Jökulhlaups from ice-dammed Strandline Lake, Alaska, Sturm, M, et al, (1987, p 79-94) MP 2307 Jökulhlaups from Strandline Lake, Alaska (especially the	Wildlife habitat mapping in Lac qui Parle, Minnesota. Me ry, CJ. et al. (1984, p.205-208) MP 208 —Monongahela River
Water and suspended solids discharge during snowmelt Chacho, E.F., Jr., [1990, p.167-173] MP 2706 Alaska—Fort Wainwright	1982 event) Sturm, M, et al, (1989, 19p) MP 2520 —Alaska—Sukakpak Mountain	Ice atlas, 1984-1985: Ohio River, Allegheny River, Monoi gahela River. Gatto, L.W., et al, [1986, 185p] SR 86-2
Thermal infrared survey of winter trails at Fort Wainwright Collins, C.M., et al, (1990, 16p) SR 90-17 Alaska—Harríson Bay	lce-cored mounds at Sukakpak Mountain, Brooks Range Brown, J., et al. (1983, p.91-96) MP 1653	Ice conditions along the Allegheny and Monongahela River Gatto, L.W., [1988, 106p] SR 88-6
Subsea permafrost in Harrison Bay, Alaska Neave, K.G., et al, (1982, 62p.) CR 82-24	-Alaska-Susitna River Mapping of the LANDSAT imagery of the Upper Susitna River Gatto, LW, et al. (1980, 41p) CR 80-04	lce observations on the Allegheny and Monongahela river Bilello, M A., et al. (1988, 43p.) SR 88-2 —Montana—Koocanusa, Lake
Alaska—Kachemak Bay Ice distribution and winter surface circulation, Kachemak Bay, Alaska. Gatto, L.W., [1981, p.995-1001]	Winter surveys of the upper Susitna River, Alaska Bilello, M.A., (1980, 30p) SR 80-19 —Alaska—Taku Glacier	Limnology of Lake Koocanusa, MT, the 1967-1972 stud Bonde, T.J H., et al, [1982, 184p] SR 82-: Limnology of Lake Koocanusa, Montana. Storm, P.C., et al.
MP 1442 Ice distribution and winter ocean circulation, Kachemak Bay, Alaska. Gatto, L. W., (1981, 43p.) CR 81-22	Geobotanical studies on the Taku Glacier anomaly. Heusser, C J., et al. [1954, p 224-239] MP 1215	(1982, 597p] SR 82-7 Montana
ce growth and circulation in Kachemak Bay, Alaska Daly, S.F., [1982, p. (C)]-(C)9, MP 1501 ce distribution and water circulation, Kachemak Bay, Alaska	-Alaska-Tanana River Tanana River monitoring and research studies near Fairbanks, Alaska. Neill, C.R., et al., [1984, 98p. + 5 ap-	Environmental analyses in the Kootenai River region, Motana McKim, H L., et al, (1976, 53p) SR 76MontanaMissouri River
Gatto, L.W., (1982, p.421-435) MP 1569 Alaska—Kenai Mountains	pends 3 SR 84-37 Chena Flood Control Project and the Tanana River near Fairbanks, Alaska. Buska, J.S., et al, (1984, 11p. + figs)	Effect of Toston dam on upstream ice conditions. Ashto G D., (1989, 9p.) SR 89-1 -Nebraska-Platte River
Periglacial landforms and processes, Kenai Mts, Alaska Bailey, P.K., [1985, 60p.] SR 85-03 Alaska—Kokolik River	MP 1745 Bank recession of the Tanana River, Alaska. Gatto, L.W., [1984, 59p] MP 1746	Ice cover effect on river flow. Ashton, G.D., [1990, 24p.] SR 90-1
Recovery of the Kokolik River tundra area, Alaska Hall, D.K., et al, [1979, 15p] MP 1638 Alaska—Livengood	Bank recession and channel changes of the Tanana River, Alaska Gatto, L.W., et al. [1984, 98p] MP 1747	-New England Applications of remote sensing in New England H L., et al, [1975, 8p + 14 figs. and tables] MP 9
Construction and performance of the Hess creek earth fill dam, Livengood, Alaska Simoni, O W, [1973, p 23-34] MP 859	Erosion analysis of the Tanana River, Alaska. Collins, C.M., [1984, 8p + figs] MP 1748 Bank erosion, vegetation and permafrost, Tanana River near	-New Hampshire Comparison of winter climatic data for three New Hampshi sites. Govoni, J.W., et al, (1986, 78p) SR 86-
Alaska-Matanuska Glacier Subaerial sediment flow of the Matanuska Glacier, Alaska	Fairbanks Gatto, L.W., [1984, 53p] SR 84-21 Sub-ice channels and frazil bars, Tanana River, Alaska. Lawson, D.E., et al, [1986, p 465-474] MP 2129	Seasonal distribution of low flow events in New Hampshi streams with emphasis on the winter period Melloh, R.A.
Lawson, D. E., (1982, p.279-300) MP 1806 Alaska—Mukluk Island Mukluk ice stress measurement program Cox, G.F.N.	Frazil ice pebbles, Tanana River, Alaska Chacho, E.F., et al. [1986, p. 475-483] MP 2130	-New Hampshire-Hanover Climate at CRREL, Hanover, New Hampshire. Bates, R.I.
(1988, p.11-15) MP 2618 Alaska—North Slope	Morphology, hydraulics and sediment transport of an ice- covered river. Lawson, D E, et al. (1986, 37p) CR 86-11	(1984, 78p.) SR 84-2 Chemical properties of snow in the northeastern Unite States Kumai, M., [1987, p (C1)625-(C1)630;
Radar imagery of ice covered North Slope lakes Weeks, W.F., et al, (1977, p.129-136) MP 923 Role of research in developing surface protection measures	Alaska Yukon River Break-up dates for the Yukon River, Pt. 1. Rampart to White-horse, 1896-1978 Stephens, CA, et al. (1979, c50)	MP 22: -New Hampshire—Lebanon Response of runway pavement to freeze thaw cycles Alle
for the Arctic Slope of Alaska Johnson, P.R., [1978, p 202-205] MP 1068 Surface protection measures for the Arctic Slope, Alaska	leaves; MP 1317 Break-up dates for the Yukon River, Pt.2. Alakanuk to Tanana, 1883-1978 Stephens, C A, et al, §1979, c50 leaves;	W.L., et al. (1989, 31p.) SR 89-1 -New Hampshire-Mount Washington
Johnson, P.R., [1978, p.202-205] MP 1519 Ground pressures exerted by underground explosions Johnson, P.R., [1978, p.284-290] MP 1520	MP 1318 Break-up of the Yukon River at the Haul Road Bridge 1979.	Atmospheric icing rates with elevation on northern New En land mountains, U.S.A. Ryerson, C.C., [1990, p.90-97] MP 25:
Summer air temperature and precipitation in northern Alaska Haugen, R.K., et al., [1980, p.403-412] MP 1439	Stephens, C.A., et al. [1979, 22p + Figs.] MP 1315 —Allegheny River Ice conditions along the Allegheny and Monongahela Rivers	-New Hampshire-Post Pond Ice growth on Post Pond, 1973-1982 Gow, AJ, et a (1983, 25p) CR 83-4
lee-covered North Slope lakes observed by radar Weeks, WF, et al. [1981, 17p.] CR 81-19 Tundra soils on the Arctic Slope of Alaska Everett, KR.	Gatto, L.W., (1988, 106p) SR 88-06 fee observations on the Affegheny and Monongahela rivers Bilello, M.A., et al., (1988, 43p) SR 88-25	-New York-Hudson River Controlled river ice cover breakup; part 1 Hudson River fie
et al. (1982, p 264-280) MP 1552 River-ice mounds on Alaska's North Slope Arcone, S.A., et al., (1989, p 288-290) MP 2563	-California-Manteca Land treatment of wastewater Murrmann, R.P., et al.	experiments Ferrick, M.G., et al. (1986, p 281-291) MP 23 —Ohio—Erie, Lake
Investigation of the LIZ3 Dew Line Station water supply lake Kovacs, A., [1990, 10p] SR 90-11 Alaska—Norton Sound	(1976, 36p) MP 920 —Great Lakes Application of ice engineering and research to Great Lakes	Use of SPOT HRV data in a Corps dredging operation in La Eric. Merry, C.J. et al., [1987, p.49-58] MP 25: —Ohlo River
Sea ice rubble formations off the NE Bering Sea and Norton Sound. Kovaes, A., [1981, p.1348-1363] MP 1527	problems Freitag, D.R., (1972, p.131-138) MP 1615 —Idaho—Salmon River	Geographic features and floods of the Ohio River H.A. et al. (1984, p.265-281) MP 20
Alaska—Oumalik Modifications of permafrost, East Oumalik, Alaska Lawson, D E. 1982, 33p.) CR 82-36	Salmon River ice jams Cunningham, L.L. et al. (1984, p. 529-533) MP 1796 Potential solution to ice jam flooding: Salmon River, Idaho	lcc conditions on the Ohio and Illinois rivers, 1972-198 Gatto, L. W., [1985, p.856-861] MP 19 Icc atlas, 1984-1985 Ohio River, Allegheny River, Mono
-Alaska—Point Hope Case study fresh water supply for Point Hope Alaska McFadden, T, et al. [1979, p.1029-1040] MP 1222	Samon River ice jam control studies interim report Axelson, K. D., et al. (1986, p. 15-25) Samon River ice jam control studies interim report Axelson, K.D., et al. (1990, 8p.) SR 90-06	gahela River. Gatto, L.W., et al., (1986, 185p.) SR 86-; Analysis of 112 years of ice conditions observed on the Oh
Alaska—Prudhoe Bay Ecological investigations of the tundra biome in the Prudhoe Bay Region, Alaska. Brown, J., ed., [1975, 215].	-Illinois River lee conditions on the Ohio and Illinois rivers, 1972-1985 Gatto, L.W., [1985, p.856-861] MP 1914	River at Cincinnati Daly, S.F., et al. (1987, p.70-79) MP 22(Ice conditions along the Ohio River, 1972-1985 Gatt I. W., (1988, 162p.) SR 88-
MP 1053	-Illinois Waterway	I, W., (1988, 162p) SR 88-4

-- Hillinois River
Ice conditions on the Ohio and Illinois rivers, 1972-1985
Gatto, L.W., (1985, p.856-861) MP 1914
-- Illinois Waterway
Ice conditions along Illinois Waterway, 1972-1985
Gatto,
I.W., (1989, 112p) CR 89-20

MP 2260
Ice conditions along the Ohio River, 1972-1985 Gatto,
I, W., [1988, 162p] SR 88-01

Oregon—Hood, Mount
Source mechanism of volcanic tremor [1982, p 8675-8683] Ferrick, M.G., et al,
M.P. 1576

Selected climatic and soil thermal characteristics of the Prudhoe Bay region Brown, J., et al., [1975, p. 3-12] MP 1054

United States (cont.) —Pennsylvania—Allegheny River	UTILITIES Sewerage and sewage disposal in cold regions Alter, A J.	Geobotanical atlas of the Prudhoe Bay region, Alaska Walker, D.A., et al. (1980, 69p) CR 80-14
Performance of the Allegheny River ice control structure,	(1969, 106p) M III-C5b	Coastal tundra at Barrow Brown, J., et al, [1980, p 1-29] MP 1356
1983. Deck, D.S. et al., [1984, 15p] SR 84-13 Ice atlas, 1984-1985. Ohio River, Allegheny River, Monon-	Utilities on permanent snowfields Mellor, M., [1969, 42p] M III-A2d	Environment of the Alaskan Haul Road. Brown, J., (1980,
gahela River. Gatto, L.W., et al. (1986, 185p)	Utilities	p 3-52 ₃ MP 1350 Road dust along the Haul Road, Alaska. Everett, K.R.,
SR 86-23 —Pennsylvania—Pittsburgh	Utility distribution systems in Iceland Aamot, HW.C., 1976, 63p. SR 76-05	[1980, p 101-128] MP 1352
Construction materials data base for Pittsburgh, PA Merry,	Utility distribution systems in Sweden, Finland. Norway and England Aamot, H W C, et al. [1976, 121p]	Crude oil spills on subarctic permafrost in interior Alaska. Johnson, L A, et al, [1980, 67p] CR 80-29
C.J., et al, [1986, 87p] SR 86-08 —Saint Clair River	SR 76-16	Tundra and analogous soils Everett, KR, et al. (1981,
Port Huron ice control model studies Calkins, D.J. et al,	Utility distribution practices in northern Europe. Mcl'adden, T, et al. (1977, p.70-95) MP 928	p 139-179; MP 1405 Point Barrow, Alaska, USA. Brown, J., (1981, p 775-776)
(1982, p.361-373) MP 1530 —South Dakota—Oahe Dam	Field performance of a subarctic utilidor. Reed, S.C.	MP 1434
Ice formation downstream of Oahe Dam—1987-1988 winter Ashton, G.D., 1988, 37p 1 MP 2506	(1977, p 448-468) MP 930 Cold climate utilities delivery design manual Smith, D W,	Seasonal growth and accumulation of N, P, and K by grass irrigated with wastes Palazzo, A.J., [1981, p 64-68]
Ashton, G.D., [1988, 37p] MP 2506 —South Dakota—White River	et al. (1979, c300 leaves) MP 1373	MP 1425 Vegetation selection and management for overland flow sys-
Ice jams and the winter climate near White River, 5D Bilel- lo, M.A., (1987, p. 154-162) MP 2399	Heat losses from the central heat distribution system at Fort Wainwright Pheticplace, G., [1982, p. 308-328]	tems. Palazzo, A.J., et al, (1982, p 135-154) MP 1511
lo, M.A., (1987, p 154-162) MP 2399 —St. Marys River	MP 2310 Water supply and waste disposal on permanent snow fields	CO2 effect on permafrost terrain Brown, J, et al, [1982,
Force estimate and field measurements of the St. Marys River ice booms Perham. R E, (1977, 26p) CR 77-04	Reed, S.C., et al. (1984, p.401-413) MP 1714	30p j MP 1546 Vegetation in two adjacent tundra habitats, northern Alaska.
-Utah-Lake Powell	Utility services for remote military facilities Reed, S.C., et al., [1984, 66p] SR 84-14	Roach, DA. [1983, p.359-364] MP 2064
Water quality measurements at Lake Powell, Utah Merry, C.J., [1977, 38p] SR 77-28	Comparative field testing of buried utility locators Bigl. S R . et al. (1984, 25p) MP 1977	U.S. tundra biome publication list Brown, J, et al., £1983, 29p 1 SR 83-29
VermontConnecticut River	Detection of buried utilities Bigl. S.R., et al. (1984, 36p)	Sensitivity of vegetation and soil flora to seawater spills, Alas-
Study of dynamic ice breakup on the Connecticut River near Windsor, Vermont Ferrick, M.G., et al. [1987, p. 163-	CR 84-31 Locating buried utilities Bigl, SR, (1985, 48p)	ka. Simmons, C.L., et al., [1983, 35p] CR 83-24 Bank recession of the Tanana River, Alaska. Gatto, L.W.,
177 ₁ MP 2400	SR 85-14	(1984, 59p) MP 1746
-Vermont-Lake Champlain Winter thermal structure and ice conditions on Lake Cham-	Thermal analysis of a shallow utilidor Phetteplace. G. et al. [1986, 10p] MP 2021	Bank crosson, vegetation and permafrost, Tanana River near Fairbanks. Gatto, L.W., (1984, 53p.) SR 84-21
plain, Vermont Bates, R E, (1976, 22p) CR 76-13	Cold climate utilities manual Smith, D.W. ed. (1986,	Using Landsat data for snow cover/vegetation mapping Merry, C J., et al. (1984, p.II(140)-II(144)) MP 1975
	Buildings and utilities in very cold regions overview and re-	Wildlife habitat mapping in Lac qui Parle, Minnesota. Mer-
et al, [1982, 25p] SR 82-06	search needs Tobiasson, W, [1987, p 299-303] MP 2424	ry, C.J., et al. (1984, p. 205-208) MP 2085 Revegetation along pipeline rights-of-way in Alaska. John-
Ottauquechee River—analysis of freeze-up processes Calkins, D.J., et al. [1982, p.2-37] MP 1738	Arctic construction working group report Marvin, E L , et	son, L., (1984, p 254-264) MP 2113
Numerical simulation of freeze-up on the Ottauquechee Riv- er. Calkins, D.J., (1984, p. 247-277) MP 1815	31, (1987, p.311-314) MP 2426 Valleys	Permafrost, snow cover and vegetation in the USSR. Bigl, SR, (1984, 128p) SR 84-36
-Washington-Mount Saint Helens	Permafrost distribution on the continental shelf of the Beau-	Vegetation and environmental gradients of the Prudhoe Bay region, Alaska Walker, D.A., [1985, 239p]
Thermal observations of Mt St. Helens before and during eruption St. Lawrence, W.F., et al. (1980, p 1526-1527)	fort Sea Hopkins, D.M., et al. [1979, p 135-141] MP 1288	CR 85-14
MP 1482	Vapor barriers Vapor retarders for membrane roofing systems Tobiasson,	Response of permafrost to disturbance. Lawson, D.E., [1986, p.1-7] MP 2165
-Washington-Quincy Land treatment of wastewater Murrmann, R.P. et al.	W , (1989, p 31-37) MP 2489	Effect and disposition of TNT in a terrestrial plant Palazzo,
(1976, 36p) MP 920	Vapor retarders to control summer condensation Tobias- son, W, 1989, p 566-5721 MP 2558	Vegetation of Beechey Point, Alaska Walker, D.A., et al.
—Washington—Saint Helens, Mount Observations of volcanic tremor at Mount St. Helens volcano	Vapor diffusion	(1987, 63p) CR 87-05 Effects of all terrain vehicles on tundra Racine, C. et al.
Fehler, M., [1984, p 3476-3484] MP 1770 Wisconsin	Thermodynamics of snow metamorphism due to variations in curvature Colbeck, S.C., (1980, p. 291-301)	(1988, 12p) SR 88-17
Land use and water quality relationships, eastern Wisconsin	MP 1368	Vegetation patterns Geobotanical studies on the Taku Glacier anomaly. Heuss-
Haugen, R.K., et al. [1976, 47p] CR 76-30 -Wisconsin-Kewaunee	(1983, p 5475-5482) MP 1603	er, CJ, et al. (1954, p.224-239) MP 1215
Impact of dredging on water quality at Kewaunce Harbor.	Aerosol growth in a cold environment, Yen, Y -C., 1984, 21p ₁ CR 84-06	VEGETATION PATTERNS Effects of permafrost on engineering Steams, S.R., (1966,
Wisconsin. Iskandar, I K, ct al. (1984, 16p) CR 84-21	Transport of water in frozen soil 6 Effects of temperature	77 _P) M I-A2
Unsteady flow	Nakano, Y , et al. [1987, p 44-50] MP 2213 Field observations of thermal convection in a subarctic snow	Vegetation patterns Abiotic overview of the Tundra Biome Program, 1971.
Framework for control of dynamic ice breakup by river regu- lation. Ferrick, M.G., et al. (1989, 14p) CR 89-12	cover Johnson, J.B. et al. [1987, p.105-118] MP 2439	Weller, G. et al. [1971, p 173-181] MP 906 Permafrost and vegetation maps from ERTS imagery. And-
Urban planning Applications of remote sensing in the Boston Urban Studies	Vapor pressure	erson, D M, et al. (1973, 75p) MP 1003
Program, Parts I and II. Merry, C J, et al. [1977, 36p]	Remote reading tension eter for use in subfreezing tempera- tures McKim, H L, et al. (1976, p. 31-45) MP 897	Vegetative research in arctic Alaska Johnson, P.L., et al., [1973, p.169-198] MP 1008
CR 77-13 Computer model of municipal snow removal Fucker, W.B.	Vapor pressure of INT by gas chromatography Leggett	Land use vegetation mapping in reservoir management.
(1977, 7p) CR 77-30	D.C., [1977, p.83-90] MP 915 Composition of vapors evolved from military TNT Leggett	Inundation of segetation in New England McKim, H.L., et
Post occupancy evaluation of a planned community in Arctic Canada. Bechtel, R.B., et al. (1980, 27p.) SR 80-06	D C . et al. (1977, 25p) SR 77-16 Vapor transfer	al, [1978, 13p] MP 1169 Geoccological mapping scheme for Alaskan coastal tundra.
Post occupancy evaluation for communities in hot or cold regions Bechtel, R.B., et al. [1980, 57p] SR 80-29	Mercury contamination of water samples. Cragin, JH,	Everetr, K.R., et al. [1978 p.359-365] MP 1098
Urea	(1979, p.313-319) MP 1270 Growth of faceted crystals in a snow cover Colbeck S.C.	Vehicle wheels Lifects of novercraft, wheeled and tracked vehicle traffic on
Soil microbiology. Bosatta, E. et al. (1981, p.38-44) MP 1753	(1982, 19p) CR 82-29	tundra Abele, G. (1976 p 186-215; MP 1123 Hovercraft ground contact directional control devices.
Properties of urea-doped ice in the CRREI test basin	Condensation control in low-stope roots Tobiasson, W., 1985 p 47-591 MP 2039	Abele G (1976, p 51-59) MP 875
Hirayama, K., (1983, 44p.) CR 83-08 Crystalline structure of urea acc sheets used in modeling in the	Vegetation Pipeline haul road between Livengeral and the Yokon River	Liffects of low ground pressure vehicle traffic on tundra at Lenely, Alaska Abele, G. et al. [1977-32p]
CRREL test basin Gow, AJ, (1984, p 241-253) MP 1835	Berg. R.; et al. (1976 73p) 5R 76-11	SR 77-31 Workshop on snow traction mechanics, 1979 Harrison,
Crystalline structure of urea ice sheets Gow, A J. (1984,	Oil spills on permafrost Collins, C.M., et al. [1976, 18p.] SR 76-15	W. L., ed., (1981, 71p.) SR 81-16
48p ₁ CR 84-24 Fracture toughness of urea model are Bentley, D 1 et al.	Computer modeling of terrain modifications in the arctic and subjectic. Outcalt, \$4, et al., (1977) p.24-321	Predicting wheeled vehicle motion resistance in shallow snow Blaisdell, G L., (1981, 18p.) SR 81-30
(1988, p 289-297) MP 2348	MP 971	Vehicle for co'd regions mounty measurements Blaisdell,
Fracture experiments on freshwater and trea model ice Bentley, D.L., et al. (1988, 152p) MP 2502	Reclamation of acidic dredge soils with sewage sludge and lime Palazzo, A.J., (1977, 24p.) SR 77-19	641 , 1985 p 9-203 MP 2044 instrumented vehicle for the measurement of mobility param-
USSR	Utilization of sewage sludge for terrain stabilization in cold	eters B'sissell, G.I., (1988 p.377-388) MP 2486 Performance of an omni-directional wheel on snow and ice.
Comparative analysis of the USSR construction codes and the US Army technical manual for design of foundations on the Code of	regions Gastin D V et al. (1977, 45p.) SR 77-27 Second progress report on oil spilled on perinafrost McFrid-	biandell GS, (1989, 21p = appends) MP 2711
permafrost. Fish, A.M., (1982, 20p.) CR 82-14. Regional and seasonal variations in snow-cover density in the	den I et al. (1977, 16p t SR 77-44 Ecology on the Yukon-Prudhoc haul rand Brown, J. ed.	Wheeled versus tracked vehicle snow mobility less program Green, C.F., et al. (1983), 19p3 MP 2715
USSR Bilella, MA. (1984, 70p) CR 84-22	(1978, 131p) MP 1115	Vehicles
Permafrost, snow cover and vegetation in the USSR Bigl SR, (1984, 198p) SR 84-36	1977 tundra fire at Kokolik River Maska Hall D.K. et al. (1978, 11p.) SR 78-10	Bearing capacity of river see for vehicles Nevel, DE, 1978, 72p. CR 78-03
-Magadan Scientiats visit Kolyma Water Balance Station in the USSR	I ffects of winter military operations on cold regions terrain Abele, G., et al., 11978, 34p.; SR 78-17	Megrotcopic view of snow deformation under a vehicle Richard P.W., et al. (1981, 200). SR 81-17
Slaughter, C.W., ct 81, [1977, 66p.] SR 77-15	Criade oil spills on black spruce forest tenkins. Lit, et al.	Snow measurements in relation to welfule performance.
Subarctic watershed research in the Soviet Union Slaugh- ter, C.W., et al., (1978, p. 305-313) MP 1273	[1978] p 305-323] Show cover mapping in northern Maine using I NDSAT	Harrison W.L., [1981, p.13-23] MP 1473 Application of energetics to vehicle trafficability problems
Siberia	Merry CJ, et al [1979, p 197-198] MP 1510	Brown R L , [1981, p 25-38] MP 1474
Embankment dams on permafrost in the I-SSR Johnson T.C., et al. (1980, 59p.) SR 80-41	sewage sheige for terrain standization, Part 2 Gastia, D.A. et al., £1979, 36pg. SR 79-28	Prediction recincis for secrete traction on stow Marine n. W. L. (1981, p. 39-48) MP 1475

Tield investigations of tenters the tier to the tier t	Viscosity Seasonal variations in apparent sea ice viscosity on the geo-	Wall coatings for concrete and masonry buildings. Korhonen, C.J., et al., [1989, 27 refs.] SR 89-36
Vehicle tests and performance in snow. Berger, R.H., et al,	physical scale. Hibler, W.D., III, et al, (1977, p 87-90) MP 900	Warning systems Motion detection systems under winter conditions. Peck, L.,
(1981, p 51-67) MP 1477 Shallow snow test results. Harrison, W.L., (1981, p.69-71)	Compression of wet snow. Colbeck, S.C., et al. [1978,	(1989, 8p) CK 89-17
MP 14/8	17p ₁ CR 78-10 Grouting silt and sand at low temperatures Johnson, R.	WASTE DISPOSAL Sewerage and sewage disposal in cold regions Alter, A.J.,
Mobility bibliography. Liston, N., comp, [1981, 313p] SR 81-29	(1979, p 937-950) MP 1078	(1969, 106p) M III-CSb Utilities on permanent snowfields. Mellor, M., (1969,
Engine starters in winter. Coutts, H.J., [1981, 37p] SR \$1-32	Some results from a linear-viscous model of the Arctic ice cover. Hibler, W.D., III, et al. [1979, p 293-304]	42p. ₁ M III-A2d
CRREL instrumented vehicle for cold regions mobility measurements Blaisdell, G.L., [1982, 11p.] MP 1515	MP 1241 Modeling mesoscale are dynamics. Hibler, W.D., III, et al.	Waste disposal Land disposal state of the art. Reed, S.C., (1973, p.229-
Measurement of snow surfaces and tire performance evalua-	[1981, p.1317-1329] MP 1526 Analysis of linear sea ice models with an ice margin. Lep-	261 ₁ MP 1392 Land treatment in relation to waste water disposal.
tion Blaisdell, G.L., et al, [1982, 7p] MP 1516 CRREL instrumented vehicle: hardware and software.	paranta, M., [1984, p 31-36] MP 1782	D.H., et al, [1976, p 60-62]
Blaisdell, G.L., [1983, 75p.] SR \$3-03 Vechicle mobility and snowpack parameters. Berger, R.H.,	Use of low viscosity asphalts in cold regions. Janoo, V C., [1989, p.70-80] MP 2462	Wastewater reuse at Livermore, California. Uiga, A., et al, [1976, p 511-531] MP 870
[1983, 26p. ₃ CR 83-10	Viscous flow Viscous wind-driven circulation of Arctic sea ice. Hibter,	Effect of open water disposal of dredged sediments Blom, BE, et al, (1976, 183p) MP 967
Utilization of Unmanned Aerial Vehicles in the ALBE Thrust. Greeley, H.P., et al. (1986, p 249-257) MP 2663	W.D., III, et al, [1977, p.95-133] MP 983	Utility distribution systems in Iceland. Aamot, H.W.C.,
Effect of oscillatory loads on the bearing capacity of floating ice covers. Kerr, A.D., et al, [1987, p.219-224]	Modeling pack ice as a viscous-plastic continuum. Hibler, W.D., III, £1977, p.46-55; MP 1164	Reclamation of wastewater by application on land. Iskandar,
MP 2216 Effect of snow on vehicle-generated seismic signatures. Al-	Thermodynamic model of creep at constant stress and constant strain rate. Fish, A.M., (1984, p 143-161)	I.K., et al. (1976, 15p) Impact of urban wastewater reuse in cold regions on land
bert, D.G., [1987, p.881-887] MIP 2229	MP 17/1	treatment systems. Iskandar, I.K., [1976, 32p] MP 2452
Trailing-tire motion resistance in shallow snow. Blaisdell, G.L., [1987, p 296-304] MP 2248	Visibility Ice fog suppression in Arctic communities. McFadden, T.	Urban waste as a source of heavy metals in land treatment.
Vehicle mobility over snow. Blaisdell, G L., [1987, p.265-266] MP 2420	(1980, p 54-65) MP 1357 Suppression of ice fog from the Fort Wainwright, Alaska,	Iskandar, I K., (1976, p 417-432) MP 977 Field performance of a subarctic utilidor. Reed, S.C.,
Arctic mobility problems. Abele, G., [1987, p 267-269] MP 2421	cooling pond. Walker, K.E., et al, [1982, 34p]	[1977, p 448-468] MP 938 Effects of wastewater on the growth and chemical composi-
Wheeled versus tracked vehicle snow mobility test program.	Explosive obscuration sub-test results at the SNOW-TWO	tion of forages. Palazzo, A J., (1977, p.171-180) MP 975
Green, C.E., et al. [1989, 19p.] MP 2715 Thawing soil strength measurements for predicting vehicle	field experiment. Ebersole, J.F., et al, (1984, p 347-354) MP 1872	Wastewater treatment at Calumet, Michigan. Baillod, C.R.,
performance. Shoop, S.A., [1989, 18p.] MP 2749	Clear improvement in obscuration Palmer, R.A., (1985, p. 476-477) MP 2067	et al, [1977, p 489-510] MP 976 Land treatment of wastewater at Manteca, Calif., and Quincy,
Velocity Critical velocities of a floating ice plate subjected to in-plane	Meteorological variation of atmospheric optical properties in	Washington. Iskandar, I.K., et al, [1977, 34p] CR 77-24
forces and a moving load. Kerr, A.D., [1979, 12p.] CR 79-19	an antarctic storm Egan, W.G., et al, (1986, p.1155- 1165) MP 2099	Land treatment of wastewater at West Dover, Vermont.
Measurement of the shear stress on the underside of simulated	Utilization of Unmanned Aerial Vehicles in the ALBE Thrust. Greeley, H.P., et al. [1986, p 249-257] MP 2663	Bouzoun, J.R., [1977, 24p.] SR 77-33 Consolidating dredged material by freezing and thawing.
ice covers. Calkins, D.J., et al., [1980, 11p] CR 80-24	Slant path extinction and visibility measurements from an unmanned aerial vehicle. Cogan, J, et al, (1987, p. 115-	Chamberlain, E.J., [1977, 94p] MIP 978
Flow velocity profiles in ice-covered shallow streams. Cal- kins, D.J., et al, [1982, p.236-247] MP 1540	126 ₁ MP 2296	Municipal sludge management: environmental factors. Reed, S.C., ed. (1977, Var. p.) MP 1406
Laboratory study of transverse velocities and ice jamming in a river bend Zufelt, J.E., et al, (1988, p.189-197)	Comparative studies of the winter climate at selected loca- tions in Europe and the United States Bates, R.E., et al.	Methodology for nitrogen isotope analysis at CRREL. Jenkins, T.F., et al. (1978, 57p) SR 78-08
MP 2501	[1989, p 283-293] MP 2598 Synoptic meteorology, crystal habit, and snowfall rates in	Lysimeters validate wastewater renovation models. Iskandar, I.K., et al., [1978, 11p] SR 78-12
Velocity measurement Eruptions from under-ice explosions. Mellor, M., et al.	Northeastern snowstorms Ryerson, C.C., et al (1989, p 335-345) MP 2599	Waste water reuse in cold regions. Iskandar, I.K., 1978,
(1988, 26p) SR \$8-14 VENTILATION	Model of smoke concentration reduction due to scavenging	p 361-3683 MP 1144 Effects of wastewater and sludge on turigrasses. Palazzo,
Utilities on permanent snowfields Meilor, M., (1969,	by snow. Hutt, D L, et al. (1989, p 87-98) MP 2628	AJ, (1978, 11p) SR 78-20 Land treatment climatic survey at CRREL. Bilello, M.A., et
Ventilation	Light transmission through smoke screens in falling snow Farmer, W.M., et al. (1989, p.99-111) MP 2629	al, (1978, 37p) SR 70-21
Venting of built-up roofing systems Tobiasson, W, (1981, p 16-21) MP 1498	Motion detection systems under winter conditions Peck, L.,	Computer file for existing land application of wastewater sys- tems Iskandar, I.K., et al. [1978, 24p] SR 78-22
Can wet roof insulation be dried out Tobiasson, W., et al. (1983, p 626-639) MP 1509	Volcanic ash	Experimental system for land renovation of effluent. Ny- lund, J.R., et al., [1978, 26p.] SR 78-23
Vents and vapor retarders for roofs Tobiasson, W., 1986,	Byrd Land quaternary volcanism LeMasurier, W.E., [1972, p.139-141] MP 994	Wastewater stabilization pond linings. Middlebrooks, E.J.,
Vents and vapor retarders for roofs Tobiasson, W., 1987.	Volcanoes	Cold climate utilities delivery design manual Smith, D.W.,
p 80-90; MP 2352 Roof design in cold regions Tobiasson, W. [1989, p 462-	Hydraulic transients: a seismic source in volcances and gla- ciers St. Lawrence, W.F., et al, £1979, p 654-656; MP 1181	et al, (1979, c300 leaves) MP 1373 Kinetics of denitrification in land treatment of wastewater.
472 ₁ MF 2013	Thermal observations of Mt St Helens before and during	Institute C at al. 1070 SOn. SMC 75-UM
Reference guide for building diagnostics equipment and techniques McKenna, C.M., et al., (1989, 649)	eruption St. Lawrence, W.F., et al., [1980, p 1526-1527] MP 1482	Design procedures for underground reactions systems
SR 89-27 Air change measurements of five Army buildings in Alaska	Fluid dynamic analysis of volcanic treinor Ferrick, M.G., et al. 41982, 1203	Spray application of wastewater effluent in Vermont. Cas-
Flanders, S.N., [1990, p 53-63] MP 2676 Very low frequencies	Source mechanism of volcanic tremor. Ferrick, M.G. et al.	sell, E.A., et al. (1979, 38p) SR 79-00
Numerical studies for an airborne VLF resistivity survey	(1982, p 8675-8683) MP 1576 Observations of volcanic tremor at Mount St. Helers volcano	tems Middlebrooks, E.J., et al. (1979, 82p) SR 79-07
Arcone, S.A., (1977, 10p.) VLF airborne resistivity survey in Maine. Arcone, S.A.,	Fehler, M., [1984, p 3476-3484] MP 1770 Recent glacier-volcano interactions on Mt Redoubt, Alaska	Freezing problems with wintertime wastewater spray irriga-
(1978, p 1399-1417) MP 1166 Vibration	Sturm, M, et al, [1988, 189] MP 2431	Soil characteristics and climatology during wastewater ap-
Analysis of explosively generated ground motions using Fourier techniques Blouin, S.E., et al., [1976, 86p]	Volume Volumetric constitutive law for snow under strain Brown.	phration at CRREL. Iskandar, I K, et al. (1979, 829) SR 79-23
CR 76-28	R.L., (1979, 13p) CR 79-20 Walls	Land treatment systems and the environment. McKim,
Vibrations caused by ship traffic on an ice-covered waterway. Haynes, F.D., et al. (1981, 27p) CR 81-05	Investigation of water jets for lock wall descing Calkins.	Land application of wastewater; effect on soil and plant potas-
Vibration analysis of the Yamachiche lightpier Haynes, F.D., (1986, p 238-241) MP 1989	DJ, et al, (1976, p G2/13-22) MP 865 Ice removal from the walls of navigation locks Franken	MP 1228
Vibration analysis of the Yamachiche Lightpier. Haynes,	stein, G.E., et al., [1976, 5-1487-1496] MP 888 Reinsulating old wood frame buildings with urea-formalde-	
Vibration analysis of a DEW Line station Haynes, F.D. et	hyde foam Tobiasson, W. ct al. (1977, p 478-487) MP 958	Nitrogen transformations in land treatment. Jenkins, TF.
al, (1988, p.1513-1518) MP 2341 Ice-induced vibrations of structures. Sodhi, D.S., (1989)	Roof moisture survey -U.S. Military Academy Korhonen,	et al. (1979, Jap)
p 189-221 ₁ MP 2492		regions Pt 3 Rindge, S.D., et al. (1979, 33p)
Investigation into the post-stable behavior of a tube array in cross-flow. Lever, J H., et al. (1989, p 457-465) MP 2561	et al. (1981, p 137-138) MP 1388	Dynamics of NH4 and NO3 in cropped soils irrigated with
VISCOELASTICITY MP 2561	S N , et al. [1984, 13p] CR 84-01	SR 20-21
Freezing process and mechanics of frozen ground. Scott,	Heat flow sensors on walls what can we learn Flanders S.N., (1985, p. 140-149) MP 2043	et al. (1980, p.105-120) MP 1363
Viscoelasticity	Measured and expected R-values of 19 building envelopes	Effectiveness of land application for P removal from waste
Viscoelasticity of floating ice plates subjected to a circular load. Takagi, S., (1978, 32p.) CR 78-05	In-pitu assessment of two retrofit insulations Flanders, S.N.	MP 1444
Acoustic emission and deformation response of finite ice plates. Airouchakis, P.C., et al. (1981, p. 123-133)	(1986, p.32-44) MP 2173 Methods to reduce see accumulation on miter gate recess	ment site during wastewater application. Abele, G, et al
pintes Attouchakis, P.C., et al. (1961, p 125-155)		

Waste disposal (cont.)	Mass water balance during spray irrigation with wastewater at	Overland flow an alternation
Seasonal growth and uptake of nutrients by orchardgrass irri-	Deer Creek Lake land treatment site Abele, G, et al. (1978, 43p) SR 79-29	Martel, C J., et al, [1982, p
gated with wastewater. Palazzo, A.J., et al, [1981, 19p.] CR 81-08	(1978, 43p) SR 79-29 Land treatment climatic survey at CRREL. Bilello, M.A., et	Heat pumps to recover heat Martel, CJ, et al. [1982, 2
Site selection methodology for the land treatment of wastewa-	al, (1978, 37p.) SR 78-21	P removal during land treatme
ter Ryan, J.R., et al, (1981, 74p) SR 81-28	Experimental system for land renovation of effluent. Ny-	et al, [1982, 12p]
Wastewater applications in forest ecosystems. McKim, H.L., et al., 1982, 22p 1 CR 82-19	lund, J.R., et al, [1978, 26p] SR 78-23 Five-year performance of CRREL land treatment test cells	Wastewater treatment in Ala
H.L., et al, (1982, 22p) CR 82-19 Mathematical simulation of nitrogen interactions in soils.	Jenkins, T.F., et al. [1978, 24p.] SR 78-26	[1982, p.207-213] Land treatment of wastewate
Selim, H.M, et al, (1983, p 241-248) MP 2051	Energy requirements for small flow wastewater treatment sys-	1231
Water supply and waste disposal on permanent snow fields	tems. Middlebrooks, E.J., et al, (1979, 82p) SR 79-07	Removal of trace organics by
Reed, S.C., et al. (1984, p 401-413) MP 1714 Observations during BRIMFROST'83. Bouzoun, J.R., et al,	Health aspects of water reuse in California. Reed, SC,	et al, [1982, p 176-184] Wastewater applications in
(1984, 36p.) SR 84-10	[1979, p.434-435] MP 1404	H.L. et al. (1982, 22p)
Utility services for remote military facilities Reed, S.C., et	Nitrification inhibitor in land treatment of wastewater in cold	Energy conservation and wa
al, (1984, 66p.) SR 84-14	regions Elgawhary, S.M., et al, (1979, 25p) SR 79-18	Martel, C.J., et al, [1982, 1
Impact of dredging on water quality at Kewaunee Harbor, Wisconsin. Iskandar, I K., et al. (1984, 16p)	Freezing problems with wintertime wastewater spray irriga-	User's index to CRREL land and data files Berggren, I
CR 84-21	tion. Bouzoun, J.R., (1979, 12p) SR 79-12	2.00 2.00 1.000 20.38.0
Chemical analysis of munitions wastewater Jenkins, T.F., et al., (1984, 95p.) CR 84-29	Water movement in a land treatment system of wastewater by overland flow. Nakano, Y., et al, [1979, p 185-206]	Wastewater treatment by nutr
al, [1984, 95p] CR 84-29 Water supply and waste disposal in Greenland and Antarc-	MP 1285	J.R., et al. (1982, 34p) Case study of land treatment:
tica Reed, S.C., et al., (1985, p 344-350) MP 1792	Health aspects of land treatment. Reed, S.C., (1979, 43p) MP 1389	Vermont. Bouzoun, JR,
Literature review: effect of freezing on hazardous waste sites	Cost-effective use of municipal wastewater treatment ponds	
Iskandar, I K., et al, [1985, p 122-129] MP 2028 Thermal analysis of a shallow utilidor. Phetteplace, G, et al,	Reed, S.C., et al, (1979, p 177-200) MP 1413	Heating enclosed wastewater pumps. Martel, C.J., et al
(1986, 10p.) MP 2021	Design of liquid-waste land application Iskandar, I.K.	panipar process, conference
Treatment and disposal of alum and other metallic hydroxide	(1979, p 65-88) MP 1415 International and national developments in land treatment of	Microbiological aerosols from
sludges Reed, S.C., et al, [1987, 40p + plates] SR 87-05	wastewater. McKim, H.L., et al, (1979, 28p.)	al, (1983, p 65-75) Assessment of the treatability
Ground freezing controls hazardous waste. Iskandar, I.K.,	MP 1420	flow Jenkins, T.F., et al.
[1987, p 455-456] MP 2270	Land application of wastewater: effect on soil and plant potas- sium Palazzo, A.J., et al., 11979, p.309-3121	Model for land treatment, Pt
Shasta waterless system as a remote site sanitation facility. Martel, C.J., £1987, 24p 1 SR 87-16	MP 1228	35p ₁
Martel, C.J., [1987, 24p] SR 87-16 Chemical analysis of hazardous wastes McGee, I.E., et al.	Cost of land treatment systems. Reed, S.C., et al, (1979,	Model for land treatment pl Pt 2. Baron, JA, et al. (1
(1987, 57p) SR \$7-21	135p1 MP 1387	Model for land treatment pi
Extraction solvents for determination of volatile organics in	Land treatment of waste water in cold climates Jenkins, T.F., et al., [1979, p.207-214] MP 1279	Pt 3. Baron, J.A, et al, [1
soil Jenkins, T.F., et al., [1987, 26p.] SR 87-22 Waste management practices in Antarctica. Sletten, R.S., et	Prototype wastewater land treatment system. Jenkins, TF,	Corps of Engineers land tree program: an annotated bibl
al, [1989, p.122-130] MP 2464	et al, (1979, 91p.) SR 79-35	(1983, 82p)
Waste management practices of the United States Antarctic	Enzyme kinetic model for nitrification in soil amended with ammonium. Leggett, D.C., et al. (1980, 20p.)	Land application systems for
Program. Reed, S.C., et al., [1989, 28p] SR 89-3	CR 80-01	S C., (1983, 26p. + figs)
ice-water partition coefficients for RDX and TNT. Taylor, S, [1989, 10p] CR 89-08	Disinfection of wastewater by microwaves Iskandar, I.K., et	Nitrogen removal in wastewa S C., (1983, 13p + figs)
Fate and transport of contaminants in frozen soils Ayo-	al, [1980, 15p] SR 80-01 Wastewater treatment in cold regions by overland flow.	Engineering systems for waste
rinde, O.A., et al. (1990, p 202-211) MP 2679	Mattel, C J., et al. (1980, 14p) CR 80-07	al, [1983, p 409-417]
Waste treatment Waste management in the north. Rice, E, et al., 1974,	Removal of volatile trace organics from wastewater by over-	Wastewater treatment and r Bouzoun, J.R., [1983, p.54]
p.14-21 ₁ MP 1048	land flow land treatment. Jenkins, T.F., et al. [1980, p.211-224] MP 1313	Land treatment research and
Land treatment of wastewaters Reed, S.C., et al. (1974,	EPA policy on land treatment and the Clean Water Act of	dar, I.K., et al, (1983, 144)
p.12-13 ₁ MP 1036	1977 Thomas, R.E., et al, (1980, p.452-460)	Land treatment processes.
Land treatment of wastewaters for rural communities Reed, S.C., et al., [1975, p 23-39] MP 1399	MP 1418 Model for nitrogen behavior in land treatment of wastewater	Analysis of infiltration results
Land treatment in relation to waste water disposal. Howells,	Selim, H.M., et al. (1980, 49p) CR 80-12	wastewater treatment site
DH, et al, [1976, p 60-62] MP 869	Nitrogen in an overland flow wastewater treatment system	Helen comment for comment
Land treatment of wastewater. Murrmann, R.P., et al. [1976, 36p] MP 920	Chen, R.L., et al., [1980, 33p] SR 80-16 Aquaculture systems for wastewater treatment: an engineer-	Utility services for remote mi al, [1984, 66p]
Reclamation of wastewater by application on land Iskandar,	ing assessment. Reed, S.C., et al. [1980, 127p]	Nitrogen removal in wastewa
I.K, et al, [1976, 15p] MP \$96	MP 1422	26p;
Wastewater renovation by a prototype slow infiltration land treatment system. Iskandar, I.K., et al, (1976, 44p)	Aquaculture systems for wastewater treatment Reed, S.C., et al., (1980, p. 1-12) MP 1423	Nitrogen behavior in soils irri H.M., et al, [1984, p 96-10
CR 76-19	Removal of organics by overland flow Martel, C.J., et al.	Problems with rapid infiltra
Overview of land treatment from case studies of existing sys-	(1980, 9p.) MP 1362	Reed, S.C., et al. (1984, 17
tems. Uiga, A, et al. (1976, 26p) MP 891 Land treatment of wastewater at a subarctic Alaskan location.	Rational design of overland flow systems Martel, C.J., et al., (1980, p.114-121) MP 1400	Wetlands for wastewater trea S C., et al. (1984, 9p + fil
Sietten, R.S., et al. (1976, 21p) MP 868	Energy and costs for agricultural reuse of wastewater Slet-	Impact of slow-rate land trea
Wastewater treatment in cold regions Sletten, R.S., et al.	ten, R S, et al, (1980, p 339-346) MP 1401	toxic organics Parker, L.
(1976, 15p) MP 965	Forage grass growth on overland flow systems Palazzo,	Maintaining frosty facilities
Wastewater reuse at Livermore, California Uiga, A., et al. [1977, p.511-531] MP 979	A.J., et al. [1980, p 347-354] MP 1402 Spray application of waste-water effluent in a cold climate.	15 ₁
Land treatment of wastewater in subarctic Alaska Sletten,	Cassell, E.A., et al. (1980. p 620-626) MP 1403	Overland flow wastewater tre
R S , et al. (1977, p 533-547) MP 1268	Soil infiltration on land treatment sites. Abele, G., et al.	thy, A.R., et al. (1985, p.2)
Municipal sludge management: environmental factors Reed, S.C., ed. [1977, Var. p.] MP 1406	[1980, 41p] SR 80-36 Overland flow removal of toxic volatile organics Jenkins,	Prevention of freezing of v Reed, S.C., et al., [1985, 49
Wastewater treatment alternative needed Iskandar, I K., et	T.F., et al. (1981, 16p) SR 81-01	Heat recovery from primar
al, (1977, p 82-87) MP 968	Toxic volatile organics removal by overland flow land treat-	Phetteplace, G, et al. [198
Land treatment module of the CAPDET program Merry, C.J., et al, [1977, 4p] MP 1112	ment Jenkins, TF, et al. (1981, 14p) MP 1421 Aquaculture for wastewater treatment in cold climates	Ground freezing for manage Sullivan, J.M. Jr. et al. [1
Land application of wastewater in permafrost areas Sletten,	Reed, S.C., et al., [1981, p 482-492] MP 1394	Potential use of artificial gr
R S. (1978, p.91 1-917) MP 1110	Seasonal growth and accumulation of N. P. and K by grass	ımmobilization İskandar,
Land treatment, present status, future prospects Pound, CE, et al. (1978, p. 98-102) MP 1417	irrigated with wastes Palazzo, A.J., [1981, p.64-68] MP 1425	Literature review effect of fre
Symposium on land treatment of wastewater, CRREL, Aug	Seven-year performance of CRREL slow-rate land treatment	Iskandar, I k. et al. [1985]
1978 (1978, 2 vols) MP 1145	prototypes Jenkins, T.F., et al. (1981, 25p)	Cold weather O&M Reed,
Remote sensing for land treatment site selection Merry, C.J., 1978, p 107-119; MP 1146	SR 81-12 Wastewater treatment by a prototype slow rate land treatment	Tana assessed same at the same
C.J., [1978, p 107-119] MP 1146 Nitrogen behavior in land treatment of wastewater a simpli-	system Jenkins, T.F., et al. (1981, 44p) CR 81-14	Toxic organics removal kines ment. Jenkins, TF, et al
fied model. Selim, H.M., et al. (1978, p. 171-179)	Model for prediction of nitrate leaching losses in soils Meh-	
MP 1149	ran, M., et al. (1981, 24p) CR 81-23	Reversed-phase high-perform
Overview of existing land treatment systems Iskandar, 1 K , (1978, p. 193-200) MP 1150	Effect of soil temperature on nitrification kinetics Parker, L.V., et al. (1981, 27p) SR 81-33	determination of nitroorg: Jenkins, T.F. et al. (1986.
Performance of overland flow land treatment in cold climates	Vegetation selection and management for overland flow sys-	Chromatographic determina
Jenkins, T.F., ct al. (1978, p.61-70) MP 1152	tems Palazzo, A.J., et al. (1982, p. 135-154)	wastewater Bauer, CF,
Adaptability of forage grasses to wastewater irrigation. Palazzo, A J., et al. (1978, p 157-163) MP 1153	MP 1511 Overview of models used in land treatment of wastewater	Nitrogen removal in cold r
Microbiological acrosols during wastewater irrigation Bau-	Iskandar, I.K. (1982, 27p) SR 82-01	Reed, S.C., et al. (1986, 3
sum, H.T., et al. (1978, p 273-280) MP 1154	Nutrient film technique for wastewater treatment Bouroun,	Freezing effect on waste of
Computer procedure for comparing wastewater treatment systems. Spaine, P.A. et al. (1978, p. 335-340)	J.R., et al. (1982, 15p) SR 82-04 Wastewater treatment and plant growth Palazzo, A.J.	(1986, 33p) Problems and opportunities
MP 1155	1982, 21p3 SR 82-05	ment Reed, S.C., [1986,
	•	•

Overland flow an alternative for wastewater treatment.
Martel, C.J., et al, [1982, p 181-184] MP 1506 Heat pumps to recover heat from waste treatment plants.
Martel, CJ, et al, [1982, 23p] SR 82-10
P removal during land treatment of wastewater. Ryden, J.C.,
et al, [1982, 12p] SR 82-14 Wastewater treatment in Alaska Schneiter, R.W., et al,
[1982, p.207-213] MP 1696
Land treatment of wastewater Reed, S.C., [1982, p.91- 123] MP 1947
1231 MP 1947 Removal of trace organics by overland flow. Leggett, D.C.,
et al. (1982, p 176-184) MP 2442
Wastewater applications in forest ecosystems McKim,
H.L., et al. (1982, 22p) CR 82-19 Energy conservation and water pollution control facilities
Martel, C.J., et al, [1982, 18p] SR 82-24
User's index to CRREL land treatment computer programs
and data files Berggren, P.A., et al. [1982, 65p.] SR 82-26
Wastewater treatment by nutrient film technique. Bouzoun,
J.R., et al. [1982, 34p] SR 82-27
Case study of land treatment in a cold climate—West Dover, Vermont. Bouzoun, JR, et al, (1982, 96p)
CR 82-44
Heating enclosed wastewater treatment facilities with heat pumps. Martel, C.J., et al., (1982, p 262-280)
MP 1976
Microbiological aerosols from waste water Bausum, HT, et al. r1983, p 65-75; MP 1578
al, (1983, p 65-75) MP 1578 Assessment of the treatability of toxic organics by overland
flow Jenkins, T.F., et al. [1983, 47p] CR 83-03
Model for land treatment, Pt 1 Baron, J A., et al. (1983,
35p ₁ SR 83-06 Model for land treatment planning, design and operation.
Pt 2. Baron, J A, et al, (1983, 30p.) SR 83-07
Model for land treatment planning, design and operation,
Corps of Engineers land treatment of wastewater research program: an annotated bibliography. Parker, L.V., et al.
(1983, 82p) SR 83-09 Land application systems for wastewater treatment. Reed,
Land application systems for wastewater treatment. Reed, S.C., [1983, 26p. + figs] MP 1946
Nitrogen removal in wastewater stabilization ponds Reed,
S C., (1983, 13p + figs) MP 1943 Engineering systems for wastewater treatment Loehr, R., et
Engineering systems for wastewater treatment Lochr. R., et al. [1983, p 409-417] MP 1948
Wastewater treatment and reuse process for cold regions
Bouzoun, J.R., (1983, p.547-557) MP 2112 Land treatment research and development program Iskan-
dar, I.K., et al, (1983, 144p) CR 83-20
Land treatment processes. Merry, C.J. et al. (1983, 79p) SR 83-26
Analysis of infiltration results at a proposed North Carolina
wastewater treatment site Abele, G, et al, [1984, 24p]
Utility services for remote military facilities Reed, S.C., et
Utility services for remote military facilities Reed, SC, et al, [1984, 66p] SR 84-14
Nitrogen removal in wastewater ponds Reed, S.C., (1984,
26p; CR 84-13 Nitrogen behavior in soils irrigated with liquid waste. Selim.
Nitrogen behavior in soils irrigated with liquid waste. Selim, H.M., et al. [1984, p 96-108] MP 1762
Problems with rapid infiltration—a post mortem analysis.
Reed, S.C., et al. (1984, 17p. + figs.) MP 1944 Wetlands for wastewater treatment in cold climates. Reed.
S C., et al. (1984, 9p + figs) MP 1945
Impact of slow-rate land treatment on groundwater quality-
toxic organics Parker, L.V., et al., [1984, 36p] CR 84-30
Maintaining frosty facilities Reed, S.C. et al. [1985, p.9- 15] MP 1949
Overland flow wastewater treatment at Easley, S.C. Aberna-
thy, A.R., et al. (1985, p.291-299) MP 2183
Prevention of freezing of wastewater treatment facilities Reed, S.C., et al. (1985, 49p.) SR 85-11
Heat recovery from primary effluent using heat pumps
Heat recovery from primary effluent using heat pumps Phetteplace, G, et al. [1985, p 199-203] MP 1978
Ground freezing for management of hazardous waste sites Sullivan, J.M. Jr., et al., [1985, 15p.] MP 2030
Potential use of artificial ground freezing for contaminant
Potential use of artificial ground freezing for contaminant immobilization liskandar, 1 K, et al. (1985, 10p.) MP 2029
Potential use of artificial ground freezing for contaminant immobilization liskandar, I K., et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites liskandar, I K., et al., [1985, p.122-129] MP 2028
Potential use of artificial ground freezing for contaminant immobilization liskandar, I K., et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites liskandar, I K., et al., [1985, p.122-129] MP 2028
Potential use of artificial ground freezing for contaminant immobilization liskandar, I K. et al. (1985, 10p.) MP 2029 Literature review effect of freezing on hazardous waste sites liskandar, I K. et al. (1985, p 122-129) MP 2028 Cold weather O&M Reed, S.C. et al. (1985, p 10-15) MP 2070
Potential use of artificial ground freezing for contaminant immobilization liskandar, I.K. et al. [1985, 107] MP 2029 Literature review effect of freezing on hazardous waste sites iskandar, I.K. et al. [1985, p. 122-129] MP 2028 Cold weather O&M Reed, S.C. et al. [1985, p. 10-15] MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F. et al. [1985, p. 707-718]
Potential use of artificial ground freezing for contaminant immobilization liskandar, I K. et al. (1985, 10p.) MP 2029 Literature review effect of freezing on hazardous waste sites liskandar, I K., et al. (1985, p 122-12) MP 2028 Cold weather O&M Reed, S.C. et al. (1985, p 10-15) MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F. et al. (1985, p 707-718) MP 2111
Potential use of artificial ground freezing for contaminant immobilization liskandar, I K. et al. [1985, 19029] Literature review effect of freezing on hazardous waste sites liskandar, I K. et al. [1985, p 122-129] MP 2028 Cold weather O&M Reed, S.C. et al. [1985, p 10-15] MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F., et al. [1985, p 707-718] Reversed-phase high-performance liquid chromatographic determination of nitroorganics in munitions wastewater.
Potential use of artificial ground freezing for contaminant immobilization liskandar, I K. et al. (1985, 107) MP 2029 Literature review effect of freezing on hazardous waste sites liskandar, I K., et al. (1985, p 122-129) MP 2028 Cold weather O&M Reed, S.C. et al. (1985, p 10-15) MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F., et al., (1985, p 707-718) MP 2111 Reversed-phase high-performance liquid chromatographic determination of nitroorganics in minimums wastewater. Jenkins, T.F., et al., (1986, p 170-175) MP 2049
Potential use of artificial ground freezing for contaminant immobilization liskandar, I.K. et al. [1985, 1907] MP 2029 Literature review effect of freezing on hazardous waste sites liskandar, I.K. et al. [1985, p. 122-129] MP 2028 Cold weather O&M Reed, S.C. et al. [1985, p. 10-15] MP 2070 Toxic organics removal kinetics in overland flow land freatment. Jenkins, T.F., et al. [1985, p. 707-718] MP 2111 Reversed-phase high-performance liquid chromatographic determination of nitroorganics in munitions wastewater. Jenkins, T.F., et al. [1986, p. 170-175] MP 2049 Chromatographic determination of nitroorganics in plant wastewater. Bauer, C.F., et al., [1986, p. 176-182]
Potential use of artificial ground freezing for contaminant immobilization Iskandar, I.K. et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites Iskandar, I.K. et al., [1985, p. 122-129.] MP 2028 Cold weather O&M Reed, S.C. et al., [1985, p. 10-15], MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F. et al., [1985, p. 707-718] Reversed-phase high-performance liquid chromatographic determination of nitroorganics in munitions wastewater, Jenkins, T.F. et al., [1986, p. 170-175] MP 2049 Chromatographic determination of nitroorganics in plant wastewater. Bauer, C.F., et al., [1986, p. 176-182]. MP 2050
Potential use of artificial ground freezing for contaminant immobilization—Iskandar, I.K., et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites Iskandar, I.K., et al., [1985, p. 122-129.] MP 2028 Cold weather O&M—Reed, S.C., et al., [1985, p. 10-15] MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F., et al., [1985, p. 707-718] MP 2111 Reversed-phase high-performance liquid chromatographic determination of nitroorganics in munitions wastewater. Jenkins, T.F., et al., [1986, p. 170-175] MP 2049 Chromatographic determination of nitroorganics in plant wastewater. Bauer, C.F., et al., [1986, p. 176-182] MP 2050 Nitrogen removal in cold regions trickling filter systems
Potential use of artificial ground freezing for contaminant immobilization Iskandar, I.K., et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites Iskandar, I.K., et al., [1985, p. 122-129] MP 2028 Cold weather O&M Reed, S.C., et al., [1985, p. 10-15] MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F., et al., [1985, p. 707-718] Reversed-phase high-performance fiquid chromatographic determination of nitroorganics in munitions wastewater. Jenkins, T.F., et al., [1986, p. 170-175] MP 2049 Chromatographic determination of nitroorganics in plant wastewater. Bauer, C.F., et al., [1986, p. 176-182] MP 2050 Nitrogen removal in cold regions trickling filter systems Reed, S.C., et al., [1986, 30p.] SR 86-02 Freezing effect on waste contaminants. Iskandar, I.K.
Potential use of artificial ground freezing for contaminant immobilization iskandar, I.K., et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites Iskandar, I.K., et al., [1985, p. 122-129.] MP 2028 Cold weather O&M Reed, S.C., et al., [1985, p. 10-15] MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F., et al., [1985, p. 707-718] MP 2111 Reversed-phase high-performance liquid chromatographic determination of nitroorganics in munitions wastewater. Jenkins, T.F., et al., [1986, p. 170-175] MP 2049 Chromatographic determination of nitroorganics in plant wastewater. Bauer, C.F., et al., [1986, p. 176-182] MP 2050 Nitrogen removal in cold regions trickling filter systems Reed, S.C., et al., [1986, 39p.] Freezing effect on waste contaminants Iskandar, I.K., [1986, 33p.] SR 86-19
Potential use of artificial ground freezing for contaminant immobilization Iskandar, I.K., et al., [1985, 10p.] MP 2029 Literature review effect of freezing on hazardous waste sites Iskandar, I.K., et al., [1985, p. 122-129] MP 2028 Cold weather O&M Reed, S.C., et al., [1985, p. 10-15] MP 2070 Toxic organics removal kinetics in overland flow land treatment. Jenkins, T.F., et al., [1985, p. 707-718] Reversed-phase high-performance fiquid chromatographic determination of nitroorganics in munitions wastewater. Jenkins, T.F., et al., [1986, p. 170-175] MP 2049 Chromatographic determination of nitroorganics in plant wastewater. Bauer, C.F., et al., [1986, p. 176-182] MP 2050 Nitrogen removal in cold regions trickling filter systems Reed, S.C., et al., [1986, 30p.] SR 86-02 Freezing effect on waste contaminants. Iskandar, I.K.

Technology and costs of wastewater application to forest sys- tems Crites, R.W., et al, [1986, p 349-355] MP 2266	Chemistry of interstitial water from subsea permafrost, Prudhoe Bay, Alaska Iskandar, I.K., et al, [1978, p 92- 98] MP 1385	Traveling wave solutions of saturated-unsaturated flow through porous media Nakano, Y., (1980, p.117-122) MP 1278
Forest land treatment with municipal wastewater in New England Reed, S.C., et al., 1986, p.420-4301	Guide to the use of 14N and 15N in environmental research. Edwards, A.P., (1978, 77p) SR 78-18	Water and air horizontal flow in porous media. Nakano, Y, [1980, p.81-85] MP 1341
Military wastewater treatment systems in cold regions.	Blank corrections for ultratrace atomic absorption analysis Cragin, J.H., et al. [1979, 5p.] CR 79-03	Water and air vertical flow through porous media. Nakano, Y, [1980, p 124-133] MP 1342
Reed, S.C., [1986, 23p.] CR 86-07 Removal of trace-level organics by slow-rate land treatment.	Spray application of wastewater effluent in Vermont. Cassell, E.A., et al., [1979, 38p] SR 79-06	Inlet current measured with Seasat-1 synthetic aperture radar Shemdin, O H., et al, [1980, p 35-37] MP 1443
Parker, L.V., et al, [1986, p.1417-1426] MP 2170	Dissolved nitrogen and oxygen in lake water Leggett, D.C.,	Traveling wave solution to the problem of simultaneous flow
Of: Overland flow wastewater treatment at Easley, S.C. Martel, C.J., et al, [1986, p 1078-1079; MP 2300	[1979, 5p.] SR 79-24 Mercury contamination of water samples Cragin, J H.,	of water and air through homogeneous porous media. Nakano, Y., (1981, p 57-64) MP 1419
Treatment and disposal of alum and other metallic hydroxide	(1979, p.313-319) MP 1270	Linearized Boussinesq groundwater flow equation Daly.
sludges. Reed, S.C., et al, [1987, 40p. + plates] SR 87-05	Land treatment of waste water in cold climates T.F., et al, (1979, p 207-214) MP 1279	C J., et al, (1981, p.875-884) MP 1470 Asymmetric flows application to flow below ice jams.
Experimental methods for decontaminating soils by freezing Ayorinde, O A, et al., [1988, 12p] MP 2513	Remote sensing of water quality using an airborne spec- troradiometer. McKim, H L., et al., [1980, p.1353-1362]	Gögüs, M., et al., [1981, p 342-350] MP 1733
New approach for sizing rapid infiltration systems Martel,	MP 1491	Tests of frazil collector lines to assist ice cover formation. Perham, R.E., [1981, p 442-448] MP 1488
C.J., (1988, p.211-215) MP 2323 Rational design of sludge freezing beds Martel, C.J.,	Overland flow removal of toxic volatile organics Jenkins, T.F, et al. (1981, 16p.) SR \$1-01	Model for prediction of nitrate leaching losses in soils Mehran, M., et al. (1981, 24p.) CR 81-23
(1988, p.575-581) MP 2343	Seven-year performance of CRREL slow-rate land treatment	Model study of Port Huron ice control structure, wind stress
Contaminant transport in freezing soils. Ayorinde, O.A., et al, [1988, 29p.] MP 2514	prototypes Jenkins, T.F., et al. [1981, 25p.] SR 81-12	simulation. Sodhi, D.S., et al, (1982, 27p) CR \$2-09
Primary effluent as a heat source for heat pumps Phette-	Halocarbons in water using headspace gas chromatography. Leggett, DC, 21981, 13p SR 81-26	Theory of thermal control and prevention of ice in rivers and lakes Ashton, GD, 1982, p.131-1851 MP 1554
place, G.E., et al., [1988, p. 141-146] MP 2445 Waste management practices in Antarctica Sletten, R.S., et	Limnology of Lake Koocanusa, Montana. Storm, P.C., et al,	lakes Ashton, G.D., [1982, p.131-185] MP 1554 Application of HEC-2 for ice-covered waterways. Calkins,
al, [1989, p.122-130] MP 2464	[1982, 597p] SR 82-23 Water quality measurements at six reservoirs. Parker, L.V.,	D J., et al. (1982, p 241-248) MP 1575
Thermal conductivity of sludges. Vesilind, P.A., et al. (1989, p 241-245) MP 2632	et al, [1982, 55p] SR 82-30	Evaluation of procedures for determining selected aquifer parameters Daly, CJ, (1982, 104p) CR 82-41
Waste management practices of the United States Antarctic	Isothermal compressibility of water mixed with montmorillo- nite. Oliphant, J.L., et al, [1983, p 45-50] MP 2066	Tailwater flow conditions. Ferrick, M.G., et al. (1983, 31p.) CR 83-07
Program. Reed, S.C., et al, [1989, 28p] SR 89-3 Development and design of sludge freezing beds. Martel,	Polyvinyl chloride pipes and ground water chemistry. Parker, L.V., et al, [1985, 27p.] SR 85-12	Asymmetric plane flow with application to ice jams Tatin-
C.J., [1989, p 799-808] MP 2556	Reversed-phase high-performance liquid chromatographic	claux, J.C., et al. (1983, p 1540-1556) MP 1645 Boundary value problem of flow in porous media Nakano,
Freezing technique for <i>in-situ</i> treatment of contaminated soils. Ayorinde, O.A., et al., [1989, p. 489-498]	determination of nitroorganics in munitions wastewater. Jenkins, TF, et al. [1986, p 170-175] MP 2049	Y , (1983, p.205-213) MP 1721
MP 2515 Low-temperature effects on systems for composting explo-	Monitoring seasonal changes in seafloor temperature and salinity Sellmann, PV, et al, [1986, p 110-114]	Procedure for calculating groundwater flow lines [1984, 42p] Daly, C.J., SR 84-09
sives-contaminated soils Ayorinde, O A, et al, (1989,	MP 2147	Diffusivity of horizontal water flow through porous media. Nakano, Y., (1985, p 26-31) MP 1881
18p; SR 89-38 Sludge dewatering by natural freeze-thaw Martel, C.J.,	Winter water quality in lakes and streams. Calkins, DJ, et al, [1988, 8p] MP 2507	Experimental measurement of channeling of flow in porous
[1990, p 116-122] MP 2714 Effect of freeze-thaw cycles on soils Chamberlain, E., et al.	Ion-pairing RP-HPLC method for determining tetrazene in	media Oliphant, J.L., et al. (1985, p.394-399) MP 1967
(1990, p.145-155) MP 2678	water and soil Walsh, M.E., et al., [1989, p. 159-179] MP 2593	Heat transfer in water over a melting ice sheet Lunardini, V J. (1986, p 227-236) MP 2033
Wastes Effects of wastewater application on forage grasses. Palazzo,	Solvent extraction for solute preconcentration from water. Leggett, D.C., et al, [1990, p. 1355-1356] MP 2743	Heat transfer in water flowing over a horizontal ice sheet.
A.J., [1976, 8p] CR 76-39	Water content	Lunardini, V.J., et al. (1986, 81p) CR 86-03 Laboratory study of flow in an ice-covered sand bed channel.
Land application of wastewater in permafrost areas Sletten, R.S. (1978, p 911-917) MP 1110	Roof moisture survey ten State of New Hampshire buildings Tobiasson, W, et al. (1977, 29p) CR 77-31	Wuebben, J.L., [1986, p.3-14] MP 2123
Uptake of nutrients by plants trigated with wastewater. Clapp, C E., et al, [1978, p 395-404] MP 1151	Strength of frozen silt as a function of ice content and dry unit weight. Sayles, F.H., et al., [1980, p.109-119]	Sorption of chemical agents and simulants Leggett, D.C., SR 87-18
Guide to the use of 14N and 15N in environmental research.	MP 1451	Effects of an ice cover on flow in a movable bed channel. Wuebben, J L., [1988, p 137-146] MP 2499
Edwards, A.P., [1978, 77p] SR 78-18 Halocarbons in water using headspace gas chromatography	Observations of moisture migration in frozen soils during thawing. Cheng, G., et al. (1988, p. 308-312)	Flow developers for melting ice-experimental results Ash-
Leggett, D C, (1981, 13p) SK 81-26 Water	MP 2373 Nonlinear problems in the study of water movement in frozen	ton, G.D., [1989, p. 151-160] MP 2465 Hydraulic model of overland flow on grass covered slopes.
Continuous monitoring of total dissolved gases, a feasibility	soils Nakano, Y., (1989, p 383-393) MP 2719 Data acquisition, first the FERF then the world Knuth,	Adrian, D.D., et al. [1989, p 569-578] MP 2710 Heat transfer from water flowing through a chilled-bed open
study. Jenkins, T.F., [1975, p 101-105] MP 851 Effects of wastewater application on forage grasses Palazzo,	K.V., (1989, p.136-138) MP 2567	channel. Richmond, P.W., et al. (1989, p 51-58) MP 2649
A J., (1976, 8p ₁ CR 76-39	Resilient modulus determination for frost conditions. Chamberlain, E.J., et al. (1989, p. 320-333) MP 2569	Jökulhlaup involving a potholed glacier in AK. Sturm, M.
Proceedings of the second planetary water and polar processes colloquium, 1978, 1978, 209p MP 1193	Water erosion	et al. [1990, p 125-126] MP 2708 Water intakes
Measurement of the shear stress on the underside of simulated ice covers. Calkins, D J., et al, [1980, 11p]	Lock wall descing with high velocity water jet at Soo Locks, Mi. Calkins, D J, et al. (1977, p 23-35) MP 973	Entrainment of ice floes into a submerged outlet. Stewart,
CR 80-24	Water films Adsorption force theory of frost heaving. Takagi, S., (1980,	D.M., et al. (1978, p. 291-299) MP 1137 Ice blockage of water intakes Carey, K.L., (1979, 27p.)
Horizontal infiltration of water in porous materials Nakano, Y., [1982, p 156-166] MP 1840	p.57-81) MP 1334	MP 1197
Effects of water and ice on the scattering of diffuse reflectors Jezek, K.C. et al. (1986, p. 259-269) MP 2664	Preliminary study of friction between ice and sled runners ltagaki, K. et al. [1987, p.297-301] MP 2358	Inlet current measured with Seasat-1 synthetic aperture radar Shemdin, O.H., et al. (1980, p. 35-37) MP 1443
Water balance	Kinetic friction of snow. Colbeck, S.C., [1988, p.78-86] MP 2339	Inlet current measured with Seasat-1 synthetic aperture radar. Shemdin, O.H., et al., [1980, p. 35-37] MP 1481
Scientists visit Kolyma Water Balance Station in the USSR. Slaughter, C.W., et al. [1977, 66p] SR 77-15	Water flow	Hydraulic model study of a water intake under frazil ice conditions Tantillo, T.J., [1981, 11p.] CR 81-03
Subarctic watershed research in the Soviet Union Slaugh- ter, CW, et al. (1978, p.305-313) MP 1273	Circulation and sediment distribution in Cook Inlet, Alaska Gatto, L.W., [1976, p 205-227] MP 895	Lake water intakes under icing conditions Dean, AM, Jr,
Mass water balance during spray irrigation with wastewater at	Effects of radiation penetration on snowmelt runoff hydrographs Colbeck, S.C., [1976, p.73-82] MP 948	[1983, 7p] CR #3-15 Modeling intake peformance under frazil ice conditions.
Deer Creek Lake land treatment site Abele, G, et al. (1978, 43p) SR 79-29	Water flow through veins in ice Colbeck, S.C. (1976, Sp.)	Dean, A.M., Jr., (1984, p.559-563) MP 1797 Intake design for tee conditions. Ashton, G.D., (1988,
Water chemistry	CR 76-06 Analysis of water flow in dry snow Colbeck, S.C., £1976.	p 107-138 ₃ MP 2518
Land treatment of wastewater Murrmann, RP, et al. [1976, 36p] MP 920	p 523-527; MP 871 Potential river ice jams at Windsor, Vermont Calkins, D J.,	Development of an underwater frazil-ice detector. Daly. SF, et al. (1990, p. 77-82) MP 2702
Effect of open water disposal of dredged sediments. Blom, B.E., et al. [1976, 183p] MP 967	et al. (1976, 31p) CR 76-31	Water level Clearing ice-clogged shipping channels Vance. G.P.,
Reclamation of wastewater by application on land Iskandar,	Computer routing of unsaturated flow through snow Cucker, W.B., et al. (1977, 44p) SR 77-10	(1980, 13p) CR 80-28
I.K., et al. (1976, 15p.) MP 896 Baseline data on the oceanography of Cook Inlet, Alaska	Heat transfer over a vertical melting plate Yen, Y-C. et al. (1977, 12p.) CR 77-32	Breakup of solid ice covers due to rapid water level variations. Billfalk, L., (1982, 17p) CR 82-03
Gatto, L.W., [1976, 84p] CR 76-25 Effects of wastewater application on forage grasses Palazzo,	Physical aspects of water flow through snow. Colbeck, S.C., (1978, p. 165-206) MP 1566	Field tests of a frost-heave model Guymon, G.L., et al., [1983, p.409-414] MP 1657
A J., (1976, 8p.) CR 76-39	Entrainment of ice floes into a submerged outlet Stewart.	Wetlands for wastewater treatment in cold climates Reed,
Rapid infiltration of primary sewage effluent at Fort Devens, Massachusetts Satterwhite, M.B., et al (1976, 34p)	D.M. et al. (1978, p. 291-299) MP 1137 Study of water drainage from columns of snow Denoth, A.	S.C. et al. (1984, 9p. + figs.) MP 1945 Effect of ice cover on hydropower production Yapa, P.D.
CR 76-48 Effects of wastewater on the growth and chemical composi-	et al. (1979, 19p.) CR 79-01 Point source bubbler systems to suppress ice Ashton, G.D.	et al. (1984, p. 231-234) MP 1876 Uplifting forces exerted by adfrozen ice on marine piles.
tion of forages Palazzo, AJ, (1977, p.171-180) MP 975	(1979, 12p) CR 79-12	Christensen, F.T. et al. (1985, p.529-542) MP 1905
Wastewater treatment at Calumet, Michigan Baillod, C.R.,	Water flow through heterogeneous snow Colbeck, S.C., (1979, p. 37-45) MP 1219	Potential solution to ice jam flooding Salmon River, Idaho Earickson, J., et al. (1986, p. 15-25) MP 2131
et al. (1977, p 489-510) MP 976 Determination of TNT in water by conversion to nitrate	Water movement in a land treatment system of wastewater by overland flow Nakano, Y, et al. (1979, p. 185-206)	Preliminary study of scour under an ice jam Wuebben, J. L., [1988, p. 177-192] MP 2475
Leggett, D.C. (1977, p. 880) MP 980	MP 1285	Seasonal distribution of low flow events in New Hampshire
Water quality measurements at Lake Powell, Utah Merry, C.J., (1977, 38p.) SR 77-28	Remote sensing of water circulation in Grays Harbor, Washington, Gatto, L.W., [1980, p.289-323] MP 1283	streams with emphasis on the winter period Melloh, R.A., [1990, p.47-53] MP 2681

Miles and a second control of the second con	M. Artista de Constituir de la constitui	Programme to the state of the s
Water pipelines Long distance heat transmission with steam and hot water.	Model study of Port Huron ice control structure, wind stress simulation Sodhi, DS, et al. [1982, 27p]	Free convection heat transfer characteristics in a melt water layer. Yen, YC. (1980, p.550-556) MP 1311
Aamot, H.W C., et al, (1976, 39p) MP 938	CR 82-09	Bottom heat transfer to water bodies in winter. O'Neill, K,
Cold climate utilities delivery design manual. Smith, D.W.,	Field tests of a frost-heave model Guymon, GL, et al,	et al. (1981, 8p) SR \$1-18
et al, (1979, c300 leaves) MP 1373	[1983, p 409-414] MP 1657	River ice suppression by side channel discharge of warm wa-
Simplified design procedures for heat transmission system piping Phetteplace, G., [1985, p 451-456] MP 1979	Investigation of transient processes in an advancing zone of freezing McGaw, R, et al, (1983, p.821-825)	ter. Ashton, G.D., [1982, p 65-80] MP 1528 Forecasting water temperature decline and freeze-up in rivers.
Water pipes	MP 1663	Shen, H.T., et al. (1984, 17p) CR 84-19
Freeze damage prevention in utility distribution lines	Water reserves	USACRREL precise thermistor meter Trachier, GM, et
McFadden, T., [1977, p 221-231] MP 929	Remote sensing data for water masses in Delaware Bay and adjacent wetlands Ackleson, S.G., et al., [1985, p. 1123-	al, (1965, 34p) SR 85-26 Heat transfer in water flowing over a horizontal ice sheet
Freeze damage protection for utility lines. McFadden, T., (1977, p.12-16) MP 953	1129 ₁ MP 1909	Lunardini, V.J., et al., [1986, 81p] CR 86-03
Heat transmission with steam and hot water. Aamot,	Water retention	Bubblers and pumps for melting ice. Ashton, G.D., (1986,
H W.C., et al, [1978, p.17-23] MP 1956	Analysis of water flow in dry snow. Colbeck, S.C., [1976, p 523-527] MP 871	p 223-234 ₁ MP 2133
Modeling intake performance under frazil ice conditions	Soil hydraulic conductivity and moisture retention features	Monitoring seasonal changes in seafloor temperature and salimity. Selimann, P.V., et al., (1986, p.110-114)
Dean, A.M., Jr., [1984, p 559-563] MP 1797 Heat distribution research. Pheticplace, G, [1986, p.2-3]	Ingersoll, J., (1981, 11p) SR 81-02	MP 2147
MP 2150	Laboratory and field use of soil tensiometers above and below 0 deg C. Ingersoil, J., (1981, 17p) SR \$1-07	Forecasting of snowmelt runoff using water temperature data.
Water-source heat pumps Phetteplace, G., 1986, p.14-	Design and performance of water-retaining embankments in	Pangburn, T., (1987, p.108-113) MP 2398
15 ₁ MP 2151	permafrost. Sayles, F.H., [1984, p 31-42] MP 1850	Forecasting river water temperatures Daly, S.F., (1988, p. 180-188) MP 2500
Water pollution Baseline data on tidal flushing in Cook Inlet, Alaska Gatto,	WATER SUPPLY	Scafloor temperature and thermal conductivity Sellmann,
L.W., (1973, 11p.) MP 1523	Water supply in cold regions. Alter, A.J., (1969, 85p.) M III-C5a	P V, et al, (1989, 19p) CR 89-01 Seafloor temperature and thermal conductivity. Sellmann.
Land treatment of wastewaters for rural communities Reed,	Utilities on permanent snowfields Mellor, M. [1969,	Seafloor temperature and thermal conductivity. Sellmann, P.V., et al, (1989, 19p.) CR 89-01
S.C., et al. (1975, p 23-39) MP 1399 Land treatment in relation to waste water disposal. Howells,	42p) M III-A2d	Remote water-temperature measurement. Daly, S., (1989,
D.H., et al, (1976, p 60-62) MP 869	Water supply Towing icebergs Lonsdale, HK, et al. (1974, p 2)	6p 3 MP 2722
Effect of open water disposal of dredged sediments Blom,	MP 1020	Water transport Mechanisms of crack growth in quartz. Martin, R.J., III, et
BE, et al, (1976, 183p) MP 967 Thermal pollution studies of French Creek, Eielson AFB,	Snow accumulation for arctic freshwater supplies Slaughter,	al, [1975, p 4837-4844] MP 855
Alaska. McFadden, T., [1976, 5p] CR 76-14	C.W., et al, [1975, p 218-224] MP 860 Computer simulation of the snowmelt and soil thermal regime	Effects of ice on the water transport in frozen soil. Nakano,
Land treatment of wastewater at a subarctic Alaskan location.	at Barrow, Alaska. Outcalt, S I., et al, [1975, p.709-715]	Y, et al, [1983, p.15-26] MP 1601 Soil-water diffusivity of unsaturated frozen soils at subzero
Sletten, R.S., et al. (1976, 21p) MP 868	MP \$57	temperatures Nakano, Y, et al. (1983, p 889-893)
Land treatment of wastewater in subarctic Alaska Sletten, R.S., et al, [1977, p 533-547] MP 1268	Utility distribution systems in Sweden, Finland, Norway and England Aamot, H.W.C., et al, (1976, 121p)	MP 1664
Health aspects of water reuse in California. Reed, S.C.,	SR 76-16	Effects of ice content on the transport of water in frozen soils. Nakano, Y., et al. (1984, p 28-34) MP 1841
[1979, p.434-435] MP 1404	Field performance of a subarctic utundor. Reed, S.C., [1977, p.448-468] MP 933	Role of heat and water transport in frost heaving of porous
Atmospheric pollutants in snow cover runoff. Colbeck, S.C., (1981, p.1383-1388) MP 1487	(1977, p 448-468) MP 933 Obtaining fresh water from icebergs Mellor, M., (1977,	soils. Nakano, Y., et al, (1984, p.93-102) MP 1842
Limnology of Lake Koocanusa, MT, the 1967-1972 study.	p.193 ₁ MP 1117	Effects of ice content on the transport of water in frozen soil. Nakano, Y, et al. (1984, p.58-66) MP 1843
Bonde, T.J.H, et al. (1982, 184p) SR 82-21	Some elements of iceberg technology Weeks, W.F. et al.	Nakano, Y, et al. (1984, p.58-66) MP 1843 Transport of water in frozen soil Nakano, Y., et al. (1984,
Energy conservation and water pollution control facilities Martel, C.J., et al. (1982, 18p) SR 82-24	[1978, p 45-98] MP 1616 Fresh water supply for an Alaskan village. McFadden, T, et	p.172-179) MP 1819
Limnology of Lake Koocanuss, Montana. Storm, P.C., et al.	al, [1978, 18p] SR 78-07	Nonlinear problems in the study of water movement in frozen soils. Nakano, Y, 1989, p 383-3931 MP 2719
(1982, 597p) SR 82-23	Water resources by satellite. McKim, H.L., (1978, p 164- 169) MP 1090	soils. Nakano, Y., [1989, p 383-393] MP 2719 Transport of water due to a temperature gradient in unsaturat-
Water quality measurements at six reservoirs Parker, L.V., et al. (1982, 55p) SR 82-30	Cold climate utilities delivery design manual Smith, D.W.,	ed frozen clay. Nakano, Y, et al. [1990, p.57-75]
Nitrogen removal in wastewater stabilization ponds Reed,	et al. (1979, c300 leaves) MP 1373	WATER TREATMENT
S C, (1983, 13p + figs) MP 1943	Bibliography on techniques of water detection in cold regions. Smith, D.W., comp. {1979, 75p ₁ SR 79-10	Water supply in cold regions Alter, A.J. (1969, 859)
Impact of dredging on water quality at Kewaunee Harbor, Wiscons:n Iskandar, I.K., et al. [1984, 16p]	Detection of Arctic water supplies with geophysical tech-	M 111-C5a
CR 84-21	niques. Arcone, S.A., et al. (1979, 30p.) CR 79-15	Water treatment
Chemical analysis of munitions wastewater. Jenkins, T.F., et	Case study fresh water supply for Point Hope. Alaska McFadden, T. et al. (1979, p.1029-1040) MP 1222	Land disposal, state of the art Reed, S.C., (1973, p.229- 261 ₃ MP 1392
al, [1984, 95p] CR 84-29 Toxic organics removal kinetics in overland flow land treat-	Tundra lakes as a source of fresh water Kipnuk, Alaska	Wastewater reuse at Livermore, California Uiga, A. et al,
ment. Jenkins, T.F., et al. (1985, p. 707-718)	Bredthauer, S.R., et al. (1979, 16p) SR 79-30	(1976, p 511-531) MP 870
MP 2111	Iceberg water: an assessment. Weeks, WF, (1980, p.5- 10) MP 1365	Land treatment of wastewater. Murrmann. R P., et al. (1976, 36p.) MP 920
Polyvinyl chloride pipes and ground water chemistry. Park- er, L.V., et al. (1985, 27p.) SR 85-12	Developing a water well for the ice backfilling of DYE-2	Reclamation of wastewater by application on land Iskandar,
Chromatographic determination of nitroorganics in plant	Rand, J H., (1982, 19p) SR 82-32	I.K., et al. (1976, 15p) MP 896
wastewater Bauer, C.F., et al. [1986, p.176-182] MP 2050	Water supply and waste disposal on permanent snow fields Reed, S.C., et al., £1984, p. 401-413; MP 1714	Wastewater renovation by a prototype slow infiltration land treatment system liskandar, I.K., et al., (1976, 44p.) CR 76-19
Floating debris control, a literature review Perham, R.E.	Utility services for remote military facilities Reed, S.C., et	
[1987, 22p + 41p of append] MP 2252	al, (1984, 66p) SR 84-14	Impact of urban wastewater reuse in cold regions on land treatment systems — Iskandar, I K., (1976, 32p.)
Extraction solvents for determination of volatile organics in	Water supply and waste disposal in Greenland and Antarc- tica Reed, S.C., et al. (1985, p. 344-350) MP 1792	MP 2452
soil. Jenkins, T.F., et al. (1987, 26p) SR 87-22 Water quality during winter river navigation seasons Slet-	Assessment of a field water purification unit. Bouzoun, JR,	Overview of land treatment from case studies of existing sys-
ten, R.S. [1988, 56p.] SR 88-10	ct al. (1986, 6p) SR 86-20	tems Uga, A, et al. (1976, 26p.) MP 891 Wastewater treatment in cold regions. Sletten, RS, et al.
Development of analytical methods for military-unique com-	Remote sensing and water resources McKim, H L, et al. [1987, p 186-190] MP 2535	(1976, 15p) MP 965
pounds Walsh, M.E., et al. (1988, p. 370-380) MP 2454	Field water supply on the winter battlefield Bouroun, JR.	Rapid infiltration of primary sewage effluent at Fort Devens,
Influence of well casing materials on chemical species in	t1988, 7p; SR 88-02 Waste management practices of the United States Antarctic	Massachusetts Satterwhite, M.B., et al. (1976, 34p.) CR 76-48
ground water Parker, L.V., et al, [1988, p 450-461] MP 2456	Program Reed, S C., et al. (1989, 28p 1 SR 89-3	Treatment of primary sewage effluent by rapid infiltration
Development of a membrane for m-situ optical detection of	Investigation of the LIZ-3 Dew Line Station water supply	Satterwhite, M.B., et al. (1976, 15p) CR 76-49
TNT. Zhang, Y., et al. (1988, op.) SR 88-24	lake Kovacs, A. (1990, 10p) SR 90-11 Water table	Wastewater treatment at Calumet, Michigan. Baillod, CR, et al, £1977, p 489-510; MP 976
Influence of well casing composition on trace metals in ground water. Hewitt, A.D., (1989, 18p.) SR 89-09	Periodic structure of New Hampshire silt in open system	Wastewater reuse at Livermore, California Uiga, A, et al.
Single fiber measurements for remote optical detection of	freezing McGaw, R., (1977, p 129-136) MP 902	(1977. p 511-531; MP 979
TNT. Zhang, Y , et al. (1989, 7p) SR 89-18	Application of recent results in functional analysis to the problem of water tables. Nakano Y. (1979, p.185-190)	Determination of TNT in water by conversion to nitrate. Leggett, D.C., [1977, p.880] MP 980
Leaching of metal pollutants from well casings Hewitt, AD. (1989, 11p) SR 89-32	MP 1269	Land treatment of wastewater at Manteca, Calif., and Quincy,
Influence of well casings on well water. Hewitt, A.D. et al.	Water and air vertical flow through porous media Nakano, Y. (1980, p. 124-133) MP 1342	Washington Iskandar, I K . et al. (1977, 34p) CR 77-24
(1989, 9p) MP 2717	Radar profiling of buried reflectors and the groundwater table	Land treatment of wastewater at West Dover, Vermont.
Well casings for monitoring trace organics in ground water Parker, L.V., et al. (1989, 29p) CR 89-18	Sellmann, P.V., et al. (1983, 16p.) CR 83-11	Bouzoun, J.R., (1977, 24p.) SR 77-33
Analytical methods for determining nitroguanidine in soil and	Water temperature Temperature and flow conditions during the formation of	Municipal sludge management environmental factors. Reed, S.C., ed., [1977, Var. p.] MP 1406
water. Walsh, M.E., (1989, 27p.) SR 89-35	river ice Ashton, G.D., et al. (1970, 12p.)	Wastewater treatment alternative needed Iskandar, I K . et
Environmental transformation of nitroaromatics and nitra- mines Walsh, M E., (1990, 21p.) SR 90-02	MP 1723	al (1977, p. 82-87) MP 968 I and recomment module of the CARDET stateon Metry
Surface changes in well casings exposed to organic pollutants	Radiation and evaporation heat loss during ice fog conditions McFadden, T. (1975, p. 18-27) MP 1051	Land treatment module of the CAPDET program Merry, CJ, et al. (1977, 4p.) MP 1112
Taylor, S. et al. (1990, 14p) SR 90-07	Compressive and shear strengths of fragmented ice covers	Land application of wastewater in permafrost areas. Sletten,
Influence of casing materials on trace-level chemicals in well water Parker, L.V., et al. (1990, 11p) MP 2720	Cheng, S.T., et al. [1977, 82p.] MP 951. Heat transmission with steam and hot water. Aamot,	R S. (1978, p. 911-917) MP 1110 Lysimeters validate wastewater tenovation models liskan-
Water pressure	Heat transmission with steam and hot water. Aamot, HWC, et al., [1978, p.17-23] MP 1956	dar, I.K. et al. 11978, 11p. SR 78-12
Water flow through veins in ice Colbeck, S.C. (1976, 5p.)	Break-up of the Yukon River at the Haul Road Bridge 1979	Land treatment present status, future prospects Pound,
On the use of tensiometers in snow hydrology Colbeck,	Stephens, C.A., et al. (1979, 22p. + Figs.) MP 1315 Winter thermal structure, ice conditions and climate of Lake	CE, et al. (1978, p.98-102) MP 1417 Symposium on land treatment of wastewater, CRREL, Aug.
S C., (1976, p 135-140) MP 843	Champlain. Bates, R.E., (1980, 26p.) CR 80-02	1978, (1978, 2 vols.) MP 1145

Remote sensing for land treatment site selection. Merry,	Forage grass growth on overland flow systems Palazzo,	Nitrogen behavior in soils irrigated with liquid waste Selim
C.J., t1978, p.107-119; MP 1146 NO3-N in percolate water in land treatment Iskandar, I K,	A.J., et al, ti980, p.347-354; MP 1402 Spray application of waste-water effluent in a cold climate	H.M., et al. (1984, p.96-108) MP 176: Problems with rapid infiltration—a post mortem analysis
et al. (1978, p 163-169) MP 1148	Cassell, E A, et al. (1980, p 620-626) MP 1403	Reed, S.C., et al. (1984, 17p + figs.) MP 194
Nitrogen behavior in land treatment of wastewater, a simplified model. Selim, H.M., et al., [1978, p.171-179]	Effectiveness of land application for P removal from waste water. Iskandur, I.K., et al. (1980, p 616-621)	Wetlands for wastewater treatment in cold climates. Reed S.C., et al. (1984, 9p. + figs.) MP 1949
MP 1149 Overview of existing land treatment systems Iskandar, I.K.	MP 1444	Impact of slow-rate land treatment on groundwater quality
[1978, p.193-200] MP 1150	Overland flow, removal of toxic volatile organics. Jenkins, T.F., et al, [1981, 16p] SR 81-01	toxic organics. Parker, L.V., et al, [1984, 36p.] CR 84-36
Uptake of nutrients by plants irrigated with wastewater. Clapp, C.E., et al. (1978, p.395-404) MP 1151	Toxic volatile organics removal by overland flow land treat- ment. Jenkins, T.F., et al. (1981, 14p.) MP 1421	Maintaining frosty facilities Reed, S.C., et al. (1935, p.9- 15) MP 1949
Performance of overland flow land treatment in cold climates	ment. Jenkins, T.F., et al, (1981, 14p) MP 1421 Aquaculture for wastewater treatment in cold climates	15] MP 1949 Overland flow wastewater treatment at Easley, S.C. Aberna
Jenkins, T.F. et al, [1978, p 61-70] MP 1152 Microbiological aerosols during wastewater irrigation Bau-	Reed, S.C., et al, (1981, p.482-492) MP 1394	thy, A.R., et al. (1985, p 291-299) MP 218:
sum, H.T., et al, [1978, p 273-280] MP 1154	Seasonal growth and accumulation of N, P, and K by grass irrigated with wastes. Palazzo, A.J., [1981, p 64-68]	Prevention of freezing of wastewater treatment facilities Reed, S.C., et al. [1985, 49p] SR 85-1
Computer procedure for comparing wastewater treatment systems. Spaine, P.A., et al, (1978, p 335-340)	MP 1425	Heat recovery from primary effluent using heat pumpe
MP 1155	Hydraulic characteristics of the Deer Creek Lake land treat- ment site during wastewater application Abele, G, et al.	Phetteplace, G., et al, [1985, p.199-203] MP 1971 Cold weather O&M. Reed, S.C., et al, [1985, p.10-15]
Waste water reuse in cold regions. Iskandar, I.K., 1978, p 361-368; MP 1144	(1981, 37p) CR 81-07 Seasonal growth and uptake of nutrients by orchardgrass irri-	MP 2070
Mass water balance during spray irrigation with wastewater at	gated with wastewater Palarzo, A J, et al, [1981, 19p]	Toxic organics removal kinetics in overland flow land treat ment. Jenkins, T.F., et al. (1985, p. 707-718)
Deer Creek Lake land treatment site. Abele, G., et al, (1978, 43p) SR 79-29	CR \$1-08 Seven-year performance of CRREL slow-rate land treatment	MP 211 Reversed-phase high-performance liquid chromatographic
Land treatment climatic survey at CRREL. Bilello, M.A. et	prototypes Jenkins, T.F., et al. (1981, 25p)	determination of nitroorganics in munitions wastewater
al, [1978, 37p] SR 78-21 Computer file for existing land application of wastewater sys-	SR 81-12 Wastewater treatment by a prototype slow rate land treatment	Jenkins, TF, et al. (1986, p.170-175) MP 2049 Chromatographic determination of nitroorganics in plan
tems. Iskandar, I.K., et al. (1978, 24p) SR 78-22	system. Jenkins, T.F., ct al, (1981, 44p) CR 81-14	wastewater. Bauer, C.F., et al, [1986, p.176-182]
Experimental system for land renovation of effluent Ny- lund, J.R., et al, [1978, 26p] SR 78-23	Site selection methodology for the land treatment of wastewa- ter. Ryan, J.R., et al. (1981, 74p.) SR \$1-28	MP 2050 Nitrogen removal in cold regions trickling filter systems
Wastewater stabilization pond linings Middlebrooks, E.J.,	Vegetation selection and management for overland flow sys-	Reed, S.C., et al. (1986, 39p) SR 86-02
et al. (1978, 116p) SR 78-28 Five-year performance of CRREL land treatment test cells	tems Palazzo, A.J., et al. (1982, p 135-154) MP 1511	Corps of Engineers Land Treatment Research and Develop ment program Iskandar, I K., (1986, p.17-18)
Jenkins, T.F., et al, (1978, 24p) SR 78-26	Overview of models used in land treatment of wastewater	MP 214
Cold climate utilities delivery design manual Smith, D.W., et al., (1979, c300 leaves) MP 1373	Iskandar, I.K., (1982, 27p ₁ SR 82-01 Nutrient film technique for wastewater treatment Bouzoun,	Assessment of a field water purification unit. Bouzoun, J R. et al. (1986, 6p) SR 86-26
Kinetics of denitrification in land treatment of wastewater.	J.R , et al. (1982, 15p) SR \$2-04	Problems and opportunities with winter wastewater treat
Jacobson, S, et al. (1979, 59p) SR 79-04 Spray application of wastewater effluent in Vermont Cas-	Wastewater treatment and plant growth. Palazzo, A.J., 1982, 21p ₁ SR 82-05	ment. Reed, S.C., [1986, p.16-20] MP 220: Technology and costs of wastewater application to forest sys
sell, E.A., et al. (1979, 38p) SR 79-06	Overland flow, an alternative for wastewater treatment.	tems. Crites, R.W., et al. (1986, p. 349-355)
Health aspects of water reuse in California. Reed, S.C., [1979, p.434-435] MP 1404	Martel, C.J., et al. (1982, p. 181-184) MP 1506 Heat pumps to recover heat from waste treatment plants	MP 2266 Forest land treatment with municipal wastewater in Nev
Nitrification inhibitor in land treatment of wastewater in cold	Martel, C.J., et al. (1982, 23p) SR 82-10	England Reed, S.C., et al. [1986, p 420-430]
regions. Elgawhary, S M , et al, [1979, 25p] SR 79-18	Premoval during land treatment of wastewater Ryden, J.C., et al., [1982, 12p] SR 82-14	MP 2286 Military wastewater treatment systems in cold regions
Freezing problems with wintertime wastewater spray irriga-	Wastewater treatment in Alaska Schneiter, RW, et al.	Reed, S.C., (1986, 23p) CR 86-0
tion Bouzoun, J.R., (1979, 12p.) SR 79-12 Soil characteristics and climatology during wastewater ap-	[1982, p 207-213] MP 1696 Land treatment of wastewater Reed, S.C., [1982, p 91-	Removal of trace-level organics by slow-rate land treatment Parker, L.V., et al., (1986, p.1417-1426) MP 2176
plication at CRREL Iskandar, I.K., et al. (1979, 82p.) SR 79-23	123 ₁ MP 1947	Of: Overland flow wastewater treatment at Easley, S.C.
Water movement in a land treatment system of wastewater by	Removal of trace organics by overland flow Leggett. D.C., et al., [1982, p 176-184] MP 2442	Martel, C.J., et al., (1986, p. 1078-1079) MP 2300 Treatment and disposal of alum and other metallic hydroxide
overland flow Nakano, Y, et al. [1979, p.185-206] MP 1285	Wastewater applications in forest ecosystems McKim.	sludges Reed, S.C., et al. (1987, 40p + plates)
Health aspects of land treatment Reed, S.C., [1979, 43p]	H.L., et al. (1982, 22p) CR 82-19 Direct filtration of streamborne glacial silt Ross, M.D., et	SR 87-0: New approach for sizing rapid infiltration systems Martel
MP 1389 Cost-effective use of municipal wastewater treatment ponds.	al, [1982, 17p] CR \$2-23	C.J. (1988, p. 211-215) MP 232
Reed, S.C., et al. (1979, p.177-200) MP 1413	Energy conservation and water pollution control facilities. Martel, C.J., et al. 1982, 18p; SR 82-24	Field water supply on the winter battlefield Bouzoun, J.R. [1988, 7p] SR 88-6.
H., et al. (1979, p 201-225) MP 1414	User's index to CRREL land treatment computer programs	Rational design of sludge freezing beds. Martel, C.J. [1988, p.575-581] MP 234:
Design of liquid-waste land application Iskandar, I K.,	and data files. Berggren, P.A., et al. (1982, 65p.) SR \$2-26	[1988, p 575-581] MP 234: Development of analytical methods for military-unique com
(1979, p 65-88) MP 1415 International and national developments in land treatment of	Wastewater treatment by nutrient film technique. Boutoun,	pounds. Walsh, M.E., et al. (1988, p.370-380) MP 245-
wastewater. McKim, H L., et al, (1979, 28p)	JR, et al. (1982, 34p) SR 82-27 Case study of land treatment in a cold climate—West Dover,	Predicting freezing design depth of studge-freezing beds
MP 1420 Bacterial aerosols resulting from wastewater irrigation in	Vermont. Bouzoun, J R, et al, (1982, 96p) CR \$2-44	Martel, C.J., (1988, p.145-156) MP 246 Waste management practices in Antarctica. Sletten, R.S., e
Ohio Bausum, H.T., et al. (1979, 64p) SR 79-32	Heating enclosed wastewater treatment facilities with heat	al, (1989, p 122-130) MP 246
Nitrogen transformations in land treatment Jenkins, T.F., et al. £1979, 32p. SR 79-31	pumps Martel, CJ, et al, (1982, p 262-280) MP 1976	Hydraulic model of overland flow on grass covered slopes Adrian, D.D., et al., (1989, p. 569-578) MP 2710
Cost of land treatment systems Reed, S.C. et al. (1979,	Microbiological aerosols from waste water Bausum, HT, et	New approach for sizing rapid infiltration systems (discussion
135p ₁ MP 1387 Prototype wastewater land treatment system. Jenkins, T.F.,	al. (1983, p.65-75) MP 1578 Assessment of the treatability of toxic organics by overland	and closure) Reed, S.C., et al. (1989, p. 879-882) MP 271;
et al. (1979, 91p) SR 79-35	flow. Jenkins, T.F., et al. (1983, 47p) CR 83-93	Water vapor
Enzyme kinetic model for nitrification in soil amended with ammonium. Leggett, D.C., et al. (1980, 20p.)	Model for land treatment. Pt 1 Baron. JA, et al., g1983, 35p1 SR 83-06	Water vapor adsorption by sodium montmorillonite at -5C Anderson, D.M., et al., [1978, p.638-644] MP 98
Disinfection of wastewater by microwaves Iskandar, I.K. et	Model for land treatment planning, design and operation,	Analysis of water in the Martian regolith Anderson, D.M.
al. (1980, 15p) SR 80-01	Pt 2 Baron, J.A., et al. (1983, 30p.) SR 83-07 Model for land treatment planning, design and operation,	et al. (1979, p. 33-38) MP 1409 Thermal convection in snow. Powers, D.J., et al., (1985,
Wastewater treatment in cold regions by overland flow Martel, C.J. et al, [1980, 14p] CR 80-07	Pt 3 Baron, J.A., et al. (1983, 38p.) SR 83-08	6lp ₁ CR 85-01
Removal of volatile trace organics from wastewater by over-	Corps of Engineers land treatment of wastewater research program: an annotated bibliography Parker, L.V. et al.	Vapor drive maps of the U.S.A. Tobiasson, W., et al., [1986, 7p. + graphs] MP 204
land flow land treatment. Jenkins, TF, et al. (1980, p 211-224) MP 1313	(1983, 82p.) SR 83-09	Water wares
EPA policy on land treatment and the Clean Water Act of	Land application systems for wastewater treatment Reed, S.C., [1983, 26p + figs.] MP 1946	Breakup of solid ice covers due to rapid water level variations Billfalk, L., (1982, 17p) CR 82-0.
1977 Thomas, R.E., et al. (1980, p 452-460) MP 1418	Nitrogen removal in wastewater stabilization ponds Reed.	On zero-inertia and kinematic waves. Katopodes, N.D.
Model for nitrogen behavior in land treatment of wastewater	SC, 1983, 13p + figs 3 MP 1943 Engineering systems for wastewater treatment Loehr, R, et	[1982, p 1381-1387] MP 205; Tailwater flow conditions Ferrick, M.G. et al. [1983,
Selim, H.M., et al. (1980, 49p.) CR 80-12 Nitrogen in an overland flow wastewater treatment system	al, (1983, p.409-417) MP 1948	31p ₁ CR 83-07
Chen, R.L., et al. (1980, 33p) SR 80-16	Wastewater treatment and reuse process for cold regions Bouzoun, J.R., [1983], p.547-5571 MP 2112	Analysis of rapidly varying flow in ice-covered tivers Fer- rick, M.G., [1984, p. 359-368] MP 1833
Dynamics of NH4 and NO3 in cropped soils irrigated with wastewater. Iskandar, I K , et al, (1980, 20p.)	Land treatment research and development program Iskan-	Shoreline erosion processes Orwell Lake, Minnesota Reid
SR 80-27	dar, I K , et al. (1983, 144p) CR 83-20	JR. (1984, 101p) CR 84-3:
Aquaculture systems for wastewater treatment, an engineering assessment. Reed, S.C., et al. (1980, 127p.)	Land treatment processes Merry, C.J. et al., (1983), "9p 1 SR 83-26	Analysis of river wave types Fetrick, M.G., (1985, 17p) CR 85-1;
MP 1422	Water supply and waste disposal on permanent snow fields	River wave response to the friction-inertia balance Ferrick M G, et al., (1987, p. 764-769) MP 223
Aquaculture systems for wastewater treatment Reed, S.C., et al. (1980, p.1-12) MP 1423	Reed, S.C., et al. (1984, p.401-413) MP 1714 Analysis of infiltration results at a proposed North Carolina	Wave-induced bergy bit motion near a floating platform
Removal of organics by overland flow Martel, C.J., et al,	wastewater treatment site Abele, G. et al. [1984, 24p] SR 84-11	Mak, L. M., et al. (1990, p.205-215) MP 2500
Rational design of overland flow systems Martel, C.J., et al,	Ltility services for remote military facilities Reed, S.C., et	Waterproofing Protected membrane roofs in cold regions Aamot, H W C
(1910, p 114 121) MP 1400	al, (1984, 66p.) SR 84-14	et al. (1976, 27p) CR 76-0;
Energy and costs for agricultural rouse of wastewater Slot- ten, R.S., et al. (1980, p.339-346) APP 1401	Nitrogen removal in wastewater ponds Reed, SC, e1984, 26p ; CR 84-13	Water absorption of insulation in protected membrane roofing systems Schaefer, D., 1976, 15p.; CR 76-30

Waterproofing (cont.)	Electromagnetic pulse propagation in dielectric slabs. Arcone. S.A., (1984, p. 1763-1773) MP 1991	Wedges
Enclosing fine-grained soils in plastic moisture barriers. Smith, N., (1978, p 560-570) MP 1089	cone, S.A., [1984, p 1763-1773] MP 1991 Attenuation and backscatter for snow and sleet at 96, 140, and	Intermittent ice forces acting on inclined wedges. Tryde, P., [1977, 26p.] CR 77-26
Load tests on membrane-enveloped road sections. Smith,	225 GHz. Nemarich, J., et al, [1984, p.41-52] MP 1864	Well castags
N., et al. (1978, 16p) CR 78-12 Waterproofing strain gages for low ambient temperatures	Catalog of smoke/obscurant characterization instruments.	Polyvinyl chloride well easings for ground water monitoring. Parker, L.V., et al. (1986, p.92-98) MP 2171
Garfield, D.E., et al. (1978, 20p.) SR 78-15	O'Brien, H.W., et al. (1984, p 77-82) MP 1865	Influence of well casing materials on chemical species in
Construction and performance of membrane encapsulated	Forward-scattering corrected extinction by nonspherical par- ticles. Bohren, C.F., et al., (1984, p 261-271)	ground water Parker, L.V., et al. (1988, p 450-461) MP 2456
soil layers in Alaska Smith, N, (1979, 27p) CR 79-16	MP 1870	Pressure buildup in permafrost pile supports induced by
Roofs in cold regions Tobiasson, W. [1980, 21p]	Discrete reflections from thin layers of snow and ice. Jezek, K.C., et al. (1984, p.323-331) MP 1871	freezeback. Ayorinde, O.A., (1989, p.236-251) MP 2467
MP 1408	K.C. et al. (1984, p.323-331) MP 1871 Analysis of river wave types. Ferrick, M.G. (1985, p.209-	Influence of well casing composition on trace metals in
Roof moisture surveys. Tobiasson, W., et al. [1981, 18p] SR 81-31	220 ₃ MP 1875	ground water Hewitt, A.D., (1989, 18p) SR 89-09
Roof moisture surveys Tobiasson, W., [1982, p 163-166]	Observations of the backscatter from snow at millimeter wavelengths. Berger, R.H., et al, [1986, p 311-316]	Leaching of metal pollutants from well casings. Hewitt, A D., [1989, 11p.] SR \$9-32
MP 1505 Roof blisters Physical fitness building, Fort Lee, Virginia	MP 2665	Influence of well casings on well water. Hewitt, A.D. et al.
Korhonen, C., et al. (1986, 15p) Sr 86-35	Comments on the characteristics of in situ snow at millimeter	[1989, 9p.] MP 2717
Cold regions roof design. Tobiasson, W., (1987, p 457-	wavelengths. Walsh, J., et al, (1986, p.317-320) MP 2666	Well casings for monitoring trace organics in ground water, Parker, L.V., et al. (1989, 29p.) CR 89-18
4583 MP 2243 Vapor retarders for membrane roofing systems Tobiasson.	River wave response to the friction-inertia balance Ferrick,	Surface changes in well casings exposed to organic pollutants.
W., (1989, p 31-37) MP 2489	M.G., et al. (1987, p.764-769) MP 2237 Obscuration and background dynamics in and over snow.	Taylor, S., et al. (1990, 14p) SR 90-07
Watersheds	Hogan, A.W., (1987, p.181-185) MP 2417	Influence of casing materials on trace-level chemicals in well water. Parker, L.V., et al. (1990, 11p.) MP 2728
High-latitude basins as settings for circumpolar environmental studies. Slaughter, C.W., ct al. (1975, p 1V/57-	Seismic and acoustic wave propagation: working group report.	Wells
IV/68 ₃ MP 917	Albert, D.G., et al. (1987, p. 253-255) MP 2419 Impact of wet snow on visible, infrared and millimeter wave	Developing a water well for the ice backfilling of DYE-2. Rand, J H., (1982, 19p.) SR 82-32
Landsat data for watershed management Cooper, S. et al. [1977, c150p.] MP 1114	attenuation. Bates, R E., et al, [1988, p 523-535]	Engineering geology studies on the National Petroleum Re-
Drainage network of a subarctic watershed. Bredthauer,	MP 2608 Overview of obscuration in the cold environment Berger,	serve in Alaska. Kachadoorian, R., et al. (1988, p.899-
S R., et al. (1979, 9p) SR 79-19	R.H., ct al. (1988, p.537-555) MP 2609	922 ₁ MP 2519 Wet snow
Drainage network analysis of a subarctic watershed. Bred- thauer, S.R., et al. [1979, p 349-359] MP 1274	SNOW IV field experiment data report. Wright, E.A. ed,	Thermodynamic deformation of wet snow. Colbeck, S.C.,
Watershed modeling in cold regions Stokely, J L., (1980,	(1989, 250p.) SR 89-14 Seismic/acoustic experiments at SNOW IV. Peck, L.	(1976, 9p) CR 76-46
241p.; MP 1471	(1989, p 155-157) MP 2646	Compression of wet snow. Colbeck, S.C., et al. (1978, 17p.) CR 78-10
Hydrology and climatology of a drainage basin near Fair- banks, Alaska Haugen, R K, et al. (1982, 34p.)	Theoretical estimates of light reflection and transmission by spatially inhomogeneous and temporally varying ice covers.	Difficulties of measuring the water saturation and porosity of
CR \$2-26	Perovich, D.K., (1990, p.45-49) MP 2729	snow. Colbeck, S.C., (1978, p.189-201) MP 1124 Regelation and the deformation of wet snow. Colbeck, S.C.,
Runoff from a small subarctic watershed, Alaska Chacho, E.F., et al, (1983, p.115-120) MP 1654	Weather	ct al. (1978, p 639-650) MP 1172
Forecasting river water temperatures Daly, S.F., (1988,	Review of sea-ice weather relationships in the Southern Hem- isphere. Ackley, S.F., (1981, p.127-159) MP 1426	Physical aspects of water flow through snow. Colbeck, S.C., (1978, p.165-206) MP 1566
p.180-188; MP 2500	Weather forecasting	(1978, p.165-206) MP 1546 Sintering and compaction of snow containing liquid water.
Wave propagation Surface-wave dispersion in Byrd Land Acharya, H.K.,	Midwinter temperature regime and snow occurrence in Germany. Bilelio, M.A., et al., (1978, 56p.) CR 78-21	Colbeck, S.C., et al. (1979, p.13-32) MP 1190
(1972, p 955-959) MP 992	Relationships between January temperatures and the winter	Compaction of wet snow on highways. Colbeck, S.C., [1979, p.14-17] MP 1234
Electrical ground impedance measurements in Alaskan per-	regime in Germany. Bilello, M.A., et al. (1979, p. 17-27)	Grain clusters in wet snow. Colbeck, S.C., [1979, p.371-
mafrost regions Hockstra, P., (1975, 60p) MP 10+>	MP 1218 Ice formation and breakup on Lake Champlain. Bates, R.E.,	314 ₁ MP 1267
Analysis of explosively generated ground motions usit.	(1980, p 125-143) MP 1429	Liquid distribution and the dielectric constant of wet snow. Colbeck, S.C., (1980, p.21-39) MP 1349
Fourier techniques Blouin, S.E., et al. (1976, 86p) CR 76-28	Current procedures for forecasting aviation icing. Tucker, W.B., (1983, 31p) SR 83-24	Introduction to the basic thermodynamics of cold capillary
Ground pressures exerted by underground explosions. John-	Frozen precipitation and weather, Munchen/Riem, West	systems. Colbeck, S.C., (1981, 9p.) SR 81-96 Mechanisms for ice bonding in wet snow accretions on power
son, P.R., [1978, p.284-290] MP 1520 Interaction of a surface wave with a dielectric slab discon-	Germany. Bilello, M.A., (1984, 47p) SR 84-32	lines. Colbeck, S.C., et al., [1983, p.25-30] MP 1633
tinuity. Arcone, S.A., et al., [1978, 10p] CR 78-08	Prediction of winter battlefield weather effects. Ryerson, C.C., et al, [1988, p 357-362] MP 2402	Impact of wet snow on visible, infrared and millimeter wave attenuation. Bates, R E., et al. (1988, p.523-535)
Hydraulic transients a seismic source in volcanoes and gla-	Weather modification	MP 2608
ciers St. Lawrence, W.F., et al. (1979, p 654-656) MP 1181	Use of compressed air for supercooled fog dispersal. Wein- stein, A.I., et al. (1976, p 1226-1231) MP 1614	Wettability
Ultrasonic investigation on ice cores from Antarctica	Weather observations	Seeking low see adhesion. Sayward, J.M., (1979, \$3p.; SR 79-11
Kohnen, H., et al., (1979, 16p.) CR 79-10 Ultrasonic investigation on ice cores from Antarctica.	Low pressure weather systems in and around Norwegian wa-	Water and air horizontal flow in porous media. Nakano, Y.,
Kohnen, H., et al. (1979, p 4863-4874) MP 1239	ters. Bilello, M.A., (1986, p.53-66) MP 2181 Weathering	(1980, p.81-85) MP 1341 Moisture gain and its thermal consequence for common roof
Analysis of plastic shock waves in snow Brown, R.L., r1979, 14p1 CR 79-29	Examining antarctic soils with a scanning electron micro-	insulations. Tobiasson, W., et al. (1920, p 4-16)
[1979, 14p] CR 79-29 Traveling wave solutions of saturated-unsaturated flow	scope. Kumai, M., et al. (1976, p. 249-252) MP 931 Antarctic soil studies using a scanning electron microscope	MP 1361 Roof moisture surveys Tobiasson, W., et al. [1981, 186.]
through porous media Nakano, Y., [1980, p 117-122]	Kumai, M., et al. (1978, p.106-112) MP 1386	SR 81-31
MP 1278 Low frequency surface impedance measurements. Arcone.	Weatherproofing	Wetting fronts in porous media Nakano, Y., (1983, p.71- 78; MP 1720
S.A., et al. (1980, p.1-9) MP 1280	Window performance in extreme cold Flanders, S.N., et al., [1981, p. 396-408] MP 1393	Wind direction
Analysis of non-steady plastic shock waves in snow Brown, R.L., (1980, p. 279-287) MP 1354	Window performance in extreme cold Flanders, S.N., et al.	Role of plastic tee interaction in marginal see Jone dynamics.
R.L., (1980, p. 279-287) MP 1354 Propagation of stress waves in alpine snow. Brown, R.L.,	(1982, 21p.) CR 82-38	Lepparanta, M., et al. (1935, p.11,899-11,909) MP 1544
(1980, p. 235-243) MP 1367	Roofer: a management tool for maintaining built-up roofs. Bailey, D.M., et al., [1989, p.6-10] MP 2488	WIND FACTORS
Dynamic testing of free field stress gages in frozen soil. Atken, G W., et al. (1980, 26p) SR 80-30	Weddell Sea	Heat exchange at the ground surface. Scott, R.F., 1964, 49p, plus append; M.H-Al
Traveling wave solution to the problem of simultaneous flow	Sea ice studies in the Weddell Sea region aboard USCGC Button Island — Ackley, S.F., (1977, p.172-173)	49p. plus append; M. II-AI Blowing snow Mellor, M., (1965, 79p.) M. III-AIc
of water and air through homogeneous potous media Nakano, Y., [1981, p.57-64] MP 1419	MP 1014	Climatology of the cold regions of the northern hemophere,
Distortion of model subsurface radar pulses in complex die-	Primary productivity in sea ice of the Weddell region. Ack- ley, S.F., et al., [1978, 17p.] CR 78-19	II Wilson, C., (1969, 155p.) M I-A36 Wind factors
lectrics. Arcone. S.A., [1981, p.355-264] MP 1472	Sea ice and ice algae relationships in the Weddell Sea. Ack-	Viscous wind-driven circulation of Arctic sea see. Hibler,
On zero-inertia and kinematic waves Katopodes, N.D., [1982, p.1381-1387] MP 2053	ley, S.F., et al. (1978, p.70-71) MP 1203	WD, III, et al. (1977, p.95-133) MP 983
Review of the propagation of inelastic pressure waves in snow	Standing crop of algae in the sea see of the Weddell Sea region Ackley, S.F., et al., (1979, p.269-281) MP 1242	leing and wind loading on a simulated power line. Greyon, JW., et al., §1956, p. 23-27; MP 2206
Albert, D.G., [1933, 26p.] CR #3-13	Mass-balance aspects of Weddell Sea pack-see Ackley, S.F.	Predicting freezing design depth of sledge-freezing beds.
SNOW-ONE-B data report Bates, R.E., ed., (1983), 284p; SR 83-16	(1979, p. 191-405) MP 1286 Continuum sea ree model for a global climate model Ling.	Martel, C.J., (1988, p.145-156) MP 2461 Effect of see pressure on marginal see rone agrainnes. Flato,
Optical engineering for cold environments. Aitken, G W.,	C.H., et al. (1980, p. 187-196) MP 1622	GM, et al. (1959, p.514-521) MP 2522
ed, (1983, 225p) MP 1646 Radar wave speeds in polar glacters	Sea see studies in the Weddell Sea aboard USCGC Polar Sea Ackley, S.F., et al., (1980, p.84-96) MP 1431	Wind-generated polynyas off the coasts of the Bering Sea- islands. Koro, T.L., et al. (1990, p.126-132)
(198), p.199-208) MP 2057	Ackley, S.F., et al. (1980, p.84-96) MP 1431 Sea-ice atmosphere interactions in the Weddell Sea using	MP 2734
Comparative near-millimeter wave propagation properties of	drifting bueys Ackley, S.F., [1981, p.177-191]	Wind (meteorology)
snow or rain Nemarich, J., et al., (1983), p.115-129; MP 1690	MP 1427 Observations of pack ace properties in the Weddell Sea	Review of sea-see weather relationships in the Southern Hem- tiphere Ackley, S.F., [1981, p. 127-159; MF 1426
Modeling rapidly varied flow in tailwaters Ferrick, M.G., et	Ackley, S.F., et al. (1982, p. 105-106) MP 1608	Wind pressure
al, (1984, p. 271-289; MP 1711 Snow-Two/Smoke Week, VI field experiment place. Red-	Physical, chemical and biological properties of winter sea see in the Weddell Sea Clarke, D.B., et al., (1982, p. 107-	Model study of Port Huron see control structure, wind stress simulation. Sodin, D.S., et al. (1982, 27p.)
field, R.K., et al., (1984, 85p.) SR 84-19	10% MP 1649	CR 12-09
SNOW-TWO data report Volume 2 System performance Jordan, R., ed., §1984, 417p.; SR 84-20	Atmospheric boundary layer measurements in the Weddell Sea Andreas, E.L., (1982, p. 113-115) MP 1610	Sea see model in wind forcing fields - Tucker, W. B., p1983, 110.3 - CR 83-17
Pulse transmission through frozen silt. Arcone, SA,	Properties of sea see in the coastal rones of the polar oceans	Some umple concepts on word forcing over the marginal see
[1984, 9p.] CR 84-17	Weeks, W.F., et al. (192), p.25-41; MP 1604	tone Tucker, W. R., [1984, p. 43-48] MP 1783
fried del	•	

lo, accretion and aerodynamic loading of transmission lines. Egelaofer, K.Z., et al. (1987, p.103-109) MP 2279
Wand tennels Les accretion under natival and laboratory conditions. Itaga- li, K., et al., 1985, p.225-228; MP 2009
Concentration and firm of wind-blown snow. Mellor M., et al. (1986, 16p.) SR 66-11
Natural rotor icing on Morat Washington, New Hampel ire, Itagahi, K., et al. (1924, 62p.) CR 36-18
Heat transfer performance of commercial thermospythom with inclined exportator sections. Haynes, F.D., et al.
(1988, p.275-280) MP 2326 Wind velocity
Snow loads on structures. O'Rourke, M.J., (1978, p.812-428) MP 1841
lee arching and the drift of pack ice through channel. Sod- hi, D.S., et al. (1978, p.415-432) MP 1136
Surface mitteorology US/USSR Weddell Polynya Expedition, 1981. Andreas, E.L., et al. (1983, 32p.) SR 83-14
Role of plastic ice interaction in murgical ice zone dynamics. Leppdranta, M., et al. (1985, p.11,899-11,909)
MP 1544 Spectra and cospectus of atmospheric turbulence over snow.
Andreas, E.L., (1986, p.219-233) MP 2661
saew and icc. Andress, E.L., (1967, p. 159-154)
Spectral measurements in a disturbed boundary layer over seow. Andreas, E.L., (1987, p. 1912-1934). http://dx.doi.org/10.1012-1934.
Windows Infrared thermography of buildings. Musia, R.H., et al.
(1977, 17p.; SR 77-29 Infrared thermography of buildings: 1977 Coast Grard ser-
vey, Marshall, S.J., (1979, 40p.; SR 79-20 Window performance in extreme cold. Flanders, S.N., et al.
(1981, p.396-458) MP 1393 Window performance in extreme cold. Fileders, S.H., et al.
(1982, 21p.) CR 82-36 Winter
Comparative studies of the winter charact at selected loca- tions in Europe and the United States. Sales, R.E., et al. (1989, p.283-293) MP 2996
(1989, p.283-293) MP 2996 Sensocal distribution of low flow events in New Hampshire
streams with emphasis on the wieter period. Melloh, R.A., [1990, p.47-53] MP 2441
Winter contreting Coments for structural concrete in cold regions. Jobsoca, R.,
[1977, 13p.] SR 77-35 Regulated set concrete for cold weather construction.
Sories, E.H., et al. (1980, p.291-314) MP 1359 Cold weather construction motorists; Part 2—Regulated-set
consent for cold weather concreting, field visible on all laboratory term. Housian, E.J., et al., 1981, 139, MP 1444
Britisment of reinispered concrete structures under metre over
ditions. Kreckle, L., et al. (1995), 22 + 14p.; MP 1969 Antilicent alloint area for cold weather concerning. Prefixi-
mary test resolut. Eochicere, C.L. et al. (1990, \$4) MP 2742
Winter maintenance Winter maintenance research needs. Massh, L.D., 1975.
p.34-35; NeP 956 Read communication and manufementary problems in control Abs-
La. Chris, E.F., et al., (1976, 1891; SR 1648; Saow removal equipment. Minds, L.D., (1991; p. 641-672;
317 5446
Some and for created an embash, beginning and superior. Missle, L.D., et al. (1981, p.57), 764, 31P 1847. Strangers for white absolutioned at promptes and crad-
ways. Missle L.D., et al. 1824, p. 555-167; MP 1964
Wister operation Data acquiscion for refragerated physical model. Zotest.
JE_11927, p.332-341; 34P 2551 Wood for friction
Str friction and thermal imposes: Warren, G.C., et al., (1992, p.223-223). MP 2745
Wooden structures Air-insuspectable Argue weaden shelters - Shindary S.N., et -
al (1991, p. 115-197) MF 1994 Weedstane each and measure - Telegraph W., (1994,
7.33-37; 3.57 2344 X ray analysis
Florensk tradject of an enjoyed rocket and amount Konnel, M., (1917, Sp.) Mr. 1191
Note memoritant of the pr firstly in sec. Institute, 1974, 1984.
New photograph of the feets from of interne sel. Alagues, S., (1992, 1995) 68, 49-65
X ray diffraction Effect of X-ray stradionary as monthly fraction and believing
reasonactor land a cost 1922 a constitu
Yes As raises which provide counts received regard to
rich Ange G. et al. 1894, 1894, CR 16-48